Detailed Site Investigation

Elwood Foreshore, Elwood, Victoria

Prepared for:
City of Port Phillip

9 April 2021

Distribution

Detailed Site Investigation,
Elwood Foreshore, Elwood, Victoria

9 April 2021

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Executive Summary

Senversa Pty Ltd was engaged by the City of Port Phillip (Council) to undertake a Detailed Site Investigation (DSI) at the Elwood Foreshore (the site). The site comprises an approximate area of 145,000 m^2 and is currently occupied primarily by public open space, a kindergarten, a restaurant, and various sports clubs with limited car park facilities. The site location and investigation boundary are defined within **Figure 1**.

In 2020, Atma Pty Ltd (Atma) completed a Preliminary Site Investigation (PSI) and Detailed Site Investigation (DSI) for the northwest portion of the site (known as the Stage 1 area), where various building and infrastructure upgrade works are proposed. These investigation works identified elevated concentrations of polycyclic aromatic hydrocarbon (PAH) concentrations that were determined to have the potential to extend into the southeast portion of the Elwood Foreshore (known as the Stage 2 area).

Senversa understands that building and infrastructure upgrade works for the broader Elwood foreshore will extend into the Stage 2 area, and a DSI was requested for the Stage 2 area to gain an understanding of the soil contamination status and further inform Council's business feasibility study and Master Development Plan for the broader Elwood Foreshore. A site-specific human health risk assessment (HHRA) was also requested to further assess the potential health risk to site users from the identified PAH impacts across both the Stage 1 and Stage 2 areas (the site).

The objectives of the DSI were to:

- Assess the contamination status of the Stage 2 area through the completion of a soil investigation.
- Produce a consolidated DSI report for the entire Elwood Foreshore area summarising the results of the investigations in both the Stage 1 and Stage 2 areas.
- Complete a site-specific human health risk assessment (HHRA) to further assess the potential health risk to existing and future recreational land users and park maintenance / construction workers.

The consolidated soil investigation works completed by Senversa and previous assessments (Atma (2020), Greencap (2020), Landserv (2020)) can be summarised as follows:

- The Elwood Foreshore has been a public recreation reserve since prior to 1869, with a public garden reserve and an 11-acre rifle range. The rifle range was removed in 1907 and the Elwood Lifesaving Club was established in the former rifle range building in 1911. The majority of the southeast portion of the site has been recreation reserves since the 1930s. Wattie Watson oval appeared on historical aerials from 1942.
- The site is underlain by fill soils generally up to 1.1 m depth, however fill of at least 3.0 m thickness was encountered at one isolated location to the east of Wattie Watson Oval. Fill soils were generally observed to increase in thickness towards the southeast portion of the site (Stage 2 area). Natural soils consist of grey sand to low-high plasticity grey silty clay.
- An isolated asbestos cement sheet fragment was encountered at one intrusive location (SB29) but was not visible on the surface during the site works.
- The fill soils contain elevated metals (arsenic, copper, lead, nickel, zinc), TRH, benzo(a)pyrene and total PAH concentrations above terrestrial ecosystem objectives, which may adversely affect the growth of some sensitive plants and trees.
- The fill soils contain elevated PAH concentrations above generic human health screening objectives across the entire site, with particularly elevated concentrations observed in the former rifle range and current Wattie Watson Oval area (designated the "Soil Management Area", refer to **Figure 2** and **Figure 3**). The recent Senversa sampling was consistent with previous sampling conducted at the site.

The HHRA completed to further assess potential risks to human health from carcinogenic PAH in soils draws the following conclusions:

- Elevated B(a)P TEQ concentrations (up to a maximum of 410 mg/kg) were measured across the site, with the highest concentrations observed at depth (>0.2 m bgl) within the former rifle range and current Wattie Watson Oval, designated here as the "Soil Management Area". Although impacts are found across the site, the highest concentrations are limited to the Soil Management Area and are not present at the ground surface.
- There is the potential for unacceptable risks to recreational users of the site if they are exposed to soils at depth within the Soil Management Area. While exposure by these users is unlikely to occur in this area given the soils are located at depth (>0.2 m bgl), it is recommended that future exposure to soils in this area be managed with the preparation of a Soil Contamination Management Plan (SCMP) to ensure access to exposed soils by recreational users is limited.
- Health risks to recreational users of the site area (including sensitive users such as children) are assessed to be low and acceptable given the risk assessment of shallow soils (<0.2 m bgl).
- Health risks to construction workers during the development of the site are estimated to be low and acceptable, even when an individual receptor spends an extended period of time (8 hours/day, 5 days/week, for a full year) directly exposed to site soils, including deep soils (<0.2 m bgl) within the Management Area.
- Health risks to other receptors who may be exposed to soil contamination at the site (e.g. gardeners, intrusive maintenance workers) are also considered to be low and acceptable, as exposure frequency for these receptors is expected to be lower than the assessed construction worker receptors.

Based on the findings of the assessment, it is recommended that:

- A SCMP be prepared to document the nature and extent of soil impacts across the site and outline control measures to manage excavated soils and minimise exposure to site users during proposed infrastructure upgrade works, primarily focusing on the designated Soil Management Area. The SCMP should include, but not limited to:
    - Specific responsibilities and obligations of relevant parties in administering the SCMP.
    - Information on the nature and extent of the benzo(a)pyrene impacted soils, plus disclosure of site-specific HHRA.
    - Management and monitoring requirements for maintaining the existing grass cover and 200mm cover of shallower fill soils that pose a low and acceptable risk to the site users.
    - Management requirements that general handling of excavated soils, including use of PPE, dust suppression, stockpile management, and personal hygiene requirements.
    - Management of unexpected contamination, including odorous soil or asbestos debris.
    - Waste management requirements for surplus soils with consideration to the separate In-situ Soil Hazard Assessment report prepared for the site (Senversa, 2021). This includes segregation of fill soils from natural soils to minimise off-site disposal costs and optimise reuse potential.
- Proposed upgrade works within the designated Soil Management Area should look to raise site levels, so a more permanent cover system can be achieved that requires less ongoing maintenance (i.e. 0.5m cover system of hard standing surface). Soil excavated from depth (>0.2m) within the designated Soil Management Area are not considered suitable for reuse within the site, unless reused beneath permanent hardstanding surfaces or 0.5m of clean fill soils with a demarcation layer.
- While risks associated with soils (>0.2m depth) outside the Soil Management Area are assessed to be low and acceptable, it is recommended that if these soils are excavated and reused a suitable topsoil planting medium (e.g. 200mm) and grass be established over these soils. The reused soils should also be free of odours and inert waste.

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List of Acronyms

Acronym	Definition
ABC	Ambient background concentration
ACL	Added contaminant limit
ACM	Asbestos containing material
AHD	Australian Height Datum
AS	Australian Standard
BH	Borehole
BTEX	Benzene, toluene, ethylbenzene, xylenes
COC	Chain of custody
DSI	Detailed Site Investigation
EIL	Ecologically based investigation level
EPA	Environment Protection Authority (Victoria)
ESL	Ecological screening level
HIL	Health-based investigation level
HSL	Health screening level
LOR	Limit of reporting
LTV	Long term trigger values
m	Metre
m^3	Cubic metres
m AHD	Metres Australian Height Datum
m bgl	Metres below ground level
mg/kg	Milligrams per kilogram
mg/L	Milligrams per litre
MAH	Monocyclic aromatic hydrocarbon
MoE	Maintenance of Ecosystems
MW	Monitoring well
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
OCP	Organochlorine Pesticides

Acronym	Definition
OPP	Organophosphate Pesticides
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated Biphenyl
PID	Photo-ionisation detector
PSI	Preliminary Site Investigation
QA	Quality assurance
QC	Quality control
RPD	Relative percentage difference
SCMP	Soil Contamination Management Plan
SEPP	State Environment Protection Policy
SEPP PMCL	State Environment Protection Policy (Prevention and Management of Contaminated Land)
SEPP (Waters)	State Environment Protection Policy (Waters)
SVOC	Semi-volatile organic compound
TDS	Total dissolved solids
TPH	Total petroleum hydrocarbons
TRH	Total recoverable hydrocarbons
USEPA	United States Environment Protection Agency
µg/kg	Micrograms per kilogram
µg/L	Micrograms per litre
VOC	Volatile organic compound

1.0 Introduction

Senversa Pty Ltd was engaged by the City of Port Phillip (Council) to undertake a Detailed Site Investigation (DSI) at the Elwood Foreshore (the site). The site location and investigation boundary are defined within **Figure 1**.

1.1 Background

The site comprises an approximate area of 145,000 m^2 and is currently occupied primarily by public open space, a kindergarten, a restaurant, and various sports clubs with limited car park facilities.

In 2020, Atma Pty Ltd (Atma) completed a Preliminary Site Investigation (PSI) and Detailed Site Investigation (DSI) for the northwest portion of the site (known as the Stage 1 area), where various building and infrastructure upgrade works are proposed. These investigation works identified elevated concentrations of polycyclic aromatic hydrocarbon (PAH) concentrations that were determined to have the potential to extend into the southeast portion of the Elwood Foreshore (known as the Stage 2 area).

Senversa understands that building and infrastructure upgrade works for the broader Elwood foreshore will extend into the Stage 2 area, and a DSI was requested for the Stage 2 area to gain an understanding of the soil contamination status and further inform Council's business feasibility study and Master Development Plan for the broader Elwood Foreshore. A site-specific human health risk assessment (HHRA) was also requested to further assess the potential health risk to site users from the identified PAH impacts across both the Stage 1 and Stage 2 areas (the site).

For completeness, Senversa recommended that this DSI summarise the assessment results from both the Stage 1 and Stage 2 areas. The HHRA is provided in **Appendix A** to this report that can also be used as a standalone deliverable.

1.2 Objectives

The objectives of the DSI were to:

- Assess the contamination status of the Stage 2 area through the completion of a soil investigation.
- Produce a consolidated DSI report for the entire Elwood Foreshore area summarising the results of the investigations in both the Stage 1 and Stage 2 areas.
- Complete a site-specific human health risk assessment (HHRA) to further assess the potential health risk to existing and future recreational land users and park maintenance / construction workers.

1.3 Scope of Works Completed

To satisfy the above objectives, the following scope of work was completed:

- A review of the previous PSI report (Atma, 2020) as well as subsequently provided soil investigation reports for Wattie Watson Oval (Landserv, 2020) and a small area near adjacent to the beach reserve (Greencap, 2020) to gain an understanding of potential contamination sources within the site.
- An inspection of the site to identify visible evidence of potential contamination sources, record current site infrastructure, site surface cover, surrounding land uses, topography and surface water drainage infrastructure.

- An intrusive soil investigation at the Stage 2 area, including:
    - Collection of soil samples from 32 grid-based locations.
    - Laboratory analysis of selected soil samples by laboratories accredited by the National Association of Testing Authorities (NATA) for the analytical methods used, including polycyclic aromatic hydrocarbon (PAH) bioaccessibility testing at the University of South Australia Centre for Environmental Risk Assessment and Remediation (CERAR).
- Collation of interpretation of data, including a quality assurance / quality control (QA/QC) data validation process.
- Completion of a human health risk assessment (HHRA) for carcinogenic PAHs identified during the soil assessment works at both the Stage 1 and Stage 2 areas (provided under separate cover, included as **Appendix A**).
- Preparation of this report detailing the findings of the assessment.

2.0 Background Information

2.1 Previous Assessments

Various previous assessment reports have been completed at the Elwood Foreshore, as list below:

- Noel Arnold, *Letter Re: Waste classification Information – Elwood Park sports Pavilion*, 26 May 2009.
- City of Port Phillip, *Letter Re: 63b Ormond Esplanade, Elwood – Soil Assessment*, 23 November 2010.
- Landserv, *Preliminary Soil Contamination Assessment*, *Elwood Public Space, 63B Ormond Esplanade*, 10 March 2017.
- Landserv, *Re: Elwood Foreshore Precinct, Elwood Soil Contamination Assessment and Soil Management Plan,* 16 June 2017.
- Landserv, *Re: Elwood Foreshore Precinct, Ormond Road, Elwood Summary of Disposal of Category B Contaminated Soil*, 10 July 2017.
- Landserv, *Soil Management Plan, Elwood Foreshore Precinct,* 25 July 2017.
- Atma Environmental, *Preliminary Site Investigation: Elwood Foreshore Area,* 01 April 2020.
- Atma Environmental, *Detailed Site Investigation: Elwood Foreshore Redevelopment*, 06 August 2020.
- Landserv, *Environmental Assessment at Wattie Watson Oval, Elwood Park, Elwood Victoria*, 29 September 2020.
- Greencap, *Soil Contamination Assessment, Elwood Fitness Station, Elwood Beach, Victoria,* October 2020.

These assessments primarily focussed on the Elwood Foreshore area immediately north of the site, however the DSI (Atma, 2020) covered the Stage 1 area and the assessments at Wattie Watson Oval (Landserv, 2020) and the small assessment at the Elwood Fitness Station (Greencap, 2020) fall within the Stage 2 area. The sections below summarise the site environmental setting and historical use of the site, based on the information provided within the Stage 1 area DSI (Atma, 2020).

2.2 Site Details

The relevant details that describe the site are summarised in **Table 1.1** below.

Table 1.1: Site Details

Item	Relevant Site Information
Site Address	Elwood Foreshore, Victoria
Current Site Owner	City of Port Phillip
Current Land Use Zoning and Overlays	Public Park and Recreation Zone - (PPRZ).
Site Area	Approximately 14.5 hectares (ha)
Municipality	City of Port Phillip

Item	Relevant Site Information
Current Use	The site's main use has been for recreation, sport and public uses. Current site features include: • Sporting club house (for cricket/football/soccer clubs) in the centre of the sport fields. • Cricket practice nets next to Wattie Watson Oval. • Buildings adjacent to the beach reserve including the Elwood Life Saving Club and a restaurant. • A tennis court and children's playground alongside Ormond Esplanade. • Buildings in the north west corner of the site including a kindergarten and the Elwood Sailing and Angling Clubs. • Elwood Croquet Club in the south east corner of the site.
Surrounding Land Use	• **North:** Ormond Esplanade followed by residential housing. • **South**: Beach reserve followed by Port Phillip Bay, residential on the south side of Head Street. • **East:** Residential followed by Elsternwick Park (public open space). • **West:** Beach reserve followed by Port Phillip Bay.

2.3 Environmental Setting

The environmental setting of the site, gathered from the site inspection, previous assessment works and/or online sources is summarised in **Table 2.1** below.

Table 2.2: Environmental Setting

Item	Relevant Site Information
Topography and Drainage	The site area is generally flat, with several raised areas surrounding Wattie Watson Oval, the sports club rooms and north of the croquet club. Garden plantings surround the site along Ormond Esplanade and Head Street, including Head Street Reserve in the southeast portion of the site. Stormwater gardens and open stormwater drains are found in the plantings adjacent to car parking areas across the site. Surface water runoff is mostly expected to infiltrate into the ground surface in unpaved areas or be captured in local stormwater drainage lines. Regionally, drainage occurs towards the car parks and beach to the west.
Nearest Surface Water Bodies	The nearest surface water bodies to the site include: • Port Phillip Bay, immediately west of the site. • Elsternwick Park lake, approximately 150 m northeast of the site. • Elster Creek, approximately 550 m north east of the site
Regional Geology	A review of the 'Melbourne' map sheet (1:250,000) from the Geological survey of Victoria shows that the regional geology comprises Quaternary sand or gravel of fluvial origin. Previous investigation works at the site noted that the site was generally underlain by fill of depths between 0.1 m and 1.1 m below ground level (bgl). The current investigation also typically found fill across the site of depths between 0 and 1.1 m bgl, however one location (SB20) featured fill down to at least 3.0 m bgl.
Regional Hydrogeology	Based on the State Government Victoria – Department of Environment, Land, Water and Planning (DELWP) information, groundwater in the region has a typical Total Dissolved Solids (TDS) of between 1,000 mg/L and 3,500 mg/L, which would classify the groundwater within Segments A2 to C under the State Environment Protection Policy (Waters), 2018 (SEPP (Waters)). Three groundwater wells were installed by Atma in 2020 during the investigation of the Stage 1 area. Groundwater was gauged at depths of 2.2-3.8 m bgl. Groundwater flow direction is presumed to be in the direction of Port Phillip Bay (south west). TDS was measured in MW02 at 2,600 mg/L. TDS at the other two wells on the adjacent site was measured at very high concentrations and assumed to be influenced tidal seawater influences from the bay. There are 46 registered groundwater bores within a one km radius of the site, 19 for groundwater investigations, 13 for domestic and stock purposes and 14 where the purpose is unknown. The depths of these bores range between 5 to 60.1 m bgl.

Item	Relevant Site Information
Evidence of Potential Imported Fill	Evidence of potential imported fill soil observed during the works included one stockpile approximately 1,000 m3 to the north of the croquet club (east corner of the site). This stockpile comprised silty sand and was covered with grass. Information from Council indicated that the stockpile was from the resurfacing of the northern soccer field.

2.4 Historical Site Usage

The Elwood Foreshore has been a public recreation reserve since prior to 1869, where an early parish plan indicates the existence of a public garden reserve and an 11-acre rifle range. The rifle range around Head Street was removed in 1907 and the Elwood Lifesaving Club was established in the former rifle range building in 1911, before moving to a permanent location in 1918. A number of sporting and recreation clubs built premises or were headquartered at the foreshore from the early 20th Century, including the Elwood Sea Canoe Club (later renamed the Elwood Sailing Club) (1916), a lawn bowling club (1925), a sea bathing pavilion (1928), tennis courts (c. 1931), croquet club (c. 1937) and an angling club (c. 1939). Most of these structures were demolished and moved or rebuilt after WWII.

The majority of the eastern portion of the site has been recreation reserves since the 1930s. Wattie Watson oval appears on historical aerials from 1942, with an outbuilding appearing next to the oval in 1963. The former Surf Lifesaving Club building in the southwest section of the site was demolished in the early 1970s and the club moved to the present site in the western section of the site. The sport club rooms adjacent to Wattie Watson oval appear in aerials from 1982 onwards and a significant renovation looks to have been done prior to 2014.

An image from the Melbourne Metropolitan Board of Works plan from 1911 showing the rifle range is reproduced in **Figure 2-1** below. The dark grey section near the beach indicates the target end of the rifle range.

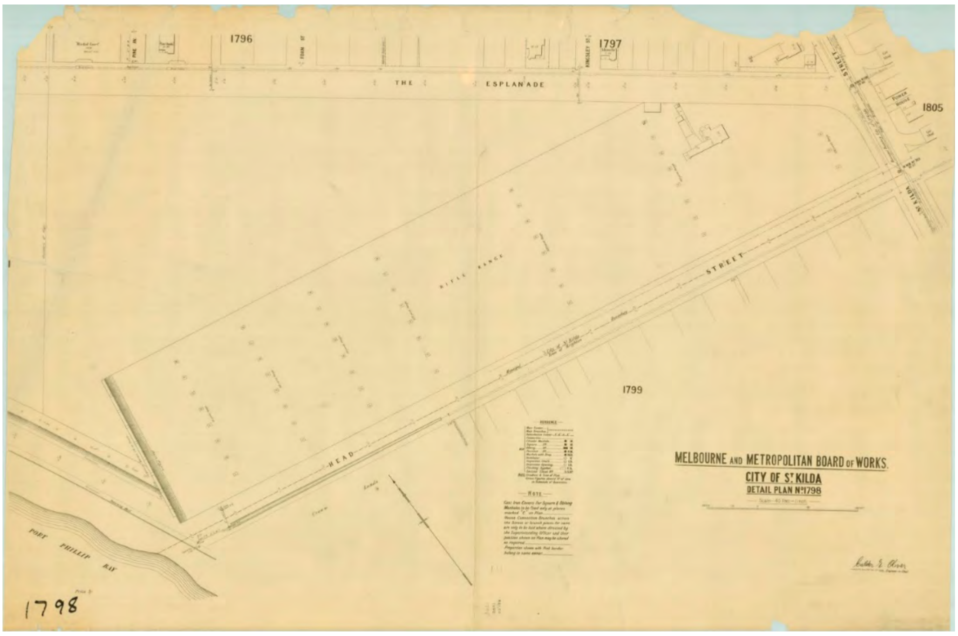

Figure 2-1. Melbourne Metropolitan Board of Works plan from 1911 showing the historical rifle range. Dark grey section near Port Phillip Bay indicates the target end of the rifle range.

2.5 Previously Identified Contamination

A soil investigation in the Stage 1 area was undertaken by Atma in July/August 2020 (BH01 to BH36), and further sampling to support a Human Health Risk Assessment was undertaken by Senversa in December 2020 (SB01 to SB06). In the Stage 2 area, a soil investigation was completed at Wattie Watson Oval by Landserv in September 2020 and additionally at the location of a proposed fitness station at Elwood Beach by Greencap in October 2020. Refer to **Figure 1** for these sample locations.

Fill soils were found at most borehole locations up to depths generally ranging between 0.1 and 1.1 m below ground level (bgl). A number of analytes were identified at concentrations exceeding health-based investigation levels. Very high concentrations of carcinogenic polycyclic aromatic hydrocarbon (PAHs) were found within fill soils (typically at depths of >0.2 m bgl) near the target area of the former rifle range and at Wattie Watson Oval including concentrations of Benzo(a)pyrene toxic equivalents (B(a)P TEQ) up to 150 mg/kg, total PAHs up to 1,324 mg/kg, as well as sporadically elevated impacts across the rest of the site (B(a)P TEQ up to 22 mg/kg, Total PAHs up to 97 mg/kg and TRH >C16-C34 up to 9,500 mg/kg).

3.0 Fieldwork Program

3.1 Relevant Guidelines and Standards

The field investigations undertaken by Senversa for the Stage 2 area and HHRA were completed in general accordance with relevant elements of the following guidelines and standards:

- EPA, 2009. *Industrial Waste Resource Guidelines (IWRG): Soil Sampling, Publication IWRG701*. EPA Victoria, June 2009.
- NEPC, 2013. *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1), Canberra*. National Environment Protection Council, 2013.
- Standards Australia, 2005. *Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil, Part 1: Non-Volatile and Semi-Volatile Compounds*, *Australian Standard: AS4482.1-2005*.
- Standards Australia, 1999. *Guide to the Sampling and Investigation of Potentially Contaminated Soil. Part 2: Volatile Substances, Australian Standard: AS4882.2-1999*.

3.2 Investigation Rationale

The soil investigations involved the completion of the following works:

- 6 targeted soil bores in the Stage 1 area to obtain samples for PAH bioaccessibility testing as part of the HHRA.
- 32 grid-based and targeted soil bore locations, providing a broad coverage across the site, as well as targeting areas of interest identified after review of the previous environmental reports and historical aerials. Exact locations were based on accessibility.
- Further excavation at two selected targeted locations to obtain samples for PAH bioaccessibility testing as part of the HHRA (**Appendix A**).

Figure 1 shows the sample locations completed during the works. Groundwater was not further assessed, based on the findings of the Atma DSI (2020) which did not identify detectable PAH concentrations in groundwater.

3.3 Fieldwork Methodology

The methodology undertaken during the fieldworks program is summarised in **Table 3.1** below.

Table 3.1: Fieldwork Methodology

Activity	Item	Description
Intrusive Soil Investigation	Date/s	8 December 2020, 12 - 13 January, 2 February and 5 March 2021
	Methods	The soil bore locations advanced via hand auger technique until either 1 m or natural soils were reached, or until refusal (multiple locations) was encountered. Select soil bores were hand excavated using a shovel to a depth of between 0.4 and 0.5 m bgl. This was to ensure enough soil was collected for bioaccessibility samples. A further 9 locations were further advanced by solid flight auger technique in order to obtain deeper fill or natural soil samples. Soil samples were collected from within each distinct fill horizon and the natural soil profile (if reached), targeting any visual or olfactory signs of contamination. The soil bores were then reinstated using excavated spoil and compacted using a crowbar until level with the existing surface.

Activity	Item	Description
	Soil Classification and Logging	Lithological conditions were logged according to Senversa's standard field protocols using a modified version of the Unified Soil Classification System. Soil classification is based on field observations and only intended to provide a general indication of the soil characteristics encountered. The classifications should not be relied upon for geotechnical purposes and have not been confirmed by geotechnical testing or particle size distribution analysis. The stratigraphy encountered during the drilling is detailed on the logs within **Appendix B**, summarised in **Section 5.1** and select photographs are presented as **Appendix C**.
Sample Handling and Preservation	Procedure	Samples were collected immediately and placed into laboratory-supplied jars and stored in a cooler box with ice prior to and during transit to the laboratory. Samples were transported to the laboratory with accompanying chain of custody (COC) documentation and laboratory provided security seals. Details of the sample transportation and handling can be found on the COC and laboratory documentation provided within **Appendix D**.
Avoidance of Cross Contamination	Procedure	Procedures employed to prevent cross contamination included: • The hand auger was decontaminated between each location using a water and Decon 90 solution, followed by a clean water rinse. • Disposable gloves were replaced between each soil sample collected.

3.4 Laboratory Analysis

The primary laboratory used for the soil analysis was Eurofins and the secondary laboratory used was ALS Environmental Laboratories Pty Ltd. Oral and dermal bioaccessibility testing on select samples was conducted at the Future Industries Institute of the University of South Australia. Selected soil samples were analysed for a broad suite of analytes or primary contaminants of concern (e.g. PAHs), as summarised in **Table 3.1** below.

Table 3.2: Laboratory Analysis

Matrix	Analytes
In-situ Soil	Analysis of primary fill samples for the following: • 15 primary samples for IWRG621 broad screen of analytes*. • 37 primary samples for TRH, PAH and IWRG metals*. • 11 primary samples for PAH. • 3 primary samples for Cation Exchange Capacity. • 3 primary samples for Soil Aggressivity Suite (pH, EC, Cl, resistivity, SO4). • 1 primary sample for Asbestos in Building Material. Analysis of primary natural samples for the following: • 5 primary samples for TRH, PAH and IWRG metals*. Analysis of field and secondary duplicate QC samples for the following: • 6 duplicate samples for TRH, PAH and IWRG metals*. • 2 duplicate samples for PAH. Analysis of select fill samples (after receipt of initial analytical results) for the following: • 5 primary samples for Oral and dermal PAH bioaccessibility.

*Vic EPA IWRG621 Screen: IWRG metals (arsenic, cadmium, total chromium, copper, lead, mercury, molybdenum, nickel, selenium, silver, tin, zinc), TPH, MAH, PAH, OCC, OCP, PCBs, Cyanide, Fluoride (Tot), Phenols, Vol & Semi Vol Chlorinated Hydrocarbons.

The laboratory certificates of analysis and accompanying chain of custody information are provided in **Appendix D**. Laboratory reporting for the bioaccessibility testing is contained within the HHRA report provided in **Appendix A**.

Additional leachability analysis was also undertaken to confirm the waste category of the soils. These results are provided and discussed within a separate In-situ Waste Categorisation Assessment report (Senversa, 2021). These results confirmed that the mobility of the PAHs in soils is low and does not pose an unacceptable groundwater pollution risk.

3.5 Quality Assurance and Quality Control

The data QA/QC procedures were adopted by Senversa to provide a consistent approach to evaluation of whether the data quality objectives of the project have been achieved. The process focused on assessment of the useability of the data in terms of accuracy and reliability in forming conclusions on the condition of the elements of the environment being investigated. The approach was generally based on guidance from the following sources:

- Australian Standard AS4482.1 - *Guide to the investigation and sampling of sites with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds* (2005).
- NEPC, 2013. National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1): Schedule B3 Guideline on Laboratory Analysis of Potentially Contaminated Soils, Canberra: National Environment Protection Council.
- United States Environmental Protection Agency *(USEPA) - Guidance on Systematic Planning Using the Data Quality Objectives Process EPA QA/G-4* (2006).
- USEPA - *Guidance on Environmental Data Verification and Data Validation EPA QA/G-8* (2002).

Documentation of the data QA/QC assessment is presented within **Appendix E**. The majority of the results conformed to acceptance criteria and the data was considered to be representative of chemical concentrations in the environmental media sampled and therefore considered suitable for their intended purpose in assessing the contamination status of soil at the site.

4.0 Adopted Assessment Criteria

The following section outlines the regulatory framework under which contamination is assessed and managed in Victoria and specifies relevant objectives and/or investigation levels which have been adopted for initial assessment of whether pollution is present at the site.

4.1 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.

4.2 Protected Beneficial Uses of Land

As discussed in **Section 2.2**, the site is currently public open space. The recreation reserves and associated car parks are actively used.

The site is proposed to be redeveloped while maintaining the public open space use. In accordance with the SEPP (PMCL) the protected beneficial uses of land used for recreation / open space use are the following:

- Maintenance of modified / highly modified ecosystems.
- Human health.
- Buildings and structures.
- Aesthetics.

4.3 Soil Quality Objectives

Soil quality objectives (also commonly referred to as investigation levels) for the protected beneficial uses of land were adopted in accordance with Table 2 of the SEPP (PMCL) and are detailed in **Table 4.1** below.

Table 4.1: Soil Quality Objectives

Beneficial Use	Adopted Soil Quality Objectives / Investigation Levels
Maintenance of Ecosystems (Highly Modified)	The SEPP (PMCL) states that the level of a chemical substance or waste (indicator) must not be greater than any regional Ecological Investigation Level (EIL) developed in accordance with the *National Environment Protection (Assessment of Site Contamination) Measure* (‘the NEPM”; NEPC, 2013), or until such time that a regional EIL applicable to the site is published, the Interim Urban EILs nominated in the NEPM. The current version of the NEPM (NEPC, 2013) specifies the following ecologically based investigation and/or screening levels: • Default EILs for arsenic, lead, DDT and naphthalene. • A methodology for derivation of site-specific EILs for nickel, chromium III, copper and zinc. The derivation process requires determination of ambient background concentrations (ABC) and added contaminant limits (ACLs) for these chemicals, and the EIL is then calculated as the ABC plus the ACL. • Ecological screening levels (ESLs) for benzene, toluene, ethylbenzene, xylenes (BTEX), benzo(a)pyrene and petroleum hydrocarbon fractions. The EILs and ESLs have been developed for three generic land use settings, based on a range of species protection levels: • Areas of ecological significance (99% species protection). • Urban residential and public open space (80% species protection). • Commercial and industrial (60% species protection). Based on the current and foreseeable future recreational / public open space land use at the site, EILs/ESLs for recreational / open space have been adopted. For initial screening purposes, EILs for nickel, chromium III, copper and zinc have been derived for aged soils based on adoption of conservative screening assumptions regarding soil properties, as follows: • EILs were calculated as the sum of the ambient background concentration (ABC) and the added contaminant limit (ACL). • ABCs were assumed to be the default (most conservative) values for aged soils with low traffic. • ACLs were assumed to be the minimum (most conservative) values specified in Table 1B(1) to 1B(4) within NEPC (2013) Schedule B1.
Human Health	The SEPP (PMCL) states that the level of a chemical substance or waste must not be greater than the investigation level specified for human health in the NEPM. Schedule B(1) of the current version of the NEPM (NEPC, 2013) provides a range of investigation levels for the protection of human health, referred to as Health-based Investigation Levels (HILs), and provides Health Screening Levels (HSLs) for BTEX and petroleum hydrocarbons. HILs and HSLs are provided for four generic land use settings as follows: • HIL/HSL A – Residential with garden/accessible soil (home-grown produce contributing less than 10% of vegetable and fruit intake; no poultry). This category also includes children’s day-care centres, kindergartens, preschools and primary schools. • HIL/HSL B – Residential with minimal opportunities for soil access. Includes dwellings with fully and permanently paved yard space such as high-rise apartments and flats. • HIL/HSL C – Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. It does not include undeveloped public open space (such as urban bushland and reserves) which should be subject to a site-specific assessment where appropriate. • HIL/HSL D – Commercial/industrial such as shops, offices, factories and industrial sites. It is emphasised within the NEPM that HILs are not intended for use as default remediation trigger criteria but are intended to prompt an appropriate site-specific assessment of risk when they are exceeded. This is consistent with Table 2 of the SEPP (PMCL), which allows for objectives derived using a risk-based methodology to be adopted in place of HILs. Based on the current and foreseeable future public open space land use(s) at the site, NEPM HIL/HSL C values have been used for comparison with reported soil conditions at the site. For chemicals for which HILs or HSLs are not specified in the NEPM, Regional Screening Levels (RSLs) published by the USEPA (USEPA, 2013) have been adopted. The release date of the screening levels adopted is dated May 2013. As relevant, ‘residential’ values have been adopted for assessment of residential and parkland/recreation land uses (Settings A, B and C), and ‘industrial’ values have been adopted for assessment of commercial and/or industrial land uses (Setting D).

Beneficial Use	Adopted Soil Quality Objectives / Investigation Levels
	With respect to the use of HSLs, the following is noted: • The HSLs in the NEPM (for TPH, BTEX and naphthalene) were derived with consideration of potential vapour exposure and consider a range of soil types and contamination depths. Friebel and Nadebaum (2011), who derived the HSLs currently adopted in the NEPM, also derived values for direct contact exposure, however these were not published in the NEPM. The HSL values adopted for this assessment were the lowest of those derived for vapour intrusion (published in the NEPM) or direct contact pathways (published by Friebel and Nadebaum, 2011) for the relevant land use(s). Where relevant, the most conservative of the vapour-based values (those derived for sand lithology and with contamination at depths of 0 to <1 m depth) were adopted. • The HSLs for BTEX and naphthalene (which are not saturation or solubility limited) are considered appropriate for use at sites where the source of contamination includes petroleum and/or non-petroleum-based activities (e.g. gas manufacture). However, the HSLs for TPH fractions have been derived for typical petroleum mixtures (petrol and diesel) and are not appropriate for assessment of non-petroleum contamination. Based on the source of TPH at the site, application of the TPH HSLs to the site is considered appropriate. It is also noted that the HSLs have been derived with consideration to potential vapour inhalation health risks, however the NEPC (2013) HILs and the USEPA (2013) RSLs have not. Therefore, where volatile contaminants are reported to be present in soils above laboratory detection limits, consideration of potential vapour intrusion risks may be warranted even where reported concentrations are below the adopted investigation levels, if the adopted investigation levels were sourced from NEPC (2013) or USEPA (2013). This is further discussed in **Section 5.4**.
Buildings and Structures	The SEPP (PMCL) states "*Contamination must not cause the land to be corrosive to or adversely affect the integrity of structures or building materials*". Relevant indicators are stated by the SEPP (PMCL) to be *"pH, sulphate, redox potential, salinity or any chemical substance or waste that may have a detrimental impact on the structural integrity of buildings or other structures."* Objectives for these key indicators have primarily been sourced from Australian Standard 2159–2009 *Piling Design and Installation*, in which levels of pH, chloride and sulphate which are considered to represent mild and/or non-aggressive conditions for concrete or steel piles are specified. The values adopted for initial screening (<5,000 mg/kg sulphate, pH >5 and <5,000 mg/kg chloride) are the most conservative of those reported in AS2159 for concrete and steel piles, and are considered to be associated with mild or non-aggressive conditions only where all objectives are met. Where one or more objective is not met, conditions may still be acceptable, but exposure conditions should be further evaluated in accordance with Tables 6.4.2(C) and 6.5.2(C) within AS2159. The potential for organic compounds (e.g. solvents or petroleum hydrocarbons) to corrode or adversely impact (e.g. permeate) non-metal underground services should also be considered, particularly where saturated concentrations or free phase product are in contact with buildings and/or structures.
Aesthetics	The SEPP (PMCL) states, "*Contamination must not cause the land to be offensive to the senses of human beings*". The aesthetic quality of soil is a subjective assessment and is discussed further in **Section 5.5**. With respect to asbestos-containing material (ACM), Senversa has adopted a criterion of 'no visible ACM' in surface soils (upper 10 cm).

5.0 Results and Findings

The section below presents the results and findings of the consolidated soil investigation works completed by Senversa and previous assessments (Atma (2020), Greencap (2020), Landserv (2020)). This has been used to evaluate the risk that contamination poses to the beneficial uses of land.

5.1 Generalised Soil Profile

Based on observations made during the consolidated soil investigations, a generalised site soil profile is summarised in **Table 5.1** below. Further information is provided in the lithological logs (**Appendix B**) and site photographs (**Appendix C**).

Table 5.1: Generalised Soil Profile

Lithology	Approximate Depth Range (m bgl)	Generalised Description
Surface Cover	Surface to 0.05	Organic material (grass, roots).
Fill Soils	0.05 to 1.1-1.7 (3.0 at one isolated location)	FILL: Silty SAND, medium to coarse grained, sub-rounded to sub-angular, poorly graded sand, low plasticity silt, trace gravel, brown, loose, moist.
Natural Soils	1.1-1.7 to 2.1 (max. depth of investigation into natural soils)	SAND: Fine to medium grained, sub-rounded to sub-angular, poorly graded, trace silt, grey, loose, moist to wet. Silty CLAY: Low to high plasticity, grey, firm, moist, near plastic limit.

5.2 Additional Field Observations

The following field observations were made during the soil investigation:

- Anthropogenic materials was observed within the majority of soil bore locations, which included brick fragments, glass, gasworks waste and ceramics in varying quantities.
- An isolated asbestos containing material (ACM) fragment was encountered at approximately 0.1 m bgl in SB29.
- Hydrocarbon odours were encountered in SB16.
- Natural soils were generally encountered at less than 1.0 m depth in the northwest portion of the site, however were deeper in the southeast portion of the site where hand auger refusal was encountered at most locations before 1.0 m depth. Further drilling at nine select locations identified natural soils at five locations between 1.3 and 1.7 m depth, however refusal was encountered at two locations at 1.8 m bgl on inferred anthropogenic gravel, and fill soils extended to 3.0 m bgl at SB20 (maximum depth of investigation).

5.3 Soil Analytical Results

Soil analytical results summarised below include all available data within the site (Stage 1 and Stage 2 areas), including the current Stage 2 area sampling program, the Stage 1 area DSI (Atma, 2020), the Wattie Watson Oval investigation (Landserv, 2020) and Elwood Fitness Station assessment (Greencap, 2020).

The soil analytical results (total concentrations) compared to relevant beneficial use criteria are provided in **Table 1**.

Laboratory certificates of analysis are provided within **Attachment D**, and lithological borelogs are provided within **Attachment B**. The ProUCL output for calculating the 95% UCL for specific analytes (where required) is provided within **Attachment F**.

Fill Soils

Reported analytical results for fill soils were below adopted urban residential / public open space investigation levels, with the exception of the following exceedances noted in **Table 5.1** below.

Table 5.2: Fill Soil Analytical Exceedences

Chemical	Adopted Ecological Criteria	Adopted Human Health Criteria	Samples Analysed	Number of Ecological Criteria Exceedences	Number of Health Criteria Exceedences	Concentration Range	Arithmetic Mean	Standard Deviation	95% UCL$_{ave}$[1]
Arsenic	100	300	168	1	-	<2 - 170	14.1	-	-
Copper	70	17000	168	10	-	<5 - *1500*	37.1	-	-
Lead	1130	600	168	1	5	<5 - ***1200***	133.5	175.3	160.4
Nickel	35	1200	168	19	-	<5 - *92*	20.6	-	-
Zinc	110	30000	168	61	-	<5 - *1500*	171.0	-	-
TRH >C16-C34 Fraction	300	5300	160	71	5	<50 - 9500	853.0	1413	766.2
B(a)P TEQ[2]	-	3	183	-	84	<0.5 - **410**	**20.5**	42.1	34.7
Total PAHs	-	300	183	-	9	<0.5 – **2,237.4**	128.1	289.2	882.8

NOTES:

All concentrations in mg/kg. Statistical analysis completed where chemicals exceeded health criteria at one or more locations.

BOLDED values exceed adopted human health criteria.

ITALICIZED values exceed adopted ecological criteria.

Underlined values indicate exceedance of statistical comparison measures in NEPC (2013), i.e. maximum concentration greater than 250% of adopted human health-based criteria or standard deviation greater than 50% of adopted human health-based criteria.

[1] 95% UCL$_{average}$ = 95% Upper Confidence Limit on average concentration. Calculated using ProUCL (Version 5.0). Value is that recommended by ProUCL based on distribution testing.

[2] B(a)P TEQ = Benzo(a)pyrene toxic equivalent concentration. This value is calculated from the concentrations of B(a)P and other carcinogenic PAHs based on toxic equivalency factors and reflects the cumulative toxic effect of these compounds. See further information within NEPC (2013).

Natural Soils

Reported analytical results for natural soils were all below adopted urban residential / public open space investigation levels.

6.0 Discussion

6.1 Soil Conditions

With regards to human health risk, the results show that with the exception of carcinogenic PAH (represented by the B(a)P TEQ), chemical concentrations exceeding the HIL were relatively marginal (less than 2.5 times the HIL) and not widespread (reported in only one or two samples). The 95% $UCL_{average}$ concentrations were below screening levels, further indicating that risks are likely to be low and acceptable when the overall concentrations to which site users are likely to be exposed are considered.

Reported B(a)P TEQ concentrations exceeded the HIL C by approximately 700% and exceedences were reported in 71% of analysed samples. The 95% $UCL_{average}$ concentration was also approximately 15 times above the screening level. These significant exceedences are predominantly attributed to PAH impacts observed within shallow soils at the western end of the Stage 2 area, within the footprint of the former rifle range target area and the current Wattie Watson Oval, where concentrations of PAHs were observed to increase with depth (refer to **Figure 2** and **Figure 3**).

The potential health risks associated with the identified concentrations of carcinogenic PAH were been assessed further as part of a human health risk assessment (HHRA), the results of which are summarised in **Section 6.2** below.

The metal impacts are considered to be associated with the variability in the fill profile and historical filling, rather than point source contamination. Elevated copper, nickel and zinc are considered typical of imported fill that is found throughout the inner south eastern suburbs of Melbourne.

A fragment of chrysotile asbestos cement sheet was found in SB29, but no further surface samples were found in the vicinity or across the site. Due to the sampling methodology undertaken (i.e. no test pit excavations have been completed) this does not rule out further asbestos being encountered across the entire site area at depth within the soil profile.

6.2 Site-Specific Human Health Risk Assessment

A screening assessment was conducted of all analytes identified in exceedance of the investigations levels for human health. Based on this screening assessment, the human health risks were considered to be low and acceptable for all analytes with the exception of carcinogenic PAH, which was assessed further as part of the HHRA (**Attachment A**).

The HHRA further assessed a pathway of direct contact with soils by recreational open space users. A key factor considered in the HHRA was the oral and dermal bioaccessibility of carcinogenic PAH, which was adjusted based on the results of site-specific bioaccessibility testing completed by the University of South Australia Centre for Environmental Risk Assessment and Remediation (CERAR); this testing indicated very low oral and dermal bioaccessibility of carcinogenic PAH in site soils.

The following conclusions were made in the HHRA:

- Elevated B(a)P TEQ concentrations (up to a maximum of 410 mg/kg) were measured across the site, with the highest concentrations observed at depth (>0.2 m bgl) within the former rifle range and current Wattie Watson Oval, designated herein as the “Soil Management Area”. Although impacts are found across the site, the highest concentrations are limited to the Soil Management Area and are not present at the ground surface.

- There is the potential for unacceptable risks to recreational users of the site if they are exposed to soils at depth within the Soil Management Area. While exposure by these users is unlikely to occur in this area given the soils are located at depth (>0.2 m bgl), it is recommended that future exposure to soils in this area be managed with the preparation of a Soil Contamination Management Plan (SCMP) to ensure access to exposed soils by recreational users is limited.
- Health risks to recreational users of the site area (including sensitive users such as children) are assessed to be low and acceptable given the risk assessment of shallow soils (<0.2 m bgl).
- Health risks to construction workers during the development of the site are estimated to be low and acceptable, even when an individual receptor spends an extended period of time (8 hours/day, 5 days/week, for a full year) directly exposed to site soils, including deep soils (<0.2 m bgl) within the Management Area.
- Health risks to other receptors who may be exposed to soil contamination at the site (e.g. gardeners, intrusive maintenance workers) are also considered to be low and acceptable, as exposure frequency for these receptors is expected to be lower than the assessed construction worker receptors.

6.3 Impact Assessment

The impact the identified contamination poses to the protected beneficial uses of land is assessed in **Table 6.1** below.

Table 6.1: Impact Assessment

Beneficial Use	Beneficial Use Potentially Precluded (Y/N)	Contamination Issue	Current and Proposed Use (Recreation/Public Open Space)
Maintenance of Ecosystems (Highly modified)	Y	Elevated arsenic, copper, lead, nickel, zinc, TRH (>C10-C16 Fraction), TRH (>C16-C34 Fraction) and benzo(a)pyrene and total PAH concentrations.	Slightly elevated concentrations of metals (arsenic, copper, lead, nickel and zinc), TRH (>C10-C16 Fraction), TRH (>C16-C34 Fraction), benzo(a)pyrene and total PAHs reported in samples of fill soils exceed maintenance of highly modified ecosystems, which have the potential to stunt plant growth. In the context of the current and future use (flexible public open space areas, recreation reserves, fitness equipment and car parking) and the level and extent of impacts identified, the risk to the current beneficial use is considered low. Where new grass and low-lying vegetation is proposed, the area should be dressed with top soil to act as a growing medium and to encourage plant growth.
Human Health	Y	Elevated benzo(a)pyrene concentrations	The HHRA concludes that the risks to future users of the site (including recreational users and other receptors who may be exposed to soil contamination at the site (e.g. gardeners, intrusive maintenance workers) are low and acceptable. Soil at depth (>0.2 m bgl) within the former rifle range and current Wattie Watson Oval area (refer to **Figure 2** and **Figure 3**) is noted to present a potentially unacceptable risk to recreational users of the site, however this is considered acceptable provided the soils remain in place at depth, and any soils excavated in this area are appropriately managed (refer to **Section 7.2**). Notwithstanding the above conclusions, it is recommended that surface cover (e.g., grass, top-soil, clean soil layers and/or hard paving) be maintained across the site to minimise potential exposures to the extent practicable. It is also recommended that workers undertaking intrusive works employ protocols to minimise exposure to soil contaminants during on-site works.

Beneficial Use	Beneficial Use Potentially Precluded (Y/N)	Contamination Issue	Current and Proposed Use (Recreation/Public Open Space)
Buildings & Structures	N	-	Available pH results (6.8-8.7 pH units), when compared to Table 6.4.2(C) ‘Exposure Classification for Concrete Piles – Piles in Soil’ within Australian Standard (AS2159) Piling – Design and Installation (2009), indicate the soils to be non-aggressive and unlikely to preclude the protected beneficial use of buildings and structures.
Aesthetics	N	Trace amounts of anthropogenic material in fill soils	The trace amounts of anthropogenic material in fill soils is not considered to be aesthetically displeasing in the context of the current and future public open space use. However, surficial anthropogenic material should be removed as far as practicable.

7.0 Conclusions and Recommendations

7.1 Conclusions

The consolidated soil investigation works completed by Senversa and previous assessments (Atma (2020), Greencap (2020), Landserv (2020)) can be summarised as follows:

- The Elwood Foreshore has been a public recreation reserve since prior to 1869, with a public garden reserve and an 11-acre rifle range. The rifle range was removed in 1907 and the Elwood Lifesaving Club was established in the former rifle range building in 1911. The majority of the southeast portion of the site has been recreation reserves since the 1930s. Wattie Watson oval appeared on historical aerials from 1942.
- The site is underlain by fill soils generally up to 1.1 m depth, however fill of at least 3.0 m thickness was encountered at one isolated location to the east of Wattie Watson Oval. Fill soils were generally observed to increase in thickness towards the southeast portion of the site (Stage 2 area). Natural soils consist of grey sand to low-high plasticity grey silty clay.
- An isolated asbestos cement sheet fragment was encountered at one intrusive location (SB29) but was not visible on the surface during the site works.
- The fill soils contain elevated metals (arsenic, copper, lead, nickel, zinc), TRH, benzo(a)pyrene and total PAH concentrations above terrestrial ecosystem objectives, which may adversely affect the growth of some sensitive plants and trees.
- The fill soils contain elevated PAH concentrations above generic human health screening objectives across the entire site, with particularly elevated concentrations observed in the former rifle range and current Wattie Watson Oval area (designated the “Soil Management Area”, refer to **Figure 2** and **Figure 3**). The recent Senversa sampling was consistent with previous sampling conducted at the site.

The HHRA completed to further assess potential risks to human health from carcinogenic PAH in soils draws the following conclusions:

- Elevated B(a)P TEQ concentrations (up to a maximum of 410 mg/kg) were measured across the site, with the highest concentrations observed at depth (>0.2 m bgl) within the former rifle range and current Wattie Watson Oval, designated here as the “Soil Management Area”. Although impacts are found across the site, the highest concentrations are limited to the Soil Management Area and are not present at the ground surface.
- There is the potential for unacceptable risks to recreational users of the site if they are exposed to soils at depth within the Soil Management Area. While exposure by these users is unlikely to occur in this area given the soils are located at depth (>0.2 m bgl), it is recommended that future exposure to soils in this area be managed with the preparation of a Soil Contamination Management Plan (SCMP) to ensure access to exposed soils by recreational users is limited.
- Health risks to recreational users of the site area (including sensitive users such as children) are assessed to be low and acceptable given the risk assessment of shallow soils (<0.2 m bgl).
- Health risks to construction workers during the development of the site are estimated to be low and acceptable, even when an individual receptor spends an extended period of time (8 hours/day, 5 days/week, for a full year) directly exposed to site soils, including deep soils (<0.2 m bgl) within the Management Area.
- Health risks to other receptors who may be exposed to soil contamination at the site (e.g. gardeners, intrusive maintenance workers) are also considered to be low and acceptable, as exposure frequency for these receptors is expected to be lower than the assessed construction worker receptors.

7.2 Recommendations

Based on the findings of the assessment, it is recommended that:

- A SCMP be prepared to document the nature and extent of soil impacts across the site and outline control measures to manage excavated soils and minimise exposure to site users during proposed infrastructure upgrade works, primarily focusing on the designated Soil Management Area. The SCMP should include, but not limited to:
    - Specific responsibilities and obligations of relevant parties in administering the SCMP.
    - Information on the nature and extent of the benzo(a)pyrene impacted soils, plus disclosure of site-specific HHRA.
    - Management and monitoring requirements for maintaining the existing grass cover and 200mm cover of shallower fill soils that pose a low and acceptable risk to the site users.
    - Management requirements that general handling of excavated soils, including use of PPE, dust suppression, stockpile management, and personal hygiene requirements.
    - Management of unexpected contamination, including odorous soil or asbestos debris.
    - Waste management requirements for surplus soils with consideration to the separate In-situ Soil Hazard Assessment report prepared for the site (Senversa, 2021). This includes segregation of fill soils from natural soils to minimise off-site disposal costs and optimise reuse potential.
- Proposed upgrade works within the designated Soil Management Area should look to raise site levels, so a more permanent cover system can be achieved that requires less ongoing maintenance (i.e. 0.5m cover system of hard standing surface). Soil excavated from depth (>0.2m) within the designated Soil Management Area are not considered suitable for reuse within the site, unless reused beneath permanent hardstanding surfaces or 0.5m of clean fill soils with a demarcation layer.
- While risks associated with soils (>0.2m depth) outside the Soil Management Area are assessed to be low and acceptable, it is recommended that if these soils are excavated and reused a suitable topsoil planting medium (e.g. 200mm) and grass be established over these soils. The reused soils should also be free of odours and inert waste.

8.0 Principles and Limitations of Investigation

8.1 General Principles and Limitations of Investigation

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.
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.
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

The soil investigation performed at the site was completed by drilling soil bores via hand auger and solid flight auger techniques. Whilst suitable for characterising soil for chemical contamination, soil boring is generally unsuitable for assessment of inert solid waste or hazardous waste materials (e.g. ACM). Test pit excavations were not completed to minimise disturbance to the public amenities at the site and to reduce the likelihood of encountering underground services.

9.0 References

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Figures

Figure 1: Site Layout and Sample Locations

Figure 2: Benzo(a)pyrene TEQ Results – Shallow Soils (<0.2 m bgl)

Figure 3: Benzo(a)pyrene TEQ Results – Deeper Soils (>0.2 m bgl)

Path: S:\01_Jobs\3.VIC_Jobs\M18310_CoPP_ELWOOD FORESHORE_HRRA\MXDs\1. Working MXDS\M18310_004_F001_Site_Layout_Samples.mxd

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Legend

- Soil Bore (Senversa, 2021)
- Soil Bore (Atma, 2020)
- Soil Bore (Greencap, 2020)
- Soil Bore (Landserv, 2020)
- Groundwater Monitoring Well (Atma, 2020)
- Current Site Feature
- Former Site Feature
- Stage 1 Area
- Stage 2 Area
- Site Boundary
- Property Boundary

Notes:
Cadastre and road data sourced from land.vic.gov.au (DELWP)
Aerial imagery (08/11/2020) sourced from Nearmap Pty Ltd

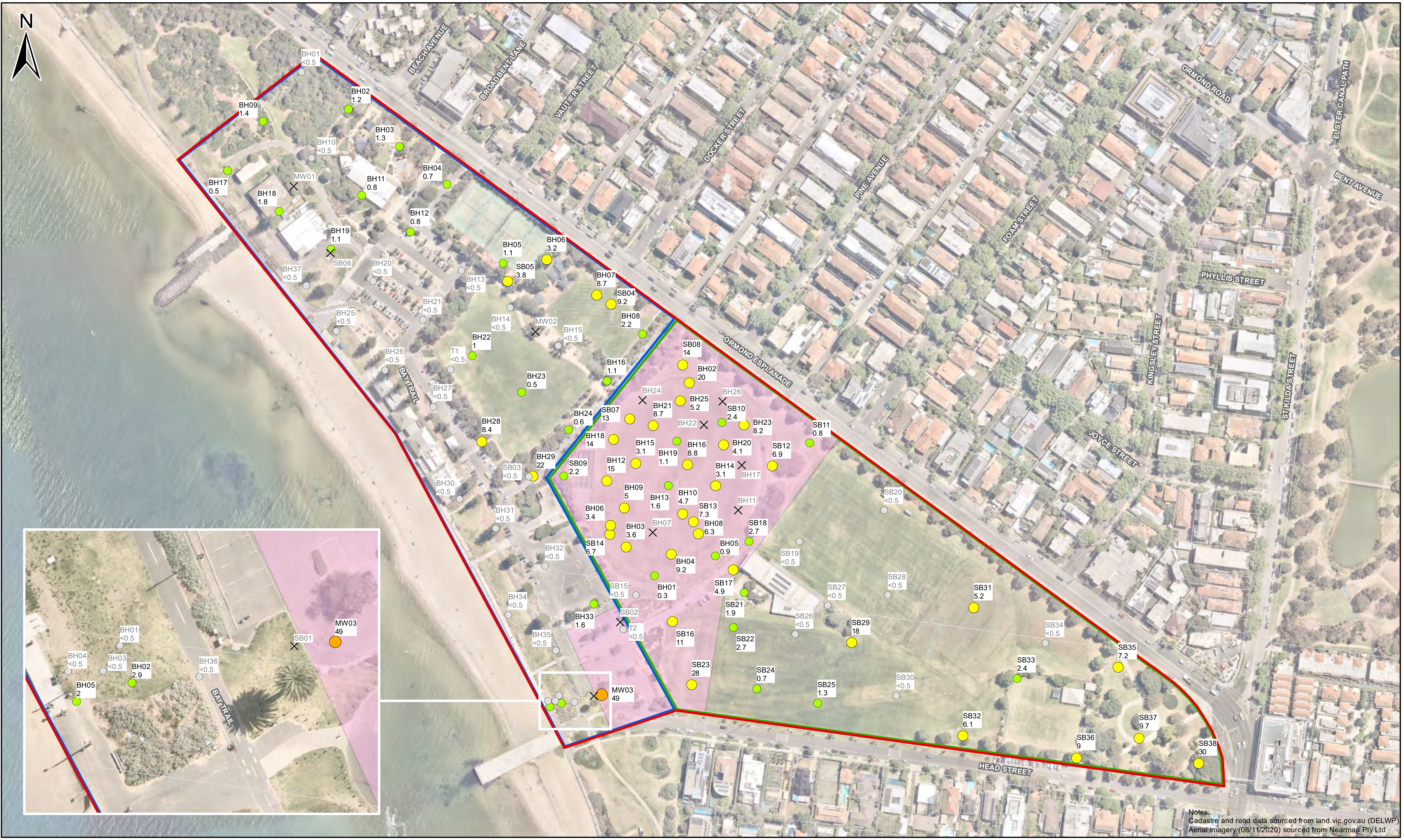
Designed:	I. Graves	Date:	9/04/2021
Drawn:	M. Sari	Revision:	0
Checked:	R. Griffin	Scale:	1:2,500 (A3)
File:	M18310_004_F001_Site_Layout_Samples		

0 25 50 100 150 200 Metres

Datum GDA 1994, Projection MGA Zone 55

Figure No:	**1**
Title:	**Site Layout and Sample Locations**
Project:	Detailed Site Investigation
Location:	Elwood Foreshore, Elwood, Victoria
Client:	City of Port Phillip

Path: S:\01_Jobs\3.VIC_Jobs\M18310_CoPP_ELWOOD FORESHORE_HRRA\MXDs\1. Working MXDS\M18310_004_F002_BaP_Results_Below.mxd



Notes:
Cadastre and road data sourced from land.vic.gov.au (DELWP)
Aerial imagery (08/11/2020) sourced from Nearmap Pty Ltd

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senversa

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

Legend

Benzo(a)pyrene TEQ (Zero) (mg/kg)

- × No Sample
- ● <EQL
- ● >EQL - 3
- ● >3 - 40
- ● >40 - 400
- ● >400

Sample ID
Benzo(a)pyrene TEQ (Zero) (mg/kg)
Below EQL or No Sample
Where multiple samples were available for the given depth interval, the highest results was adopted.

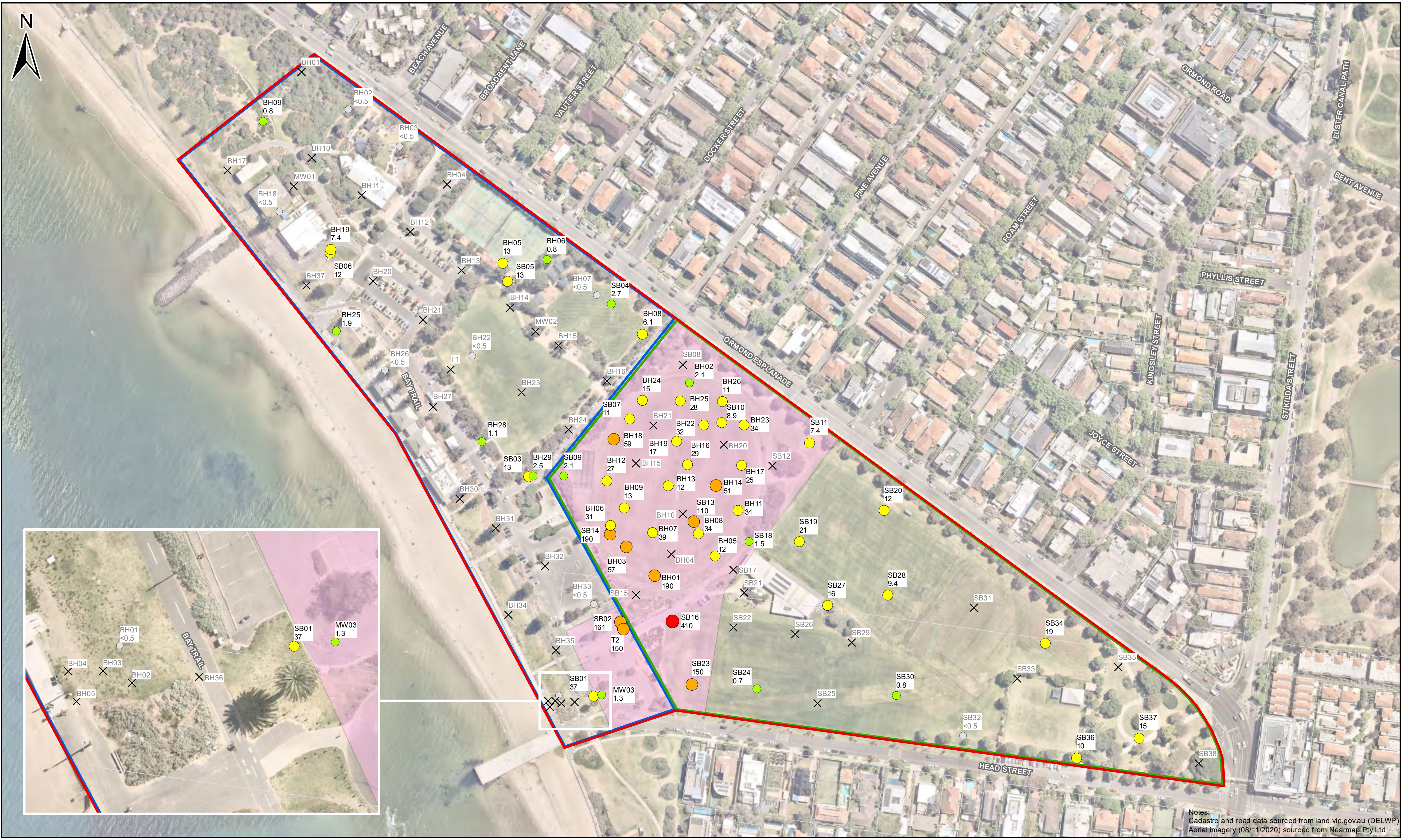
- ▭ Stage 1 Area
- ▭ Stage 2 Area
- ▭ Site Boundary
- ▨ Soil Management Area
- ▭ Property Boundary

Designed:	I. Graves	Date:	9/04/2021
Drawn:	M. Sari	Revision:	0
Checked:	R. Griffin	Scale:	1:2,500 (A3)
File:	M18310_004_F002_BaP_Results_Below		

0 25 50 100 150 200 Metres

Datum GDA 1994, Projection MGA Zone 55

Figure No:	**2**
Title:	**Benzo(a)pyrene TEQ Results – Shallow Soils (<0.2 m bgl)**
Project:	Detailed Site Investigation
Location:	Elwood Foreshore, Elwood, Victoria
Client:	City of Port Phillip



Notes:
Cadastre and road data sourced from land.vic.gov.au (DELWP)
Aerial imagery (08/11/2020) sourced from Nearmap Pty Ltd

Path: S:\01_Jobs\3.VIC_Jobs\M18310_CoPP_ELWOOD FORESHORE_HRRA\MXDs\1. Working MXDS\M18310_004_F003_BaP_Results_Above.mxd

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

Legend

Benzo(a)pyrene TEQ (Zero) (mg/kg)

- × No Sample
- ● <EQL
- ● >EQL - 3
- ● >3 - 40
- ● >40 - 400
- ● >400

Sample ID
Benzo(a)pyrene TEQ (Zero) (mg/kg)
Below EQL or No Sample
Where multiple samples were available for the given depth interval, the highest results was adopted.

- ▭ Stage 1 Area
- ▭ Stage 2 Area
- ▭ Site Boundary
- ▭ Soil Management Area
- ▭ Property Boundary

Designed:	I. Graves	Date:	9/04/2021
Drawn:	M. Sari	Revision:	0
Checked:	R. Griffin	Scale:	1:2,500 (A3)
File:	M18310_004_F003_BaP_Results_Above		

0 25 50 100 150 200 Metres

Datum GDA 1994, Projection MGA Zone 55

Figure No:	**3**
Title:	**Benzo(a)pyrene TEQ Results – Deeper Soils (>0.2 m bgl)**
Project:	Detailed Site Investigation
Location:	Elwood Foreshore, Elwood, Victoria
Client:	City of Port Phillip

Tables

Table 1: Soil Results Vs. Relevant Beneficial Use Criteria

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria

Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

Report						Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020
Location Code						BH01	BH01	BH01	BH02	BH02	BH03	BH03	BH04	BH05	BH05	BH05	BH06	BH06	BH06	BH06	BH07	BH07	BH08	BH08	BH09	BH09	BH10	BH10	BH11
Field ID						BH1/0.1	DUP-140720A	SPLIT140720A	BH2/0.1	BH2/0.5	BH3/0.1	BH3/0.5	BH4/0.1	BH5/0.1	BH5/0.5	BH5/1.0	BH6/0.1	DUP-140720B	SPLIT140720B	BH6/0.5	BH7/0.1	BH7/0.5	BH8/0.1	BH8/0.5	BH9/0.1	BH9/0.5	BH10/0.1	BH10/0.5	BH11/0.1
Date						14/07/2020	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020	14/07/2020	15/07/2020	15/07/2020	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020
Depth						0.1	0.1	0.1	0.1	0.5	0.1	0.5	0.1	0.1	0.5	1	0.1	0.1	0.1	0.5	0.1	0.5	0.1	0.5	0.1	0.5	0.1	0.5	0.1
Sample Type						Normal	Field_D	Interlab_D	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Field_D	Interlab_D	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Fill/Natural						Fill	Fill	Fill	Fill	Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
Lab Report No.						732366	732366	EM2012544	732366	733886	732366	733886	732366	732366	733886	734380	732366	732366	EM2012544	733886	732366	733886	732366	733886	732366	733886	732366	733886	732366
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																								
Physical Parameters																													
Moisture Content	%	0.1				28	22	20.3	14	8.8	13	8.2	14	9.7	5.6	4.6	25	15	11.6	7.3	30	8.7	50	11	14	10	14	14	33
Resistivity	Ω m	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Electrical Conductivity	µS/cm	10				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	390	-	260
pH (aqueous extract)	pH Units	0.1				6.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (Lab)	pH Units	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inorganics																													
Cyanide (Free)	mg/kg	5		**240**[#12]	1,500[#23]	-	-	-	-	-	<5	-	-	-	-	-	<5	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (Total)	mg/kg	5		**240**[#13]	1,500[#24]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoride	mg/kg	100		**3,100**[#14]	47,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Calcium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Magnesium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Potassium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Sodium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Sodium Percent	%	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cation Exchange Capacity	meq/100g	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	35	-	43
Major Ions																													
Chloride	mg/kg	5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate (as SO4)	mg/kg	30				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																													
Arsenic	mg/kg	2	100[#1]	**300**[#12]	3,000[#23]	8.6	3.5	-	12	4.2	16	-	7.4	26	36	39	8.3	14	-	-	8.6	4.1	12	14	6.9	-	6.4	2.7	11
Barium	mg/kg	10		**15,000**[#14]	220,000[#25]	22	15	-	41	11	-	-	30	160	140	14	-	42	-	-	72	16	53	54	30	-	29	<10	42
Beryllium	mg/kg	2		**90**[#12]	500[#23]	<2	<2	-	<2	<2	<2	-	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	-	<2	<2	<2
Boron	mg/kg			**20,000**[#12]	300,000[#23]	15	15	-	<10	<10	<10	-	<10	34	<10	<10	13	19	-	-	<10	<10	15	<10	<10	-	10	<10	28
Cadmium	mg/kg	0.2		**90**[#12]	900[#23]	<0.4	<0.4	-	<0.4	<0.4	<0.4	-	<0.4	0.9	1.3	<0.4	<0.4	<0.4	-	-	<0.4	<0.4	<0.4	<0.4	<0.4	-	<0.4	<0.4	<0.4
Chromium	mg/kg	2	200[#2]	**300**[#15]	3,600[#26]	7.1	6.3	-	15	6	19	-	9.8	14	25	22	14	17	-	-	16	6.9	22	16	7.7	-	9.6	<5	22
Chromium(VI)	mg/kg	1		**300**[#12]	3,600[#23]	-	-	-	-	-	<1	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/kg	5		**300**[#12]	4,000[#23]	<5	<5	-	<5	<5	5.2	-	<5	6.8	8.3	<5	<5	<5	-	-	6.4	<5	12	<5	<5	-	<5	<5	<5
Copper	mg/kg	5	70[#3]	**17,000**[#12]	240,000[#23]	12	10	-	18	<5	17	-	7	81	1,500	30	18	18	-	-	61	5.3	27	14	11	-	14	<5	25
Lead	mg/kg	5	1,130[#4]	**600**[#16]	1,500[#27]	44	41	-	130	9.8	58	-	20	520	580	35	140	120	-	-	250	45	130	140	53	-	46	<5	97
Manganese	mg/kg	5		**19,000**[#12]	60,000[#23]	140	110	-	70	42	91	-	58	180	210	33	98	85	-	-	110	34	250	58	68	-	140	22	200
Mercury	mg/kg	0.05		**80**[#12]	730[#23]	<0.1	<0.1	-	1.1	<0.1	0.3	-	<0.1	<0.1	2.8	0.1	0.2	0.2	-	-	0.4	0.2	0.2	0.1	<0.1	-	1.3	<0.1	0.2
Molybdenum	mg/kg	5		**390**[#14]	5,800[#25]	<5	<5	-	<5	<5	-	-	<5	<5	<5	<5	-	<5	-	-	<5	<5	<5	<5	<5	-	<5	<5	<5
Nickel	mg/kg	2	35[#3]	**1,200**[#12]	6,000[#23]	5.8	<5	-	9.9	<5	14	-	9.1	19	38	5.3	12	13	-	-	22	<5	47	9.2	8	-	11	<5	8.3
Selenium	mg/kg	2		**700**[#12]	10,000[#23]	<2	<2	-	<2	<2	<2	-	<2	<2	<2	<2	<2	<2	-	-	<2	<2	<2	<2	<2	-	<2	<2	<2
Silver	mg/kg	2		**390**[#14]	5,800[#25]	<0.2	<0.2	-	<0.2	<0.2	-	-	<0.2	0.5	0.9	<0.2	-	<0.2	-	-	<0.2	<0.2	<0.2	0.2	<0.2	-	<0.2	<0.2	<0.2
Tin	mg/kg	5		**47,000**[#14]	700,000[#25]	<10	<10	-	<10	<10	-	-	<10	34	59	<10	-	<10	-	-	34	11	14	<10	<10	-	<10	<10	<10
Zinc	mg/kg	5	110[#3]	**30,000**[#12]	400,000[#23]	160	120	-	95	7.7	82	-	35	620	1,500	53	140	140	-	-	140	34	150	76	62	-	66	33	160
BTEX																													
Benzene	mg/kg	0.1	50	**120**[#17]	3[#28]	-	-	<0.2	-	-	<0.1	-	-	-	-	-	<0.1	-	<0.2	-	-	<0.1	-	-	-	-	-	-	-
Toluene	mg/kg	0.1	85	**18,000**[#17]	99,000[#28]	-	-	<0.5	-	-	<0.1	-	-	-	-	-	<0.1	-	<0.5	-	-	<0.1	-	-	-	-	-	-	-
Ethylbenzene	mg/kg	0.1	70	**5,300**[#17]	27,000[#28]	-	-	<0.5	-	-	<0.1	-	-	-	-	-	<0.1	-	<0.5	-	-	<0.1	-	-	-	-	-	-	-
Xylene (m & p)	mg/kg	0.2				-	-	<0.5	-	-	<0.2	-	-	-	-	-	<0.2	-	<0.5	-	-	<0.2	-	-	-	-	-	-	-
Xylene (o)	mg/kg	0.1				-	-	<0.5	-	-	<0.1	-	-	-	-	-	<0.1	-	<0.5	-	-	<0.1	-	-	-	-	-	-	-
Total Xylene	mg/kg	0.3	45	**15,000**[#17]	230[#28]	-	-	<0.5	-	-	<0.3	-	-	-	-	-	<0.3	-	<0.5	-	-	<0.3	-	-	-	-	-	-	-
Total BTEX	mg/kg	0.2				-	-	<0.2	-	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
Total Recoverable Hydrocarbons																													
C6-C10 Fraction	mg/kg	10	180			<20	-	<10	<20	-	<20	-	<20	<20	-	-	<20	-	<10	-	<20	<20	<20	-	<20	-	<20	-	<20
C6-C10 Fraction minus BTEX (F1)	mg/kg	10	180	**5,100**[#20]	260[#29]	<20	-	<10	<20	-	<20	-	<20	<20	-	-	<20	-	<10	-	<20	<20	<20	-	<20	-	<20	-	<20
>C10-C16 Fraction	mg/kg	20	120			<50	-	<50	<50	-	<50	-	<50	<50	-	-	<50	-	<50	-	<50	<50	<50	-	<50	-	<50	-	<50
>C10-C16 Fraction minus naphthalene (F2)	mg/kg	20	120	**3,800**[#20]	20,000[#20]	<50	-	<50	<50	-	<50	-	<50	<50	-	-	<50	-	<50	-	<50	<50	<50	-	<50	-	<50	-	<50
>C16-C34 Fraction	mg/kg	50	300	**5,300**[#21]	27,000[#21]	240	-	200	200	-	130	-	130	250	-	-	110	-	160	-	500	<100	180	-	160	-	<100	-	160
>C34-C40 Fraction	mg/kg	50	2800	**7,400**[#21]	38,000[#21]	<100	-	<100	<100	-	<100	-	<100	<100	-	-	<100	-	<100	-	140	<100	<100	-	<100	-	<100	-	<100
>C10-C40 Fraction (Sum)	mg/kg	50				240	-	200	200	-	130	-	130	250	-	-	110	-	160	-	640	<100	180	-	160	-	<100	-	160
PAHs																													
Acenaphthene	mg/kg	0.1				<0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5
Acenaphthylene	mg/kg	0.1				<0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5
Anthracene	mg/kg	0.1				<0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3	<0.5	<0.5	<0.5	0.6	<0.5	0.8	<0.5	<0.5	2.5	<0.5	<0.5	<0.5	-	<0.5
Benz(a)anthracene	mg/kg	0.1				<0.5	-	-	0.6	<0.5	0.6	<0.5	<0.5	0.6	7.5	0.6	1.6	2.4	2.3	<0.5	4.5	<0.5	1.3	4.4	0.8	<0.5	<0.5	-	0.6
2-Chloronaphthalene	mg/kg	0.1		**4,800**[#14]	60,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1	0.7			<0.5	-	-	1	<0.5	1	<0.5	0.6	0.9	8.4	0.7	1.8	1.7	2.5	0.7	6	<0.5	1.7	3.9	1.1	0.7	<0.5	-	0.7
Benzo(b)fluoranthene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoranthene	mg/kg	0.5				<0.5	-	-	0.8	<0.5	0.7	<0.5	<0.5	0.7	6.1	0.6	1.3	1.1	2.8	0.6	4.6	<0.5	1.3	2.9	0.7	<0.5	<0.5	-	<0.5
Benzo(g,h,i)perylene	mg/kg	0.1				<0.5	-	-	<0.5	<0.5	0.6	<0.5	<0.5	0.5	5	<0.5	1	<0.5	1.6	0.6	2.6	<0.5	0.8	2.7	0.6	<0.5	<0.5	-	<0.5
Benzo(b+j+k)fluoranthene	mg/kg	0.2				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1				<0.5	-	-	0.8	<0.5	1	<0.5	0.5	0.9	6.4	0.7	1.8	1.8	0.8	0.6	5.8	<0.5	1.6	3.9	0.9	0.6	<0.5	-	0.6
Chrysene	mg/kg	0.1				<0.5	-	-	0.9	<0.5	0.9	<0.5	<0.5	0.8	6.8	0.7	1.8	2.5	1.9	0.6	4.8	<0.5	1.5	4.6	1	0.5	<0.5	-	0.6
Dibenz(a,h)anthracene	mg/kg	0.1				<0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.9	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	-	<0.5
Fluoranthene	mg/kg	0.1				0.9	-	-	1.6	<0.5	0.9	0.6	0.9	1.2	16	1.7	2.6	3.1	4.6	0.8	10	<0.5	2.7	9.4	1.9	0.9	0.9	-	1.4
Fluorene	mg/kg	0.1				<0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1				<0.5	-	-	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	4.5	<0.5	0.9	<0.5	1.3	<0.5	2.5	<0.5	0.7	2.5	<0.5	<0.5	<0.5	-	<0.5
Naphthalene	mg/kg	0.1	170[#11]	**1,900**[#17]	NL [#28]	<0.5	-	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5
Phenanthrene	mg/kg	0.1				<0.5	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	13	0.8	1.9	0.7	2	<0.5	2.9	<0.5	0.6	8.5	<0.5	<0.5	<0.5	-	<0.5
Pyrene	mg/kg	0.1				1	-	-	1.8	0.5	1	0.6	1	1.5	16	1.8	2.7	2.8	4.5	0.9	11	<0.5	3.2	9.9	2.1	1	1	-	1.6
Benzo(a)pyrene TEQ (Zero)	mg/kg	0.1		**3**[#12]	40[#23]	<0.5	-	-	1.2	<0.5	1.3	<0.5	0.7	1.1	**13**	0.9	2.4	2.3	**3.2**	0.8	**8.7**	<0.5	2.2	**6.1**	1.4	0.8	<0.5	-	0.8
Sum of Polycyclic aromatic hydrocarbons (PAH)	mg/kg	0.1		**300**[#12]	4,000[#23]	1.9	-	-	7.5	0.5	7.3	1.2	3	7.1	96.8	7.6	17.4	16.1	24.9	4.8	56.4	<0.5	15.4	56	9.1	3.7	1.9	-	5.5

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria
Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**
					Location Code	BH12	BH12	BH13	BH13	BH14	BH14	BH15	BH16	BH17	BH18	BH18	BH19	BH19	BH19	BH19	BH20	BH21	BH22	BH22	BH23	BH24	BH24	BH25	BH25
					Field ID	BH12/0.1	BH12/0.1	BH13/0.1	BH13/0.5	BH14/0.1	BH14/0.5	BH15/0.1	BH16/0.1	BH17/0.1	BH18/0.1	BH18/0.5	BH19/0.1	BH19/0.5	BH19/0.5	BH19/1.0	BH20/0.1	BH21/0.1	BH22/0.1	BH22/0.5	BH23/0.1	BH24/0.1	BH24/0.5	BH25/0.1	BH25/0.5
					Date	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	15/07/2020	15/07/2020	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020
					Depth	0.1	0.1	0.1	0.5	0.1	0.5	0.1	0.1	0.1	0.1	0.5	0.1	0.5	0.5	1	0.1	0.1	0.1	0.5	0.1	0.1	0.5	0.1	0.5
					Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
					Lab Report No.	732366	733886	732366	733886	732366	733886	732366	732366	732366	732366	733886	732366	733886	734380	734380	732366	732366	732366	733886	732366	732366	733886	732366	733886
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																								
Physical Parameters																													
Moisture Content	%	0.1				11	7.1	25	7.5	16	7.4	14	41	6.3	6.4	3.8	14	8.9	8.6	11	6.6	4.3	14	5.1	31	16	5.8	14	14
Resistivity	Ω m	0.5				310	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Electrical Conductivity	µS/cm	10				33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	290	-	-	-	-
pH (aqueous extract)	pH Units	0.1				7.4	-	6.6	-	-	-	-	-	7.6	-	-	-	-	-	-	-	-	-	-	5.4	-	-	7.4	-
pH (Lab)	pH Units	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inorganics																													
Cyanide (Free)	mg/kg	5		**240**[#12]	1,500[#23]	-	-	-	-	-	-	-	-	-	<5	-	<5	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (Total)	mg/kg	5		**240**[#13]	1,500[#24]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoride	mg/kg	100		**3,100**[#14]	47,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Calcium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Magnesium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Potassium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Sodium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Sodium Percent	%	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cation Exchange Capacity	meq/100g	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.5	-	-	-	-
Major Ions																													
Chloride	mg/kg	5				<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate (as SO4)	mg/kg	30				<30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																													
Arsenic	mg/kg	2	100[#1]	**300**[#12]	3,000[#23]	-	5.7	4.8	2.9	6.9	-	7.9	29	3.3	13	6.5	12	-	6.6	-	3.1	<2	9.3	-	9.3	8.5	8.3	6.7	18
Barium	mg/kg	10		**15,000**[#14]	220,000[#25]	-	22	81	13	27	-	22	38	18	-	<10	-	-	130	-	21	<10	13	-	16	15	36	53	49
Beryllium	mg/kg	2		**90**[#12]	500[#23]	-	<2	<2	<2	<2	-	<2	<2	<2	<2	<2	<2	-	<2	-	<2	<2	<2	-	<2	<2	<2	<2	<2
Boron	mg/kg			**20,000**[#12]	300,000[#23]	-	11	<10	<10	<10	-	<10	24	<10	<10	<10	<10	-	<10	-	<10	<10	<10	-	<10	<10	<10	<10	22
Cadmium	mg/kg	0.2		**90**[#12]	900[#23]	-	<0.4	<0.4	<0.4	<0.4	-	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	-	0.6	-	<0.4	<0.4	<0.4	-	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	2	200[#2]	**300**[#15]	3,600[#26]	-	9.2	22	<5	11	-	9.7	22	6.1	11	<5	18	-	16	-	7.3	<5	6.4	-	7.7	12	17	30	42
Chromium(VI)	mg/kg	1		**300**[#12]	3,600[#23]	-	-	-	-	-	-	-	-	-	<1	-	<1	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/kg	5		**300**[#12]	4,000[#23]	-	<5	7.9	<5	<5	-	<5	<5	<5	<5	<5	<5	-	14	-	<5	<5	<5	-	<5	<5	6.2	<5	12
Copper	mg/kg	5	70[#3]	**17,000**[#12]	240,000[#23]	-	12	70	5.3	7.1	-	8.8	18	8.9	25	<5	10	-	74	-	10	<5	5.5	-	7.3	9.1	19	10	22
Lead	mg/kg	5	1,130[#4]	**600**[#16]	1,500[#27]	-	92	38	6.6	31	-	46	180	33	310	12	48	-	310	-	26	<5	71	-	58	68	73	24	39
Manganese	mg/kg	5		**19,000**[#12]	60,000[#23]	-	67	220	90	110	-	49	78	69	80	21	66	-	260	-	53	33	29	-	44	46	99	100	140
Mercury	mg/kg	0.05		**80**[#12]	730[#23]	-	<0.1	<0.1	<0.1	0.4	-	0.4	0.1	<0.1	<0.1	<0.1	<0.1	-	0.1	-	<0.1	<0.1	<0.1	-	0.2	<0.1	<0.1	<0.1	0.2
Molybdenum	mg/kg	5		**390**[#14]	5,800[#25]	-	<5	<5	<5	<5	-	<5	<5	<5	-	<5	-	-	<5	-	<5	<5	<5	-	<5	<5	<5	<5	<5
Nickel	mg/kg	2	35[#3]	**1,200**[#12]	6,000[#23]	-	6.6	25	<5	7.5	-	6.6	6.6	11	16	<5	10	-	61	-	5.6	<5	5.3	-	5.5	6.8	26	10	38
Selenium	mg/kg	2		**700**[#12]	10,000[#23]	-	<2	<2	<2	<2	-	<2	<2	<2	<2	<2	<2	-	<2	-	<2	<2	<2	-	<2	<2	<2	<2	<2
Silver	mg/kg	2		**390**[#14]	5,800[#25]	-	0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	<0.2	-	<0.2	-	-	<0.2	-	<0.2	<0.2	<0.2	-	<0.2	0.2	<0.2	<0.2	<0.2
Tin	mg/kg	5		**47,000**[#14]	700,000[#25]	-	<10	13	<10	<10	-	<10	<10	<10	-	<10	-	-	<10	-	<10	<10	<10	-	<10	<10	<10	<10	<10
Zinc	mg/kg	5	110[#3]	**30,000**[#12]	400,000[#23]	-	180	320	44	24	-	61	200	49	70	19	71	-	310	-	79	34	31	-	67	140	75	31	81
BTEX																													
Benzene	mg/kg	0.1	50	**120**[#17]	3[#28]	-	-	-	<0.1	-	<0.1	-	-	-	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	mg/kg	0.1	85	**18,000**[#17]	99,000[#28]	-	-	-	<0.1	-	<0.1	-	-	-	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	mg/kg	0.1	70	**5,300**[#17]	27,000[#28]	-	-	-	<0.1	-	<0.1	-	-	-	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
Xylene (m & p)	mg/kg	0.2				-	-	-	<0.2	-	<0.2	-	-	-	<0.2	-	<0.2	-	-	-	-	-	-	-	-	-	-	-	-
Xylene (o)	mg/kg	0.1				-	-	-	<0.1	-	<0.1	-	-	-	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
Total Xylene	mg/kg	0.3	45	**15,000**[#17]	230[#28]	-	-	-	<0.3	-	<0.3	-	-	-	<0.3	-	<0.3	-	-	-	-	-	-	-	-	-	-	-	-
Total BTEX	mg/kg	0.2				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Recoverable Hydrocarbons																													
C6-C10 Fraction	mg/kg	10	180			-	-	<20	<20	<20	<20	<20	<20	<20	<20	-	<20	-	-	-	<20	<20	<20	-	<20	<20	-	<20	-
C6-C10 Fraction minus BTEX (F1)	mg/kg	10	180	**5,100**[#20]	260[#29]	-	-	<20	<20	<20	<20	<20	<20	<20	<20	-	<20	-	-	-	<20	<20	<20	-	<20	<20	-	<20	-
>C10-C16 Fraction	mg/kg	20	120			-	-	<50	<50	<50	<50	<50	72	<50	<50	-	<50	-	-	-	<50	<50	<50	-	<50	<50	-	<50	-
>C10-C16 Fraction minus naphthalene (F2)	mg/kg	20	120	**3,800**[#20]	20,000[#20]	-	-	<50	<50	<50	<50	<50	72	<50	<50	-	<50	-	-	-	<50	<50	<50	-	<50	<50	-	<50	-
>C16-C34 Fraction	mg/kg	50	300	**5,300**[#21]	27,000[#21]	-	-	470	<100	370	140	<100	570	<100	120	-	<100	-	-	-	120	<100	<100	-	<100	100	-	<100	-
>C34-C40 Fraction	mg/kg	50	2800	**7,400**[#21]	38,000[#21]	-	-	180	<100	120	<100	<100	310	<100	<100	-	<100	-	-	-	<100	<100	<100	-	<100	<100	-	<100	-
>C10-C40 Fraction (Sum)	mg/kg	50				-	-	650	<100	490	140	<100	952	<100	120	-	<100	-	-	-	120	<100	<100	-	<100	100	-	<100	-
PAHs																													
Acenaphthene	mg/kg	0.1				-	<0.5	<0.5	-	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5
Acenaphthylene	mg/kg	0.1				-	<0.5	<0.5	-	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5
Anthracene	mg/kg	0.1				-	<0.5	<0.5	-	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.1				-	<0.5	<0.5	-	<0.5	-	<0.5	0.6	<0.5	0.8	<0.5	0.6	4	-	1.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	1	1
2-Chloronaphthalene	mg/kg	0.1		**4,800**[#14]	60,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1	0.7			-	0.7	<0.5	-	<0.5	-	<0.5	0.9	0.5	1.4	<0.5	0.8	5.8	-	2.7	<0.5	<0.5	0.8	<0.5	0.5	0.6	-	<0.5	1.5
Benzo(b)fluoranthene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoranthene	mg/kg	0.5				-	<0.5	<0.5	-	<0.5	-	<0.5	0.6	<0.5	1	<0.5	0.6	3.8	-	1.8	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	-	<0.5	0.9
Benzo(g,h,i)perylene	mg/kg	0.1				-	<0.5	<0.5	-	<0.5	-	<0.5	<0.5	<0.5	0.9	<0.5	0.6	4	-	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	0.9
Benzo(b+j+k)fluoranthene	mg/kg	0.2				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1				-	0.7	<0.5	-	<0.5	-	<0.5	0.7	<0.5	1.3	<0.5	0.8	4.2	-	2.4	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	-	0.6	1.3
Chrysene	mg/kg	0.1				-	<0.5	<0.5	-	<0.5	-	<0.5	0.7	0.5	1.1	<0.5	0.7	5	-	1.9	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	-	1.2	1
Dibenz(a,h)anthracene	mg/kg	0.1				-	<0.5	<0.5	-	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	-	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5
Fluoranthene	mg/kg	0.1				-	0.7	<0.5	-	<0.5	-	<0.5	1.3	1.1	1	<0.5	0.9	13	-	3.6	<0.5	<0.5	1.3	0.5	<0.5	1	-	1.2	1.9
Fluorene	mg/kg	0.1				-	<0.5	<0.5	-	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1				-	<0.5	<0.5	-	<0.5	-	<0.5	<0.5	<0.5	0.7	<0.5	0.5	2.9	-	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	0.8
Naphthalene	mg/kg	0.1	170[#11]	**1,900**[#17]	NL [#28]	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5
Phenanthrene	mg/kg	0.1				-	<0.5	<0.5	-	<0.5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.8	-	1.6	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	-	<0.5	1.1
Pyrene	mg/kg	0.1				-	0.8	<0.5	-	<0.5	-	<0.5	1.5	1.3	1.3	<0.5	1	9	-	3.9	<0.5	<0.5	1.4	0.6	0.5	1.1	-	1.1	2.1
Benzo(a)pyrene TEQ (Zero)	mg/kg	0.1		**3**[#12]	40[#23]	-	0.8	<0.5	-	<0.5	-	<0.5	1.1	0.5	1.8	<0.5	1.1	**7.4**	-	**3.9**	<0.5	<0.5	1	<0.5	0.5	0.6	-	<0.5	1.9
Sum of Polycyclic aromatic hydrocarbons (PAH)	mg/kg	0.1		**300**[#12]	4,000[#23]	-	2.9	<0.5	-	<0.5	-	<0.5	6.3	3.4	9.5	<0.5	6.5	55.5	-	22.8	<0.5	<0.5	5.7	1.1	1	3.5	-	5.1	12.5

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria

Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

Report						**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**
Location Code						BH26	BH26	BH26	BH26	BH27	BH28	BH28	BH29	BH29	BH29	BH30	BH31	BH32	BH33	BH33	BH33	BH33	BH34	BH35	BH35	BH35	BH36	BH36	BH37
Field ID						BH26/0.1	DUP-140720C	SPLIT140720C	BH26/0.5	BH27/0.1	BH28/0.1	BH28/0.5	BH29/0.1	BH29/0.5	BH29/1.0	BH30/0.1	BH31/0.1	BH32/0.1	BH33/0.1	DUP-140720D	SPLIT140720D	BH33/0.5	BH34/0.1	BH35/0.1	SPLIT140720E	BH35/0.5	BH36/0.1	BH36/0.5	BH37/0.1
Date						14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	15/07/2020	14/07/2020	14/07/2020	14/07/2020	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020
Depth						0.1	0.1	0.1	0.5	0.1	0.1	0.5	0.1	0.5	1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.1	0.1	0.1	0.5	0.1	0.5	0.1
Sample Type						Normal	Field_D	Interlab_D	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Field_D	Interlab_D	Normal	Normal	Normal	Interlab_D	Normal	Normal	Normal	Normal
Fill/Natural						Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
Lab Report No.						732366	732366	EM2012544	733886	732366	732366	733886	732366	733886	733886	732366	732366	732366	732366	732366	EM2012544	733886	732366	732366	EM2012544	733886	732366	733886	732366
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																								
Physical Parameters																													
Moisture Content	%	0.1				9.2	12	8.6	3.3	13	30	8.1	12	11	12	40	16	15	28	26	44.8	6.6	18	55	30.9	9.1	19	7	7.7
Resistivity	Ω m	0.5				-	-	-	-	14	-	-	-	-	-	-	-	20	-	-	-	-	-	-	-	-	-	-	-
Electrical Conductivity	µS/cm	10				-	-	-	-	720	-	-	-	-	-	-	-	500	-	-	-	-	53	-	-	-	3,100	-	-
pH (aqueous extract)	pH Units	0.1				-	-	-	-	7.3	-	-	-	-	-	5.9	-	6.9	-	-	-	-	-	-	-	-	-	-	-
pH (Lab)	pH Units	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inorganics																													
Cyanide (Free)	mg/kg	5		**$240^{\#12}$**	$1,500^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (Total)	mg/kg	5		**$240^{\#13}$**	$1,500^{\#24}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoride	mg/kg	100		**$3,100^{\#14}$**	$47,000^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Calcium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Magnesium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Potassium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Sodium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Sodium Percent	%	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cation Exchange Capacity	meq/100g	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-	-	-	21	-	-
Major Ions																													
Chloride	mg/kg	5				-	-	-	-	1,100	-	-	-	-	-	-	-	260	-	-	-	-	-	-	-	-	-	-	-
Sulfate (as SO4)	mg/kg	30				-	-	-	-	240	-	-	-	-	-	-	-	83	-	-	-	-	-	-	-	-	-	-	-
Metals																													
Arsenic	mg/kg	2	$100^{\#1}$	**$300^{\#12}$**	$3,000^{\#23}$	4.7	5.3	-	4.2	4.3	5.7	-	9.8	5.1	-	4.5	6.7	4.1	10	-	7	9.4	5.9	11	21	-	2.3	-	<2
Barium	mg/kg	10		**$15,000^{\#14}$**	$220,000^{\#25}$	20	23	-	<10	15	20	-	25	13	-	41	29	27	31	-	30	23	22	45	40	-	16	-	17
Beryllium	mg/kg	2		**$90^{\#12}$**	$500^{\#23}$	<2	<2	-	<2	<2	<2	-	<2	<2	-	<2	<2	<2	<2	-	<1	<2	<2	<2	<1	-	<2	-	<2
Boron	mg/kg			**$20,000^{\#12}$**	$300,000^{\#23}$	<10	<10	-	<10	15	28	-	<10	16	-	10	<10	11	16	-	<50	<10	<10	29	<50	-	35	-	<10
Cadmium	mg/kg	0.2		**$90^{\#12}$**	$900^{\#23}$	<0.4	<0.4	-	<0.4	<0.4	<0.4	-	<0.4	<0.4	-	<0.4	<0.4	<0.4	<0.4	-	<1	<0.4	<0.4	<0.4	<1	-	<0.4	-	<0.4
Chromium	mg/kg	2	$200^{\#2}$	**$300^{\#15}$**	$3,600^{\#26}$	12	17	-	<5	7.8	5.9	-	44	6.7	-	6.6	16	8.2	15	-	7	7.2	8.2	9	10	-	5.1	-	<5
Chromium(VI)	mg/kg	1		**$300^{\#12}$**	$3,600^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/kg	5		**$300^{\#12}$**	$4,000^{\#23}$	6.3	12	-	<5	<5	<5	-	<5	<5	-	<5	7.5	<5	<5	-	3	<5	<5	<5	5	-	<5	-	<5
Copper	mg/kg	5	$70^{\#3}$	**$17,000^{\#12}$**	$240,000^{\#23}$	17	17	-	<5	10	10	-	8.2	9.7	-	23	<5	14	16	-	16	11	5.3	21	7	-	11	-	<5
Lead	mg/kg	5	$1,130^{\#4}$	**$600^{\#16}$**	$1,500^{\#27}$	22	26	-	5.3	48	37	-	34	55	-	16	29	51	47	-	26	35	36	18	24	-	13	-	<5
Manganese	mg/kg	5		**$19,000^{\#12}$**	$60,000^{\#23}$	130	190	-	35	63	120	-	68	34	-	110	73	78	110	-	111	63	61	87	88	-	66	-	16
Mercury	mg/kg	0.05		**$80^{\#12}$**	$730^{\#23}$	<0.1	<0.1	-	<0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	<0.1
Molybdenum	mg/kg	5		**$390^{\#14}$**	$5,800^{\#25}$	<5	<5	-	<5	<5	<5	-	<5	<5	-	<5	<5	<5	<5	-	4	<5	<5	<5	<2	-	<5	-	<5
Nickel	mg/kg	2	$35^{\#3}$	**$1,200^{\#12}$**	$6,000^{\#23}$	21	36	-	6	7	6.1	-	12	5.8	-	6	8.1	9.6	9.9	-	8	11	5.5	5.8	8	-	<5	-	<5
Selenium	mg/kg	2		**$700^{\#12}$**	$10,000^{\#23}$	<2	<2	-	<2	<2	<2	-	<2	<2	-	<2	<2	<2	<2	-	<5	<2	<2	<2	<5	-	<2	-	<2
Silver	mg/kg	2		**$390^{\#14}$**	$5,800^{\#25}$	<0.2	<0.2	-	<0.2	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	<0.2	<0.2	<0.2	-	<2	<0.2	<0.2	<0.2	<2	-	<0.2	-	<0.2
Tin	mg/kg	5		**$47,000^{\#14}$**	$700,000^{\#25}$	<10	<10	-	<10	<10	<10	-	<10	<10	-	<10	<10	<10	<10	-	<5	<10	<10	<10	<5	-	<10	-	<10
Zinc	mg/kg	5	$110^{\#3}$	**$30,000^{\#12}$**	$400,000^{\#23}$	140	140	-	9.4	68	91	-	21	83	-	99	30	79	110	-	101	80	49	64	50	-	65	-	<5
BTEX																													
Benzene	mg/kg	0.1	50	**$120^{\#17}$**	$3^{\#28}$	-	-	-	<0.1	-	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	-	<0.1	-	-	-	<0.1	-	<0.1	-
Toluene	mg/kg	0.1	85	**$18,000^{\#17}$**	$99,000^{\#28}$	-	-	-	<0.1	-	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	-	<0.1	-	-	-	<0.1	-	<0.1	-
Ethylbenzene	mg/kg	0.1	70	**$5,300^{\#17}$**	$27,000^{\#28}$	-	-	-	<0.1	-	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	-	<0.1	-	-	-	<0.1	-	<0.1	-
Xylene (m & p)	mg/kg	0.2				-	-	-	<0.2	-	-	<0.2	-	<0.2	<0.2	-	-	-	-	-	-	<0.2	-	-	-	<0.2	-	<0.2	-
Xylene (o)	mg/kg	0.1				-	-	-	<0.1	-	-	<0.1	-	<0.1	<0.1	-	-	-	-	-	-	<0.1	-	-	-	<0.1	-	<0.1	-
Total Xylene	mg/kg	0.3	45	**$15,000^{\#17}$**	$230^{\#28}$	-	-	-	<0.3	-	-	<0.3	-	<0.3	<0.3	-	-	-	-	-	-	<0.3	-	-	-	<0.3	-	<0.3	-
Total BTEX	mg/kg	0.2				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Recoverable Hydrocarbons																													
C6-C10 Fraction	mg/kg	10	180			<20	-	-	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	-	<20	<20	<20	-	<20	<20	<20	<20
C6-C10 Fraction minus BTEX (F1)	mg/kg	10	180	**$5,100^{\#20}$**	$260^{\#29}$	<20	-	-	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	-	<20	<20	<20	-	<20	<20	<20	<20
>C10-C16 Fraction	mg/kg	20	120			<50	-	-	<50	100	<50	<50	<50	<50	<50	<50	<50	<50	70	65	-	<50	<50	160	-	<50	<50	<50	<50
>C10-C16 Fraction minus naphthalene (F2)	mg/kg	20	120	**$3,800^{\#20}$**	$20,000^{\#20}$	<50	-	-	<50	100	<50	<50	<50	<50	<50	<50	<50	<50	70	65	-	<50	<50	160	-	<50	<50	<50	<50
>C16-C34 Fraction	mg/kg	50	300	**$5,300^{\#21}$**	$27,000^{\#21}$	<100	-	-	<100	260	610	130	1,200	130	140	<100	<100	130	530	380	-	<100	<100	740	-	210	410	370	<100
>C34-C40 Fraction	mg/kg	50	2800	**$7,400^{\#21}$**	$38,000^{\#21}$	<100	-	-	<100	<100	170	<100	300	<100	<100	<100	<100	<100	260	170	-	<100	<100	320	-	<100	220	<100	<100
>C10-C40 Fraction (Sum)	mg/kg	50				<100	-	-	<100	360	780	130	1,500	130	140	<100	<100	130	860	615	-	<100	<100	1,220	-	210	630	370	<100
PAHs																													
Acenaphthene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	-	-	<0.5	-	<0.5
Acenaphthylene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	-	-	<0.5	-	<0.5
Anthracene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	3.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	-	-	<0.5	-	<0.5
Benz(a)anthracene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	<0.5	4.7	<0.5	15	0.5	1.4	<0.5	<0.5	<0.5	0.9	1.1	-	<0.5	<0.5	<0.5	-	-	<0.5	-	<0.5
2-Chloronaphthalene	mg/kg	0.1		**$4,800^{\#14}$**	$60,000^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1	0.7			<0.5	<0.5	<0.5	<0.5	<0.5	5.8	0.9	16	0.8	1.9	<0.5	<0.5	<0.5	0.8	1.2	-	<0.5	<0.5	<0.5	-	-	<0.5	-	<0.5
Benzo(b)fluoranthene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoranthene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	4	0.6	10	0.6	1.2	<0.5	<0.5	0.5	0.9	1.1	-	<0.5	<0.5	<0.5	-	-	<0.5	-	<0.5
Benzo(g,h,i)perylene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	<0.5	3.2	0.7	8.6	0.6	1.2	<0.5	<0.5	<0.5	<0.5	0.8	-	<0.5	<0.5	<0.5	-	-	<0.5	-	<0.5
Benzo(b+j+k)fluoranthene	mg/kg	0.2				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	<0.5	4.5	0.8	13	0.8	1.7	<0.5	<0.5	<0.5	1	1	-	<0.5	<0.5	<0.5	-	-	<0.5	-	<0.5
Chrysene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	<0.5	6.2	0.6	13	0.7	1.5	<0.5	<0.5	<0.5	1	1.5	-	<0.5	<0.5	<0.5	-	-	<0.5	-	<0.5
Dibenz(a,h)anthracene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	1.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	-	-	<0.5	-	<0.5
Fluoranthene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	<0.5	6.8	0.9	24	0.9	2.5	<0.5	<0.5	0.9	1.3	1.9	-	<0.5	<0.5	<0.5	-	-	<0.5	-	<0.5
Fluorene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	-	-	<0.5	-	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	<0.5	2.5	0.5	7.1	<0.5	1	<0.5	<0.5	<0.5	<0.5	0.6	-	<0.5	<0.5	<0.5	-	-	<0.5	-	<0.5
Naphthalene	mg/kg	0.1	$170^{\#11}$	**$1,900^{\#17}$**	$\text{NL}^{\#28}$	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	-	<0.5	<0.5	<0.5	<0.5
Phenanthrene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	<0.5	2	<0.5	8.9	<0.5	1.5	<0.5	<0.5	<0.5	<0.5	0.7	-	<0.5	<0.5	<0.5	-	-	<0.5	-	<0.5
Pyrene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	<0.5	7.8	1	26	1	2.8	<0.5	<0.5	0.9	1.2	2	-	<0.5	<0.5	<0.5	-	-	<0.5	-	<0.5
Benzo(a)pyrene TEQ (Zero)	mg/kg	0.1		**$3^{\#12}$**	$40^{\#23}$	<0.5	<0.5	<0.5	<0.5	<0.5	**8.4**	1.1	**22**	1	2.5	<0.5	<0.5	<0.5	1.1	1.6	-	<0.5	<0.5	<0.5	-	-	<0.5	-	<0.5
Sum of Polycyclic aromatic hydrocarbons (PAH)	mg/kg	0.1		**$300^{\#12}$**	$4,000^{\#23}$	<0.5	<0.5	<0.5	<0.5	<0.5	48.9	6	147.4	5.9	16.7	<0.5	<0.5	2.3	7.1	11.9	-	<0.5	<0.5	<0.5	-	-	<0.5	-	<0.5

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Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**
					Location Code	MW03	MW03	MW03	T1	T2	T2	BH01	BH01	BH01	BH01	BH02	BH02	BH02	BH03	BH03	BH04	BH05	BH05	BH05	BH06
					Field ID	MW03/0.1	MW03/0.5	MW03/1.0	T1/0.1	T2/0.1	T2/0.5	BH01/0-0.05	BH01/0.4-0.5	BH01/0.6-0.7	BH01/1.4-1.5	BH02/0.15-0.25	BH02/0.9-1.0	BH02/1.4-1.5	BH03/0-0.05	BH03/0.6-0.7	BH04/0.15-0.25	BH05/0-0.05	BH05/0.15-0.25	BH05/0.4-0.5	BH06/0.15-0.25
					Date	15/07/2020	15/07/2020	15/07/2020	14/07/2020	14/07/2020	15/07/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020
					Depth	0.1	0.5	1	0.1	0.1	0.5	0 - 0.05	0.4 - 0.5	0.6 - 0.7	1.4 - 1.5	0.15 - 0.25	0.9 - 1	1.4 - 1.5	0 - 0.05	0.6 - 0.7	0.15 - 0.25	0 - 0.05	0.15 - 0.25	0.4 - 0.5	0.15 - 0.25
					Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
					Lab Report No.	732271	732271	733886	732366	732366	733886	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																				
Physical Parameters																									
Moisture Content	%	0.1				6.4	12	6.2	-	22	8.1	-	-	-	8	-	-	-	-	-	-	-	-	-	-
Resistivity	Ω m	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Electrical Conductivity	µS/cm	10				-	-	-	-	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (aqueous extract)	pH Units	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (Lab)	pH Units	0.1				-	-	-	-	-	-	-	-	-	9	-	-	-	-	-	-	-	-	-	-
Inorganics																									
Cyanide (Free)	mg/kg	5		**240**[#12]	1,500[#23]	-	-	-	<5	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (Total)	mg/kg	5		**240**[#13]	1,500[#24]	-	-	-	-	-	-	-	-	-	<5	-	-	-	-	-	-	-	-	-	-
Fluoride	mg/kg	100		**3,100**[#14]	47,000[#25]	-	-	-	-	-	-	-	-	-	240	-	-	-	-	-	-	-	-	-	-
Exchangeable Calcium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Magnesium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Potassium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Sodium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Sodium Percent	%	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cation Exchange Capacity	meq/100g	0.05				-	-	-	-	8.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions																									
Chloride	mg/kg	5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate (as SO4)	mg/kg	30				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																									
Arsenic	mg/kg	2	100[#1]	**300**[#12]	3,000[#23]	11	7.1	-	<2	2.5	5.4	<5	11	9	13	11	56	35	5	8	6	<5	<5	16	8
Barium	mg/kg	10		**15,000**[#14]	220,000[#25]	77	26	-	-	-	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/kg	2		**90**[#12]	500[#23]	<2	<2	-	<2	<2	<2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/kg			**20,000**[#12]	300,000[#23]	<10	19	-	22	<10	<10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/kg	0.2		**90**[#12]	900[#23]	<0.4	<0.4	-	<0.4	<0.4	<0.4	<0.2	2.2	2.2	0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	1.3	<0.2
Chromium	mg/kg	2	200[#2]	**300**[#15]	3,600[#26]	27	15	-	<5	7.1	11	9	22	22	-	22	38	52	8	7	11	12	15	23	10
Chromium(VI)	mg/kg	1		**300**[#12]	3,600[#23]	-	-	-	<1	<1	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-
Cobalt	mg/kg	5		**300**[#12]	4,000[#23]	19	<5	-	<5	<5	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/kg	5	70[#3]	**17,000**[#12]	240,000[#23]	31	8.9	-	10	8.9	21	16	230	240	32	17	8	13	10	16	13	17	17	250	7
Lead	mg/kg	5	1,130[#4]	**600**[#16]	1,500[#27]	87	60	-	12	42	50	56	**1,100**	**910**	130	140	34	17	60	56	71	80	88	**1,200**	50
Manganese	mg/kg	5		**19,000**[#12]	60,000[#23]	350	54	-	68	57	210	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/kg	0.05		**80**[#12]	730[#23]	<0.1	<0.1	-	<0.1	<0.1	<0.1	0.1	0.53	0.62	0.18	0.15	0.06	0.07	0.13	0.09	0.16	0.12	0.12	0.66	0.08
Molybdenum	mg/kg	5		**390**[#14]	5,800[#25]	<5	<5	-	-	-	<5	-	-	-	<5	-	-	-	-	-	-	-	-	-	-
Nickel	mg/kg	2	35[#3]	**1,200**[#12]	6,000[#23]	70	8.2	-	<5	6.6	49	8	69	72	47	19	8	22	8	17	14	9	12	69	10
Selenium	mg/kg	2		**700**[#12]	10,000[#23]	<2	<2	-	<2	<2	<2	-	-	-	<3	-	-	-	-	-	-	-	-	-	-
Silver	mg/kg	2		**390**[#14]	5,800[#25]	0.2	<0.2	-	-	-	<0.2	-	-	-	<5	-	-	-	-	-	-	-	-	-	-
Tin	mg/kg	5		**47,000**[#14]	700,000[#25]	20	<10	-	-	-	<10	-	-	-	11	-	-	-	-	-	-	-	-	-	-
Zinc	mg/kg	5	110[#3]	**30,000**[#12]	400,000[#23]	130	44	-	71	66	73	120	1,500	1,100	130	190	29	25	98	140	120	130	120	1,000	68
BTEX																									
Benzene	mg/kg	0.1	50	**120**[#17]	3[#28]	-	-	<0.1	<0.1	<0.1	<0.5	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
Toluene	mg/kg	0.1	85	**18,000**[#17]	99,000[#28]	-	-	<0.1	<0.1	<0.1	<0.5	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	mg/kg	0.1	70	**5,300**[#17]	27,000[#28]	-	-	<0.1	<0.1	<0.1	<0.5	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
Xylene (m & p)	mg/kg	0.2				-	-	<0.2	<0.2	<0.2	<1	-	-	-	<1	-	-	-	-	-	-	-	-	-	-
Xylene (o)	mg/kg	0.1				-	-	<0.1	<0.1	<0.1	<0.5	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
Total Xylene	mg/kg	0.3	45	**15,000**[#17]	230[#28]	-	-	<0.3	<0.3	<0.3	<1.5	-	-	-	<1	-	-	-	-	-	-	-	-	-	-
Total BTEX	mg/kg	0.2				-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-
Total Recoverable Hydrocarbons																									
C6-C10 Fraction	mg/kg	10	180			-	-	<20	<20	<20	<100	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C6-C10 Fraction minus BTEX (F1)	mg/kg	10	180	**5,100**[#20]	260[#29]	-	-	<20	<20	<20	<100	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
>C10-C16 Fraction	mg/kg	20	120			-	-	<50	<50	<50	470	<20	<20	<60	<200	<80	<20	<20	<20	<400	<20	<40	<20	<60	<20
>C10-C16 Fraction minus naphthalene (F2)	mg/kg	20	120	**3,800**[#20]	20,000[#20]	-	-	<50	<50	<50	470	<20	<20	<60	<20	<80	<20	<20	<20	<400	<20	<40	<20	<60	<20
>C16-C34 Fraction	mg/kg	50	300	**5,300**[#21]	27,000[#21]	-	-	<100	110	<100	9,500	79	730	790	9,100	810	100	<50	290	5,600	470	110	68	980	170
>C34-C40 Fraction	mg/kg	50	2800	**7,400**[#21]	38,000[#21]	-	-	<100	<100	<100	1,100	<50	260	320	590	<200	<50	<50	76	<1,000	74	<100	<50	280	<50
>C10-C40 Fraction (Sum)	mg/kg	50				-	-	<100	110	<100	11,070	79	990	1,100	9,700	810	100	<50	370	5,600	540	110	68	1,300	170
PAHs																									
Acenaphthene	mg/kg	0.1				0.7	<0.5	-	<0.5	<0.5	11	<0.1	<0.3	<0.6	2.6	<0.6	<0.1	<0.1	<0.1	<2	<0.2	<0.1	<0.1	<0.6	<0.1
Acenaphthylene	mg/kg	0.1				4.2	<0.5	-	<0.5	<0.5	6.6	<0.1	0.5	<0.6	24	0.8	<0.1	<0.1	0.2	<2	0.5	<0.1	<0.1	0.6	0.2
Anthracene	mg/kg	0.1				11	<0.5	-	<0.5	<0.5	56	<0.1	0.8	0.8	57	1.2	0.2	<0.1	0.3	2.3	0.9	<0.1	<0.1	2	0.3
Benz(a)anthracene	mg/kg	0.1				33	0.8	-	<0.5	<0.5	99	0.1	3.4	2.9	130	6.2	0.8	<0.1	1.6	21	4.5	0.3	0.4	5.2	1.7
2-Chloronaphthalene	mg/kg	0.1		**4,800**[#14]	60,000[#25]	-	-	-	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1	0.7			34	1	-	<0.5	<0.5	99	0.2	4.4	5.4	130	14	1.5	<0.1	2.3	37	6	0.5	0.6	8.7	2.2
Benzo(b)fluoranthene	mg/kg	0.1				-	-	-	-	-	-	0.2	3.9	4.1	100	11	1.2	<0.1	2.4	36	5.3	0.4	0.5	6.5	1.9
Benzo(b+j)fluoranthene	mg/kg	0.5				26	0.7	-	<0.5	<0.5	68	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	0.1				19	0.5	-	<0.5	<0.5	57	0.2	4.2	4.1	74	10	1	<0.1	2	31	5.2	0.4	0.5	4.7	1.8
Benzo(b+j+k)fluoranthene	mg/kg	0.2				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1				29	0.9	-	<0.5	<0.5	74	0.1	3.4	4.1	98	11	1.2	<0.1	1.4	26	4.2	0.4	0.4	6.2	1.5
Chrysene	mg/kg	0.1				28	1	-	<0.5	<0.5	87	0.1	3.5	4.2	120	11	1.2	<0.1	1.8	24	4.8	0.4	0.5	7.4	1.8
Dibenz(a,h)anthracene	mg/kg	0.1				4.2	<0.5	-	<0.5	<0.5	21	<0.1	0.9	<0.6	16	2.1	0.2	<0.1	0.5	7.6	1.2	<0.1	0.1	1.1	0.5
Fluoranthene	mg/kg	0.1				60	2	-	<0.5	<0.5	230	0.2	5.9	6.7	360	18	2.3	<0.1	3	28	9	0.6	0.7	15	3
Fluorene	mg/kg	0.1				2.9	<0.5	-	<0.5	<0.5	9.2	<0.1	<0.3	<0.6	12	<0.6	<0.1	<0.1	<0.1	<2	<0.2	<0.1	<0.1	<0.6	<0.1
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1				16	<0.5	-	<0.5	<0.5	53	0.2	3.9	3.4	84	8.6	0.8	<0.1	2	32	5.2	0.4	0.5	4.5	1.9
Naphthalene	mg/kg	0.1	170[#11]	**1,900**[#17]	NL [#28]	0.6	<0.5	<0.5	<0.5	<0.5	<2.5	<0.1	<0.3	<0.6	5.5	<0.6	<0.1	<0.1	<0.1	<2	<0.2	<0.1	<0.1	<0.6	<0.1
Phenanthrene	mg/kg	0.1				42	<0.5	-	<0.5	<0.5	210	<0.1	2.3	2.6	310	6.6	1.2	<0.1	1	4.7	3.4	0.2	0.2	9.6	0.9
Pyrene	mg/kg	0.1				62	2.2	-	<0.5	<0.5	240	0.3	6	6.9	310	18	2.2	<0.1	3.1	32	9	0.6	0.8	15	3.1
Benzo(a)pyrene TEQ (Zero)	mg/kg	0.1		**3**[#12]	40[#23]	**49**	1.3	-	<0.5	<0.5	**150**	0.3	**6.8**	**6.9**	**190**	**20**	2.1	<0.1	**3.6**	**57**	**9.2**	0.7	0.9	**12**	**3.4**
Sum of Polycyclic aromatic hydrocarbons (PAH)	mg/kg	0.1		**300**[#12]	4,000[#23]	**372.6**	9.1	-	<0.5	<0.5	**1,323.9**	1.6	43	45	**1,800**	120	14	<0.1	22	280	59	4.2	5.2	86	21

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria
Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**
					Location Code	BH06	BH07	BH08	BH08	BH09	BH09	BH10	BH11	BH12	BH12	BH13	BH13	BH14	BH14	BH15	BH16	BH16	BH17	BH17
					Field ID	BH06/0.4-0.5	BH07/0.4-0.5	BH08/0-0.05	BH08/0.6-0.7	BH09/0-0.05	BH09/0.6-0.7	BH10/0.15-0.25	BH11/0.4-0.5	BH12/0.15-0.25	BH12/0.4-0.5	BH13/0-0.05	BH13/0.6-0.7	BH14/0-0.05	BH14/0.4-0.5	BH15/0.15-0.25	BH16/0.15-0.25	BH16/0.4-0.5	BH17/0.4-0.5	BH17/0.6-0.7
					Date	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020
					Depth	0.4 - 0.5	0.4 - 0.5	0 - 0.05	0.6 - 0.7	0 - 0.05	0.6 - 0.7	0.15 - 0.25	0.4 - 0.5	0.15 - 0.25	0.4 - 0.5	0 - 0.05	0.6 - 0.7	0 - 0.05	0.4 - 0.5	0.15 - 0.25	0.15 - 0.25	0.4 - 0.5	0.4 - 0.5	0.6 - 0.7
					Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
					Lab Report No.	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																			
Physical Parameters																								
Moisture Content	%	0.1				-	-	44	-	-	-	19	-	-	-	-	23	-	-	-	-	-	-	18
Resistivity	Ω m	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Electrical Conductivity	µS/cm	10				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (aqueous extract)	pH Units	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (Lab)	pH Units	0.1				-	-	6.6	-	-	-	7.3	-	7.6	-	-	8.4	-	-	-	-	-	-	8.4
Inorganics																								
Cyanide (Free)	mg/kg	5		**240$^{\#12}$**	1,500$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (Total)	mg/kg	5		**240$^{\#13}$**	1,500$^{\#24}$	-	-	<5	-	-	-	<5	-	-	-	-	<5	-	-	-	-	-	-	<5
Fluoride	mg/kg	100		**3,100$^{\#14}$**	47,000$^{\#25}$	-	-	120	-	-	-	190	-	-	-	-	260	-	-	-	-	-	-	260
Exchangeable Calcium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Magnesium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Potassium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Sodium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Sodium Percent	%	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cation Exchange Capacity	meq/100g	0.05				-	-	-	-	-	-	-	-	7.7	-	-	-	-	-	-	-	-	-	-
Major Ions																								
Chloride	mg/kg	5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate (as SO4)	mg/kg	30				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																								
Arsenic	mg/kg	2	100$^{\#1}$	**300$^{\#12}$**	3,000$^{\#23}$	16	15	<5	17	<5	8	5	15	9	16	<5	17	<5	16	6	7	14	13	14
Barium	mg/kg	10		**15,000$^{\#14}$**	220,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/kg	2		**90$^{\#12}$**	500$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/kg			**20,000$^{\#12}$**	300,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/kg	0.2		**90$^{\#12}$**	900$^{\#23}$	0.3	0.3	<0.2	0.4	<0.2	<0.2	<0.2	0.3	<0.2	0.3	<0.2	0.5	<0.2	0.4	<0.2	0.2	0.4	0.3	0.2
Chromium	mg/kg	2	200$^{\#2}$	**300$^{\#15}$**	3,600$^{\#26}$	21	25	-	27	10	18	-	25	13	27	6	-	10	26	10	10	22	18	-
Chromium(VI)	mg/kg	1		**300$^{\#12}$**	3,600$^{\#23}$	-	-	<1	-	-	-	<1	-	-	-	-	<1	-	-	-	-	-	-	<1
Cobalt	mg/kg	5		**300$^{\#12}$**	4,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/kg	5	70$^{\#3}$	**17,000$^{\#12}$**	240,000$^{\#23}$	22	23	11	33	11	10	9	26	16	22	8	32	10	31	9	13	27	24	21
Lead	mg/kg	5	1,130$^{\#4}$	**600$^{\#16}$**	1,500$^{\#27}$	150	170	49	190	65	59	53	230	100	180	33	200	28	320	45	93	220	140	130
Manganese	mg/kg	5		**19,000$^{\#12}$**	60,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/kg	0.05		**80$^{\#12}$**	730$^{\#23}$	0.18	0.28	0.09	0.3	0.1	0.11	0.08	0.68	0.11	0.25	<0.05	0.3	0.05	0.36	0.06	0.12	1.3	0.17	0.2
Molybdenum	mg/kg	5		**390$^{\#14}$**	5,800$^{\#25}$	-	-	<5	-	-	-	<5	-	-	-	-	<5	-	-	-	-	-	-	<5
Nickel	mg/kg	2	35$^{\#3}$	**1,200$^{\#12}$**	6,000$^{\#23}$	36	24	9	27	10	12	9	28	18	24	5	23	6	29	10	13	25	27	19
Selenium	mg/kg	2		**700$^{\#12}$**	10,000$^{\#23}$	-	-	<3	-	-	-	<3	-	-	-	-	<3	-	-	-	-	-	-	<3
Silver	mg/kg	2		**390$^{\#14}$**	5,800$^{\#25}$	-	-	<5	-	-	-	<5	-	-	-	-	<5	-	-	-	-	-	-	<5
Tin	mg/kg	5		**47,000$^{\#14}$**	700,000$^{\#25}$	-	-	<5	-	-	-	<5	-	-	-	-	9	-	-	-	-	-	-	8
Zinc	mg/kg	5	110$^{\#3}$	**30,000$^{\#12}$**	400,000$^{\#23}$	210	310	100	410	98	110	86	320	150	260	89	410	67	400	87	130	310	210	280
BTEX																								
Benzene	mg/kg	0.1	50	**120$^{\#17}$**	3$^{\#28}$	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Toluene	mg/kg	0.1	85	**18,000$^{\#17}$**	99,000$^{\#28}$	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Ethylbenzene	mg/kg	0.1	70	**5,300$^{\#17}$**	27,000$^{\#28}$	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Xylene (m & p)	mg/kg	0.2				-	-	<1	-	-	-	<1	-	-	-	-	<1	-	-	-	-	-	-	<1
Xylene (o)	mg/kg	0.1				-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Total Xylene	mg/kg	0.3	45	**15,000$^{\#17}$**	230$^{\#28}$	-	-	<1	-	-	-	<1	-	-	-	-	<1	-	-	-	-	-	-	<1
Total BTEX	mg/kg	0.2				-	-	<1	-	-	-	<1	-	-	-	-	<1	-	-	-	-	-	-	<1
Total Recoverable Hydrocarbons																								
C6-C10 Fraction	mg/kg	10	180			<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C6-C10 Fraction minus BTEX (F1)	mg/kg	10	180	**5,100$^{\#20}$**	260$^{\#29}$	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
>C10-C16 Fraction	mg/kg	20	120			<60	<20	<20	<20	<40	<20	<20	<80	<60	<20	<20	<80	<20	<80	<20	<20	<80	<60	<20
>C10-C16 Fraction minus naphthalene (F2)	mg/kg	20	120	**3,800$^{\#20}$**	20,000$^{\#20}$	<60	<20	<20	<20	<40	<20	<20	<80	<60	<20	<20	<80	<20	<80	<20	<20	<80	<60	<20
>C16-C34 Fraction	mg/kg	50	300	**5,300$^{\#21}$**	27,000$^{\#21}$	1,500	1,700	360	1,900	340	650	270	1,300	500	1,400	270	630	200	2,100	140	370	1,300	870	570
>C34-C40 Fraction	mg/kg	50	2800	**7,400$^{\#21}$**	38,000$^{\#21}$	200	230	77	280	<100	80	81	<200	<150	370	100	<200	78	270	<50	57	<200	<150	150
>C10-C40 Fraction (Sum)	mg/kg	50				1,700	1,900	440	2,200	340	730	350	1,300	500	1,800	370	630	280	2,400	140	430	1,300	870	720
PAHs																								
Acenaphthene	mg/kg	0.1				<0.3	<0.6	<0.2	<0.6	<0.2	<0.2	<0.2	<0.6	<0.6	<0.6	<0.1	<0.6	<0.2	<0.6	<0.1	<0.3	<0.6	<0.6	<0.6
Acenaphthylene	mg/kg	0.1				2.2	1.6	0.3	1.5	0.3	0.8	0.3	1.3	<0.6	1.4	<0.1	0.7	<0.2	2	0.1	0.3	1.4	<0.6	0.6
Anthracene	mg/kg	0.1				2.9	2.4	0.5	2.1	0.4	1.1	0.4	2.1	1.4	1.7	0.1	0.9	0.7	3.1	0.2	0.5	2	2.9	0.7
Benz(a)anthracene	mg/kg	0.1				16	13	3	10	2.3	6.3	2.2	11	5.3	8.2	0.5	5	1.5	17	1	2.7	12	9.4	3.7
2-Chloronaphthalene	mg/kg	0.1		**4,800$^{\#14}$**	60,000$^{\#25}$	-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
Benzo(a)pyrene	mg/kg	0.1	0.7			20	27	4.2	24	3.2	8.6	3.1	24	11	19	1.1	8.2	2.3	36	2.2	6.2	21	18	6.2
Benzo(b)fluoranthene	mg/kg	0.1				18	21	3.5	19	2.8	8.8	2.6	18	8.1	15	0.8	7.3	1.6	27	1.7	4.9	15	13	5.2
Benzo(b+j)fluoranthene	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	0.1				16	22	3.6	16	2.8	7.2	2.6	14	6.8	17	0.8	7.6	1.5	25	1.6	4.7	15	10	5.1
Benzo(b+j+k)fluoranthene	mg/kg	0.2				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1				14	21	3	19	2.6	4.9	2.5	18	8	15	0.9	6.4	1.4	27	1.7	4.9	13	13	4.5
Chrysene	mg/kg	0.1				17	21	3.2	19	2.5	7.1	2.5	18	8.7	15	0.9	7.1	1.8	25	1.7	4.8	16	14	5.3
Dibenz(a,h)anthracene	mg/kg	0.1				3.9	4.1	0.7	3.3	0.7	1.7	0.6	3.5	1.3	2.8	0.2	1.1	0.2	4.9	0.3	0.9	2.3	2.5	0.7
Fluoranthene	mg/kg	0.1				30	35	5.5	30	3.9	12	4.1	30	15	23	1.4	11	4.3	43	2.5	7.3	24	27	8
Fluorene	mg/kg	0.1				0.6	0.7	<0.2	<0.6	<0.2	0.2	<0.2	<0.6	<0.6	<0.6	<0.1	<0.6	<0.2	0.7	<0.1	<0.3	<0.6	<0.6	<0.6
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1				16	16	3.5	15	2.8	7.2	2.6	14	6.3	12	0.6	7.6	1.6	21	1.4	3.7	16	9.3	5.1
Naphthalene	mg/kg	0.1	170$^{\#11}$	**1,900$^{\#17}$**	NL $^{\#28}$	0.3	<0.6	<0.2	<0.6	<0.2	<0.2	<0.2	<0.6	<0.6	<0.6	<0.1	<0.5	<0.2	<0.6	<0.1	<0.3	<0.6	<0.6	<0.5
Phenanthrene	mg/kg	0.1				13	13	1.9	11	1.1	4.5	1.4	11	7.6	8.2	0.5	3.9	2.9	15	0.8	2.4	8	13	2.8
Pyrene	mg/kg	0.1				31	36	5.8	31	4.3	13	4.3	31	16	24	1.6	12	3.9	45	2.7	7.8	26	25	8.4
Benzo(a)pyrene TEQ (Zero)	mg/kg	0.1		**3$^{\#12}$**	40$^{\#23}$	**31**	**39**	**6.3**	**34**	**5**	**13**	**4.7**	**34**	**15**	**27**	1.6	**12**	**3.1**	**51**	**3.1**	**8.8**	**29**	**25**	**8.9**
Sum of Polycyclic aromatic hydrocarbons (PAH)	mg/kg	0.1		**300$^{\#12}$**	4,000$^{\#23}$	200	230	39	200	30	83	29	200	96	160	9.4	79	24	290	18	51	170	160	56

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria

Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**
					Location Code	BH18	BH18	BH18	BH19	BH19	BH20	BH21	BH22	BH23	BH23	BH24	BH25	BH25	BH25	BH26	SB01	SB02	SB02	SB02	SB03
					Field ID	BH18/0.0-0.05	BH18/0.4-0.5	BH18/0.6-0.7	BH19/0.0-0.05	BH19/0.6-0.7	BH20/0.15-0.25	BH21/0.15-0.25	BH22/0.4-0.5	BH23/0.0-0.05	BH23/0.6-0.7	BH24/0.4-0.5	BH25/0.0-0.05	BH25/0.4-0.5	BH25/0.6-0.7	BH26/0.4-0.5	SB01_0.45	SB02_0.4	QC01	QC02	SB03_0.1
					Date	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020
					Depth	0 - 0.05	0.4 - 0.5	0.6 - 0.7	0 - 0.05	0.6 - 0.7	0.15 - 0.25	0.15 - 0.25	0.4 - 0.5	0 - 0.05	0.6 - 0.7	0.4 - 0.5	0 - 0.05	0.4 - 0.5	0.6 - 0.7	0.4 - 0.5	0.45	0.4			0.1
					Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Field_D	Interlab_D	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
					Lab Report No.	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	762416	762416	762416	EM2021988	762416
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																				
Physical Parameters																									
Moisture Content	%	0.1				-	8	-	-	-	-	22	-	-	-	-	28	-	-	22	8.1	5.3	7.0	4.1	6.0
Resistivity	Ω m	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Electrical Conductivity	µS/cm	10				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (aqueous extract)	pH Units	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH (Lab)	pH Units	0.1				-	8	-	-	-	-	7.5	-	-	-	-	6.9	-	-	8.7	-	-	-	-	-
Inorganics																									
Cyanide (Free)	mg/kg	5		**240[#12]**	1,500[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (Total)	mg/kg	5		**240[#13]**	1,500[#24]	-	<5	-	-	-	-	<5	-	-	-	-	<5	-	-	<5	-	-	-	-	-
Fluoride	mg/kg	100		**3,100[#14]**	47,000[#25]	-	130	-	-	-	-	150	-	-	-	-	130	-	-	200	-	-	-	-	-
Exchangeable Calcium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Magnesium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Potassium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Sodium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Sodium Percent	%	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cation Exchange Capacity	meq/100g	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions																									
Chloride	mg/kg	5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate (as SO4)	mg/kg	30				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																									
Arsenic	mg/kg	2	100[#1]	**300[#12]**	3,000[#23]	8	6	15	<5	24	6	6	14	8	7	10	<5	14	17	18	-	-	-	-	-
Barium	mg/kg	10		**15,000[#14]**	220,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/kg	2		**90[#12]**	500[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/kg			**20,000[#12]**	300,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/kg	0.2		**90[#12]**	900[#23]	<0.2	<0.2	<0.2	<0.2	0.2	<0.2	0.3	0.3	0.2	0.3	0.3	<0.2	0.4	<0.2	0.2	-	-	-	-	-
Chromium	mg/kg	2	200[#2]	**300[#15]**	3,600[#26]	13	-	15	6	23	14	-	27	13	14	17	-	23	11	-	-	-	-	-	-
Chromium(VI)	mg/kg	1		**300[#12]**	3,600[#23]	-	<1	-	-	-	-	<1	-	-	-	-	<1	-	-	<1	-	-	-	-	-
Cobalt	mg/kg	5		**300[#12]**	4,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/kg	5	70[#3]	**17,000[#12]**	240,000[#23]	11	22	120	6	16	13	11	24	17	60	23	8	24	12	22	-	-	-	-	-
Lead	mg/kg	5	1,130[#4]	**600[#16]**	1,500[#27]	76	110	140	23	120	60	110	210	120	**630**	130	50	170	85	130	-	-	-	-	-
Manganese	mg/kg	5		**19,000[#12]**	60,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/kg	0.05		**80[#12]**	730[#23]	0.09	0.07	0.08	<0.05	0.15	0.06	0.1	0.31	0.1	0.22	0.15	0.05	0.26	0.09	0.19	-	-	-	-	-
Molybdenum	mg/kg	5		**390[#14]**	5,800[#25]	-	<5	-	-	-	-	<5	-	-	-	-	<5	-	-	<5	-	-	-	-	-
Nickel	mg/kg	2	35[#3]	**1,200[#12]**	6,000[#23]	15	27	42	<5	20	12	12	26	14	43	21	8	24	13	24	-	-	-	-	-
Selenium	mg/kg	2		**700[#12]**	10,000[#23]	-	<3	-	-	-	-	<3	-	-	-	-	<3	-	-	<3	-	-	-	-	-
Silver	mg/kg	2		**390[#14]**	5,800[#25]	-	<5	-	-	-	-	<5	-	-	-	-	<5	-	-	<5	-	-	-	-	-
Tin	mg/kg	5		**47,000[#14]**	700,000[#25]	-	13	-	-	-	-	<5	-	-	-	-	<5	-	-	39	-	-	-	-	-
Zinc	mg/kg	5	110[#3]	**30,000[#12]**	400,000[#23]	110	99	110	43	200	97	130	320	140	340	250	94	360	57	180	-	-	-	-	-
BTEX																									
Benzene	mg/kg	0.1	50	**120[#17]**	3[#28]	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
Toluene	mg/kg	0.1	85	**18,000[#17]**	99,000[#28]	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
Ethylbenzene	mg/kg	0.1	70	**5,300[#17]**	27,000[#28]	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
Xylene (m & p)	mg/kg	0.2				-	<1	-	-	-	-	<1	-	-	-	-	<1	-	-	<1	-	-	-	-	-
Xylene (o)	mg/kg	0.1				-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
Total Xylene	mg/kg	0.3	45	**15,000[#17]**	230[#28]	-	<1	-	-	-	-	<1	-	-	-	-	<1	-	-	<1	-	-	-	-	-
Total BTEX	mg/kg	0.2				-	<1	-	-	-	-	<1	-	-	-	-	<1	-	-	<1	-	-	-	-	-
Total Recoverable Hydrocarbons																									
C6-C10 Fraction	mg/kg	10	180			<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	-	-	-	-	-
C6-C10 Fraction minus BTEX (F1)	mg/kg	10	180	**5,100[#20]**	260[#29]	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	-	-	-	-	-
>C10-C16 Fraction	mg/kg	20	120			<80	<60	<60	<20	<80	<20	<80	<60	<20	<60	<60	<20	<60	<200	<200	-	-	-	-	-
>C10-C16 Fraction minus naphthalene (F2)	mg/kg	20	120	**3,800[#20]**	20,000[#20]	<80	<60	<60	<20	<80	<20	<80	<60	<20	<60	<60	<20	<60	<200	<200	-	-	-	-	-
>C16-C34 Fraction	mg/kg	50	300	**5,300[#21]**	27,000[#21]	430	810	2,900	66	620	170	410	1,700	530	2,700	950	400	1,600	1,100	1,400	-	-	-	-	-
>C34-C40 Fraction	mg/kg	50	2800	**7,400[#21]**	38,000[#21]	<200	<150	570	<50	<200	<50	<200	210	170	410	<150	100	210	<500	<500	-	-	-	-	-
>C10-C40 Fraction (Sum)	mg/kg	50				430	810	3,500	66	620	170	410	1,900	700	3,100	950	500	1,800	1,100	1,400	-	-	-	-	-
PAHs																									
Acenaphthene	mg/kg	0.1				<0.7	<0.5	<0.6	<0.1	<0.6	<0.3	<0.6	<0.6	<0.7	<0.6	<0.6	<0.7	<0.6	<0.6	<0.7	0.5	0.9	1.4	2.1	<0.5
Acenaphthylene	mg/kg	0.1				<0.7	0.8	1.3	<0.1	0.8	<0.3	<0.6	1.7	<0.7	1.1	0.9	<0.7	1.5	<0.6	<0.7	4.8	21	12	28.1	<0.5
Anthracene	mg/kg	0.1				0.8	1	3.4	<0.1	1.1	<0.3	0.7	2.6	<0.7	2.1	1.4	<0.7	2.2	0.7	0.9	8.6	29	20	39.4	<0.5
Benz(a)anthracene	mg/kg	0.1				4.4	9.1	26	0.5	5.9	1.2	3.7	13	2.5	13	6.6	2.3	12	4.1	4.5	22	63	53	91.6	<0.5
2-Chloronaphthalene	mg/kg	0.1		**4,800[#14]**	60,000[#25]	-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1	0.7			9.9	16	43	0.7	12	2.9	6.1	23	5.8	24	11	3.9	20	9.9	7.9	26	62	52	115	<0.5
Benzo(b)fluoranthene	mg/kg	0.1				7.5	11	28	0.6	9.3	2.3	5	17	4.6	17	8.3	3.5	14	7.4	6.3	-	-	-	-	-
Benzo(b+j)fluoranthene	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17	39	34	116	<0.5
Benzo(g,h,i)perylene	mg/kg	0.1				6	11	27	0.7	7	2	4.8	16	3.8	19	8.3	3.5	15	6.3	6.2	18	37	22	68.7	<0.5
Benzo(b+j+k)fluoranthene	mg/kg	0.2				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1				7.6	9.8	26	0.6	9.1	2.3	4.4	15	4.5	16	7.3	3.1	13	7.2	5.5	18	35	42	38.0	<0.5
Chrysene	mg/kg	0.1				7.7	11	27	0.7	10	2.2	5.1	17	4.6	16	9	3.4	15	7.6	6.1	21	56	55	73.0	<0.5
Dibenz(a,h)anthracene	mg/kg	0.1				1.5	1.9	4.9	0.1	1.7	0.4	0.7	2.8	0.8	2.8	1.1	<0.7	2.3	1.3	1	3.2	12	7.2	15.1	<0.5
Fluoranthene	mg/kg	0.1				12	14	38	0.9	17	3.2	7	27	6.5	21	14	4.4	24	11	8.3	35	57	100	194	0.7
Fluorene	mg/kg	0.1				<0.7	<0.5	<0.6	<0.1	<0.6	<0.3	<0.6	<0.6	<0.7	<0.6	<0.6	<0.7	<0.6	<0.6	<0.7	1.7	4.4	3.0	4.7	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1				5.8	12	30	0.7	6.6	1.7	5	17	3.6	19	8.8	3.6	15	5.7	6.2	18	42	23	54.0	<0.5
Naphthalene	mg/kg	0.1	170[#11]	**1,900[#17]**	NL [#28]	<0.7	<0.5	<0.6	<0.1	<0.6	<0.3	<0.5	<0.6	<0.7	<0.6	<0.6	<0.5	<0.6	<0.6	<0.5	0.8	2.4	2.0	3.0	<0.5
Phenanthrene	mg/kg	0.1				4.3	3.3	9.4	0.3	6.3	1.2	2.3	9	2	5.9	5.2	1.4	8.3	3.6	2.5	27	67	98	162	<0.5
Pyrene	mg/kg	0.1				12	15	44	1	18	3.5	7.5	28	7.2	23	15	4.9	25	12	8.7	36	63	100	176	0.7
Benzo(a)pyrene TEQ (Zero)	mg/kg	0.1		**3[#12]**	40[#23]	**14**	**22**	**59**	1.1	**17**	**4.1**	**8.7**	**32**	**8.2**	**34**	**15**	**5.2**	**28**	**14**	**11**	**37**	**93**	**75**	**161**	<0.5
Sum of Polycyclic aromatic hydrocarbons (PAH)	mg/kg	0.1		**300[#12]**	4,000[#23]	80	120	**310**	6.8	100	23	52	190	46	180	97	34	170	77	64	257.6	**590.7**	**624.6**	**1,180**	1.4

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria

Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**
					Location Code	SB03	SB04	SB04	SB05	SB05	SB06	SB07	SB07	SB08	SB09	SB09	SB10	SB10	SB11	SB11	SB12	SB12	SB13	SB13	SB13
					Field ID	SB03_0.4	SB04_0.1	SB04_0.4	SB05_0.1	SB05_0.5	SB06_0.48	SB07_0.1-0.2	SB07_0.7-0.8	SB08_0.1-0.2	SB09_0.1-0.2	SB09_0.4-0.5	SB10_0.1-0.2	SB10_0.7-0.8	SB11_0.1-0.2	SB11_0.8-0.9	SB12_0.1-0.2	SB12_1.9-2.0	SB13_0.1-0.2	SB13_0.8_0.9	SB13_1.9-2.0
					Date	8/12/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020	12/01/2021	12/01/2021	12/01/2021	8/12/2020	8/12/2020	12/01/2021	12/01/2021	8/12/2020	8/12/2020	8/12/2020	5/03/2021	12/01/2021	12/02/2021	5/03/2021
					Depth	0.4	0.1	0.4	0.1	0.5	0.48	0.1 - 0.2	0.7 - 0.8	0.1 - 0.2	0.1 - 0.2	0.4 - 0.5	0.1 - 0.2	0.7 - 0.8	0.1 - 0.2	0.8 - 0.9	0.1 - 0.2	1.9 - 2.0	0.1 - 0.2	0.8 - 0.9	1.9 - 2.0
					Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Natural	Fill	Fill	Natural
					Lab Report No.	762416	762416	762416	762416	762416	762416	767787	767787	767787	767787	767787	767787	767787	767787	767787	767787	778664	767787	773807	778664
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																				
Physical Parameters																									
Moisture Content	%	0.1				7.6	11	12	4.5	5.4	4.7	19	12	8.1	15	7.9	24	13	17	29	6.4	23	18	15	27
Resistivity	Ω m	0.5				-	-	-	-	-	-	-	-	-	-	-	97	-	-	-	-	-	-	-	-
Electrical Conductivity	µS/cm	10				-	-	-	-	-	-	-	-	120	-	-	100	-	-	-	-	-	-	-	-
pH (aqueous extract)	pH Units	0.1				-	-	-	-	-	-	-	-	6.8	-	-	7.2	8.3	7.8	-	-	-	-	-	-
pH (Lab)	pH Units	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inorganics																									
Cyanide (Free)	mg/kg	5		**240**[#12]	1,500[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (Total)	mg/kg	5		**240**[#13]	1,500[#24]	-	-	-	-	-	-	-	-	<5	-	-	-	<5	<5	-	-	-	-	-	-
Fluoride	mg/kg	100		**3,100**[#14]	47,000[#25]	-	-	-	-	-	-	-	-	100	-	-	-	<100	<100	-	-	-	-	-	-
Exchangeable Calcium	meq/100g	0.1				-	-	-	-	-	-	-	-	9.1	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Magnesium	meq/100g	0.1				-	-	-	-	-	-	-	-	4.9	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Potassium	meq/100g	0.1				-	-	-	-	-	-	-	-	1.4	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Sodium	meq/100g	0.1				-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Sodium Percent	%	0.1				-	-	-	-	-	-	-	-	2.0	-	-	-	-	-	-	-	-	-	-	-
Cation Exchange Capacity	meq/100g	0.05				-	-	-	-	-	-	-	-	16	-	-	-	-	-	-	-	-	-	-	-
Major Ions																									
Chloride	mg/kg	5				-	-	-	-	-	-	-	-	-	-	-	620	-	-	-	-	-	-	-	-
Sulfate (as SO4)	mg/kg	30				-	-	-	-	-	-	-	-	-	-	-	37	-	-	-	-	-	-	-	-
Metals																									
Arsenic	mg/kg	2	100[#1]	**300**[#12]	3,000[#23]	-	-	-	-	-	-	9.6	4.8	12	9.1	63	9.3	46	5.8	64	17	14	4.4	17	40
Barium	mg/kg	10		**15,000**[#14]	220,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/kg	2		**90**[#12]	500[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/kg			**20,000**[#12]	300,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/kg	0.2		**90**[#12]	900[#23]	-	-	-	-	-	-	<0.4	<0.4	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	2	200[#2]	**300**[#15]	3,600[#26]	-	-	-	-	-	-	16	34	23	13	30	19	22	7.4	83	14	44	9.7	29	61
Chromium(VI)	mg/kg	1		**300**[#12]	3,600[#23]	-	-	-	-	-	-	-	-	<1	-	-	-	<1	<1	-	-	-	-	-	-
Cobalt	mg/kg	5		**300**[#12]	4,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/kg	5	70[#3]	**17,000**[#12]	240,000[#23]	-	-	-	-	-	-	14	26	40	9.4	16	17	7.9	6.0	26	23	9.5	10	35	17
Lead	mg/kg	5	1,130[#4]	**600**[#16]	1,500[#27]	-	-	-	-	-	-	94	23	220	42	82	90	45	19	110	97	9.9	53	180	14
Manganese	mg/kg	5		**19,000**[#12]	60,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/kg	0.05		**80**[#12]	730[#23]	-	-	-	-	-	-	<0.2	<0.1	<0.4	<0.1	<0.1	<0.1	<0.2	<0.1	<0.2	<0.2	<0.1	<0.1	0.2	<0.1
Molybdenum	mg/kg	5		**390**[#14]	5,800[#25]	-	-	-	-	-	-	-	-	<5	-	-	-	<5	<5	-	-	-	-	<5	-
Nickel	mg/kg	2	35[#3]	**1,200**[#12]	6,000[#23]	-	-	-	-	-	-	17	80	24	8.1	13	15	9.5	<5	38	15	16	9.1	24	20
Selenium	mg/kg	2		**700**[#12]	10,000[#23]	-	-	-	-	-	-	-	-	<2	-	-	-	<2	<2	-	-	-	-	<2	-
Silver	mg/kg	2		**390**[#14]	5,800[#25]	-	-	-	-	-	-	-	-	<2	-	-	-	<2	<2	-	-	-	-	<2	-
Tin	mg/kg	5		**47,000**[#14]	700,000[#25]	-	-	-	-	-	-	-	-	12	-	-	-	<10	<10	-	-	-	-	21	-
Zinc	mg/kg	5	110[#3]	**30,000**[#12]	400,000[#23]	-	-	-	-	-	-	160	70	270	79	53	120	110	36	140	160	14	96	440	22
BTEX																									
Benzene	mg/kg	0.1	50	**120**[#17]	3[#28]	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1
Toluene	mg/kg	0.1	85	**18,000**[#17]	99,000[#28]	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1
Ethylbenzene	mg/kg	0.1	70	**5,300**[#17]	27,000[#28]	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1
Xylene (m & p)	mg/kg	0.2				-	-	-	-	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2
Xylene (o)	mg/kg	0.1				-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1
Total Xylene	mg/kg	0.3	45	**15,000**[#17]	230[#28]	-	-	-	-	-	-	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	-	<0.3
Total BTEX	mg/kg	0.2				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Recoverable Hydrocarbons																									
C6-C10 Fraction	mg/kg	10	180			-	-	-	-	-	-	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	-	<20
C6-C10 Fraction minus BTEX (F1)	mg/kg	10	180	**5,100**[#20]	260[#29]	-	-	-	-	-	-	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	-	<20
>C10-C16 Fraction	mg/kg	20	120			-	-	-	-	-	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	310	<50	<50	-	<50
>C10-C16 Fraction minus naphthalene (F2)	mg/kg	20	120	**3,800**[#20]	20,000[#20]	-	-	-	-	-	-	<50	<50	<50	<50	<50	<50	<50	<50	<50	310	<50	<50	-	<50
>C16-C34 Fraction	mg/kg	50	300	**5,300**[#21]	27,000[#21]	-	-	-	-	-	-	590	730	580	220	180	220	270	290	450	1,000	<100	480	-	<100
>C34-C40 Fraction	mg/kg	50	2800	**7,400**[#21]	38,000[#21]	-	-	-	-	-	-	140	150	170	<100	<100	<100	<100	130	160	380	<100	140	-	<100
>C10-C40 Fraction (Sum)	mg/kg	50				-	-	-	-	-	-	730	880	750	220	180	220	270	420	610	1,690	<100	620	-	<100
PAHs																									
Acenaphthene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.9	<0.5
Acenaphthylene	mg/kg	0.1				1.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	6.6	<0.5
Anthracene	mg/kg	0.1				2.6	1.0	<0.5	0.7	0.9	1.8	0.6	1.0	1.2	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	6.1	<0.5
Benz(a)anthracene	mg/kg	0.1				7.6	5.1	1.7	2.5	5.6	7.3	7.4	6.3	7.3	0.9	1.0	1.0	5.4	<0.5	3.2	2.1	<0.5	4.0	68	<0.5
2-Chloronaphthalene	mg/kg	0.1		**4,800**[#14]	60,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1	0.7			8.7	6.2	2.1	2.9	9.8	8.3	8.1	7.2	9.5	1.8	1.7	2.0	6.3	0.7	5.1	4.8	<0.5	4.8	72	<0.5
Benzo(b)fluoranthene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoranthene	mg/kg	0.5				6.0	4.7	1.7	1.9	8.1	6.2	6.8	7.6	9.5	0.9	1.4	1.2	5.2	<0.5	3.3	4.0	<0.5	4.5	65	<0.5
Benzo(g,h,i)perylene	mg/kg	0.1				5.6	4.5	1.1	2.0	2.3	5.4	5.6	4.9	4.7	0.8	0.8	1.1	2.9	0.5	3.5	2.9	<0.5	3.0	41	<0.5
Benzo(b+j+k)fluoranthene	mg/kg	0.2				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1				6.6	5.0	1.5	1.7	8.0	6.2	4.8	4.1	7.3	0.9	1.0	1.1	4.1	0.6	4.5	2.9	<0.5	2.6	61	<0.5
Chrysene	mg/kg	0.1				7.0	5.6	2.2	2.6	5.6	7.7	5.3	5.9	8.0	1.9	1.7	2.5	5.5	0.5	3.7	2.1	<0.5	3.4	97	<0.5
Dibenz(a,h)anthracene	mg/kg	0.1				1.2	1.0	<0.5	<0.5	1.1	1.2	2.2	1.3	1.1	<0.5	<0.5	<0.5	0.7	<0.5	0.8	0.9	<0.5	0.9	14	<0.5
Fluoranthene	mg/kg	0.1				13	9.5	3.3	4.5	9.7	12	14	13	11	3.2	3.5	4.4	9.9	0.9	6.2	4.7	<0.5	6.6	210	<0.5
Fluorene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.9	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1				6.2	4.5	1.0	2.2	2.8	6.3	5.5	4.0	4.3	0.6	<0.5	0.8	3.3	<0.5	2.9	2.4	<0.5	4.1	57	<0.5
Naphthalene	mg/kg	0.1	170[#11]	**1,900**[#17]	NL [#28]	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	4.7	<0.5
Phenanthrene	mg/kg	0.1				6.4	3.7	1.1	2.1	4.1	5.8	3.9	6.1	4.9	0.9	0.8	1.1	3.7	<0.5	2.0	1.8	<0.5	1.9	61	<0.5
Pyrene	mg/kg	0.1				15	10	3.5	4.9	11	13	13	13	12	3.9	3.7	5.1	10	1.0	6.8	5.1	<0.5	6.8	210	<0.5
Benzo(a)pyrene TEQ (Zero)	mg/kg	0.1		**3**[#12]	40[#23]	**13**	**9.2**	2.7	**3.8**	**13**	**12**	**13**	**11**	**14**	2.2	2.1	2.4	**8.9**	0.8	**7.4**	**6.9**	<0.5	**7.3**	**110**	<0.5
Sum of Polycyclic aromatic hydrocarbons (PAH)	mg/kg	0.1		**300**[#12]	4,000[#23]	87.4	60.8	19.2	28	69	81.8	77.2	74.4	80.8	15.8	15.6	20.3	57.9	4.2	42	33.7	<0.5	42.6	**980.2**	<0.5

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria
Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

						SB14	SB14	SB14	SB15	SB16	SB16	SB16	SB16	SB17	SB18	SB18	SB19	SB19	SB20	SB20	SB20	SB21	SB22	SB22
					Report	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**
					Location Code	SB14	SB14	SB14	SB15	SB16	SB16	SB16	SB16	SB17	SB18	SB18	SB19	SB19	SB20	SB20	SB20	SB21	SB22	SB22
					Field ID	SB14_0.1-0.2	SB14_0.8-0.9	SB14_1.9-2.0	SB15_0.1-0.2	SB16_0.05-0.15	SB16_0.45-0.55	QC03	QC04	SB17_0.05-0.15	SB18_0.1-0.2	SB18_0.4-0.5	SB19_0.1-0.2	SB19_0.35-0.45	SB20_0.1-0.2	SB20_0.5-0.6	SB20_2.4-2.5	SB21_0.1-0.2	SB22_0.1-0.2	SB22_1.4-1.5
					Date	12/01/2021	12/02/2021	5/03/2021	12/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021	2/02/2021	2/02/2021	2/02/2021	2/02/2021	5/03/2021	13/01/2021	13/01/2021	5/03/2021
					Depth	0.1 - 0.2	0.8 - 0.9	1.9 - 2.0	0.1 - 0.2	0.05 - 0.15	0.45 - 0.55	0.45 - 0.55	0.45 - 0.55	0.05 - 0.15	0.1 - 0.2	0.4 - 0.5	0.1 - 0.2	0.35 - 0.45	0.1 - 0.2	0.5 - 0.6	2.4 - 2.5	0.1 - 0.2	0.1 - 0.2	1.4 - 1.5
					Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Field_D	Interlab_D	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
					Fill/Natural	Fill	Fill	Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Natural
					Lab Report No.	767787	773807	778664	767787	767787	767787	767787	EM2100608	767787	767787	767787	771075	771075	771075	771075	778664	767787	767787	778664
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																			
Physical Parameters																								
Moisture Content	%	0.1				19	5.9	26	6.9	8.4	1.4	8.9	6.3	3.9	13	9.1	9.6	12	8.7	12	23	6.5	10	19
Resistivity	Ω m	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Electrical Conductivity	µS/cm	10				-	-	-	-	-	-	-	-	60	-	-	-	-	-	-	-	-	-	-
pH (aqueous extract)	pH Units	0.1				7.4	-	-	7.0	-	8.7	-	-	-	-	7.5	-	-	-	-	-	-	-	-
pH (Lab)	pH Units	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inorganics																								
Cyanide (Free)	mg/kg	5		**240**[#12]	1,500[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (Total)	mg/kg	5		**240**[#13]	1,500[#24]	<5	-	-	<5	-	<5	-	-	-	-	<5	-	-	-	-	-	-	-	-
Fluoride	mg/kg	100		**3,100**[#14]	47,000[#25]	<100	-	-	<100	-	<100	-	-	-	-	<100	-	-	-	-	-	-	-	-
Exchangeable Calcium	meq/100g	0.1				-	-	-	-	-	-	-	-	6.1	-	-	-	-	-	-	-	-	-	-
Exchangeable Magnesium	meq/100g	0.1				-	-	-	-	-	-	-	-	1.2	-	-	-	-	-	-	-	-	-	-
Exchangeable Potassium	meq/100g	0.1				-	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-	-	-
Exchangeable Sodium	meq/100g	0.1				-	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-
Exchangeable Sodium Percent	%	0.1				-	-	-	-	-	-	-	-	2.3	-	-	-	-	-	-	-	-	-	-
Cation Exchange Capacity	meq/100g	0.05				-	-	-	-	-	-	-	-	8.3	-	-	-	-	-	-	-	-	-	-
Major Ions																								
Chloride	mg/kg	5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulfate (as SO4)	mg/kg	30				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																								
Arsenic	mg/kg	2	100[#1]	**300**[#12]	3,000[#23]	6.0	5.4	12	<2	10	15	12	16	32	5.1	25	<2	19	<2	6.1	170	2.7	13	2.2
Barium	mg/kg	10		**15,000**[#14]	220,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/kg	2		**90**[#12]	500[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/kg			**20,000**[#12]	300,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/kg	0.2		**90**[#12]	900[#23]	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<1	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	0.8	<0.4
Chromium	mg/kg	2	200[#2]	**300**[#15]	3,600[#26]	8.8	17	41	<5	12	18	14	15	23	19	32	<5	40	<5	20	150	8.8	16	<5
Chromium(VI)	mg/kg	1		**300**[#12]	3,600[#23]	<1	-	-	1.1	-	<1	-	-	-	-	<1	-	-	-	-	-	-	-	-
Cobalt	mg/kg	5		**300**[#12]	4,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/kg	5	70[#3]	**17,000**[#12]	240,000[#23]	8.2	34	13	<5	50	43	57	79	7.2	19	100	<5	20	<5	20	10	9.4	160	5.8
Lead	mg/kg	5	1,130[#4]	**600**[#16]	1,500[#27]	62	25	12	31	330	320	250	340	39	86	**650**	<5	79	<5	98	44	23	360	43
Manganese	mg/kg	5		**19,000**[#12]	60,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/kg	0.05		**80**[#12]	730[#23]	<0.1	<0.1	<0.1	<0.1	<0.2	<0.2	0.2	0.2	<0.2	<0.1	<0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1
Molybdenum	mg/kg	5		**390**[#14]	5,800[#25]	<5	<5	-	<5	-	<5	-	-	-	-	<5	-	-	-	-	-	-	-	-
Nickel	mg/kg	2	35[#3]	**1,200**[#12]	6,000[#23]	7.7	92	20	<5	17	53	20	23	<5	15	64	<5	21	<5	16	90	8.1	21	<5
Selenium	mg/kg	2		**700**[#12]	10,000[#23]	<2	<2	-	<2	-	<2	-	-	-	-	<2	-	-	-	-	-	-	-	-
Silver	mg/kg	2		**390**[#14]	5,800[#25]	<2	<2	-	<2	-	<2	-	-	-	-	<2	-	-	-	-	-	-	-	-
Tin	mg/kg	5		**47,000**[#14]	700,000[#25]	<10	<10	-	<10	-	21	-	-	-	-	550	-	-	-	-	-	-	-	-
Zinc	mg/kg	5	110[#3]	**30,000**[#12]	400,000[#23]	70	71	22	46	320	380	330	494	160	110	310	<5	85	<5	91	150	58	560	13
BTEX																								
Benzene	mg/kg	0.1	50	**120**[#17]	3[#28]	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	85	**18,000**[#17]	99,000[#28]	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	70	**5,300**[#17]	27,000[#28]	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Xylene (m & p)	mg/kg	0.2				<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Xylene (o)	mg/kg	0.1				<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylene	mg/kg	0.3	45	**15,000**[#17]	230[#28]	<0.3	-	<0.3	<0.3	<0.3	<0.3	<0.3	<0.5	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Total BTEX	mg/kg	0.2				-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-	-
Total Recoverable Hydrocarbons																								
C6-C10 Fraction	mg/kg	10	180			<20	-	<20	<20	<20	<20	<20	<10	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C6-C10 Fraction minus BTEX (F1)	mg/kg	10	180	**5,100**[#20]	260[#29]	<20	-	<20	<20	<20	<20	<20	<10	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
>C10-C16 Fraction	mg/kg	20	120			<50	-	<50	<50	<50	<500	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
>C10-C16 Fraction minus naphthalene (F2)	mg/kg	20	120	**3,800**[#20]	20,000[#20]	<50	-	<50	<50	<50	<500	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
>C16-C34 Fraction	mg/kg	50	300	**5,300**[#21]	27,000[#21]	320	-	<100	<100	530	8,900	600	540	130	230	700	<100	650	<100	310	<100	170	210	<100
>C34-C40 Fraction	mg/kg	50	2800	**7,400**[#21]	38,000[#21]	170	-	<100	<100	180	1,100	260	170	<100	<100	150	<100	120	<100	<100	<100	<100	<100	<100
>C10-C40 Fraction (Sum)	mg/kg	50				490	-	<100	<100	710	10,000	860	710	130	230	850	<100	770	<100	310	<100	170	210	<100
PAHs																								
Acenaphthene	mg/kg	0.1				<0.5	4.9	<0.5	<0.5	<0.5	1.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.1				<0.5	5.3	<0.5	<0.5	<0.5	10	<0.5	0.6	0.8	<0.5	<0.5	<0.5	0.7	<0.5	0.7	<0.5	<0.5	<0.5	<0.5
Anthracene	mg/kg	0.1				<0.5	11	<0.5	<0.5	<0.5	67	0.6	0.9	2.2	<0.5	<0.5	<0.5	2.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.1				2.7	120	<0.5	<0.5	4.4	180	7.2	4.1	4.7	1.1	0.8	<0.5	13	<0.5	7.9	<0.5	0.7	1.9	<0.5
2-Chloronaphthalene	mg/kg	0.1		**4,800**[#14]	60,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1	0.7			5.3	120	<0.5	<0.5	6.6	300	8.1	7.1	3.0	2.2	1.2	<0.5	13	<0.5	7.8	<0.5	1.1	2.1	<0.5
Benzo(b)fluoranthene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoranthene	mg/kg	0.5				3.8	120	<0.5	<0.5	5.3	200	7.6	8.0	2.4	1.3	0.8	<0.5	14	<0.5	7.2	<0.5	1.0	1.3	<0.5
Benzo(g,h,i)perylene	mg/kg	0.1				2.7	100	<0.5	<0.5	4.7	100	6.7	5.7	1.7	1.4	0.7	<0.5	7.3	<0.5	4.1	<0.5	1.0	1.4	<0.5
Benzo(b+j+k)fluoranthene	mg/kg	0.2				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1				4.0	100	<0.5	<0.5	5.9	190	7.8	2.5	3.2	1.4	0.9	<0.5	13	<0.5	7.1	<0.5	0.7	1.3	<0.5
Chrysene	mg/kg	0.1				3.7	120	<0.5	<0.5	4.7	240	7.0	4.2	3.1	0.9	0.9	<0.5	10	<0.5	6.2	<0.5	0.6	1.6	<0.5
Dibenz(a,h)anthracene	mg/kg	0.1				<0.5	26	<0.5	<0.5	1.8	38	3.0	1.0	0.6	<0.5	<0.5	<0.5	3.1	<0.5	1.4	<0.5	0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.1				4.4	300	<0.5	<0.5	8.0	300	11	7.6	12	2.0	1.3	<0.5	20	<0.5	10	0.6	1.3	3.5	<0.5
Fluorene	mg/kg	0.1				<0.5	2.3	<0.5	<0.5	<0.5	2.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1				2.5	78	<0.5	<0.5	4.7	140	7.4	4.2	1.8	1.3	0.6	<0.5	8.2	<0.5	3.4	<0.5	0.7	1.5	<0.5
Naphthalene	mg/kg	0.1	170[#11]	**1,900**[#17]	NL [#28]	<0.5	3.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	mg/kg	0.1				1.8	62	<0.5	<0.5	2.1	100	3.3	2.6	10	0.7	<0.5	<0.5	10	<0.5	3.4	<0.5	<0.5	1.3	<0.5
Pyrene	mg/kg	0.1				6.0	350	<0.5	<0.5	8.5	360	13	7.9	9.7	2.1	1.4	<0.5	20	<0.5	11	0.6	1.4	3.4	<0.5
Benzo(a)pyrene TEQ (Zero)	mg/kg	0.1		**3**[#12]	40[#23]	**6.7**	**190**	<0.5	<0.5	**11**	**410**	**14**	**10.1**	**4.9**	2.7	1.5	<0.5	**21**	<0.5	**12**	<0.5	1.9	2.7	<0.5
Sum of Polycyclic aromatic hydrocarbons (PAH)	mg/kg	0.1		**300**[#12]	4,000[#23]	36.9	**1,522.6**	<0.5	<0.5	56.7	**2,237.4**	82.7	56.4	55.2	14.4	8.6	<0.5	134.8	<0.5	70.8	1.2	9	19.3	<0.5

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria

Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**
					Location Code	SB23	SB23	SB23	SB24	SB24	SB24	SB25	SB26	SB27	SB27	SB28	SB28	SB29	SB30	SB30	SB31	SB31	SB31	SB32
					Field ID	SB23_0.1-0.2	SB23_0.35-0.45	SB23_1.4-1.5	SB24_0.1-0.2	SB24_0.9-1.0	SB24_0.9_1.0	SB25_0.1-0.2	SB26_0.1-0.2	SB27_0.1-0.2	SB27_0.3-0.4	SB28_0.1-0.2	SB28_0.6-0.7	SB29_0.05-0.15	SB30_0.1-0.2	SB30_0.3-0.4	SB31_0.1-0.2	QC05	QC06	SB32_0.05-0.15
					Date	12/01/2021	12/01/2021	5/03/2021	12/01/2021	12/01/2021	12/02/2021	12/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021	12/01/2021	12/01/2021	12/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
					Depth	0.1 - 0.2	0.35 - 0.45	1.4 - 1.5	0.1 - 0.2	0.9 - 1	0.9 - 1	0.1 - 0.2	0.1 - 0.2	0.1 - 0.2	0.3 - 0.4	0.1 - 0.2	0.6 - 0.7	0.05 - 0.15	0.1 - 0.2	0.3 - 0.4	0.1 - 0.2	0.1 - 0.2	0.1 - 0.2	0.05 - 0.15
					Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Field_D	Interlab_D	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
					Lab Report No.	767787	767787	778664	767787	767787	773807	767787	767787	767787	767787	767787	767787	767787	767787	767787	767787	767787	EM2100608	767787
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																			
Physical Parameters																								
Moisture Content	%	0.1				13	7.8	17	19	19	20	11	4.9	6.3	7.2	9.4	13	11	9.8	15	22	17	15.4	7.5
Resistivity	Ω m	0.5				-	-	-	-	-	-	-	-	180	-	-	-	-	-	-	-	-	-	-
Electrical Conductivity	µS/cm	10				-	-	-	-	-	-	-	-	56	-	-	-	-	-	-	-	-	-	-
pH (aqueous extract)	pH Units	0.1				-	8.3	-	-	-	-	7.5	8.1	7.2	-	-	8.0	-	-	-	-	-	-	7.7
pH (Lab)	pH Units	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inorganics																								
Cyanide (Free)	mg/kg	5		**240**[#12]	1,500[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (Total)	mg/kg	5		**240**[#13]	1,500[#24]	-	<5	-	-	-	-	<5	<5	-	-	-	<5	-	-	-	-	-	-	<5
Fluoride	mg/kg	100		**3,100**[#14]	47,000[#25]	-	<100	-	-	-	-	<100	<100	-	-	-	<100	-	-	-	-	-	-	130
Exchangeable Calcium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Magnesium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Potassium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Sodium	meq/100g	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exchangeable Sodium Percent	%	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cation Exchange Capacity	meq/100g	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Major Ions																								
Chloride	mg/kg	5				-	-	-	-	-	-	-	-	110	-	-	-	-	-	-	-	-	-	-
Sulfate (as SO4)	mg/kg	30				-	-	-	-	-	-	-	-	47	-	-	-	-	-	-	-	-	-	-
Metals																								
Arsenic	mg/kg	2	100[#1]	**300**[#12]	3,000[#23]	16	23	12	16	15	46	4.1	3.2	2.3	2.1	<2	15	12	9.3	57	4.9	6.6	<5	9.5
Barium	mg/kg	10		**15,000**[#14]	220,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/kg	2		**90**[#12]	500[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/kg			**20,000**[#12]	300,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/kg	0.2		**90**[#12]	900[#23]	<0.4	<0.4	<0.4	<0.4	0.7	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	0.6	0.6	<0.4	<0.4	<0.4	<0.4	<1	<0.4
Chromium	mg/kg	2	200[#2]	**300**[#15]	3,600[#26]	24	18	30	14	33	53	8.1	6.0	9.4	20	<5	24	15	15	76	15	15	14	16
Chromium(VI)	mg/kg	1		**300**[#12]	3,600[#23]	-	<1	-	-	-	-	<1	<1	-	-	-	<1	-	-	-	-	-	-	<1
Cobalt	mg/kg	5		**300**[#12]	4,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/kg	5	70[#3]	**17,000**[#12]	240,000[#23]	43	29	<5	14	91	12	12	8.2	7.3	8.3	<5	57	88	9.1	13	24	33	20	25
Lead	mg/kg	5	1,130[#4]	**600**[#16]	1,500[#27]	180	160	<5	57	440	27	52	41	38	63	<5	440	320	36	48	130	170	104	140
Manganese	mg/kg	5		**19,000**[#12]	60,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/kg	0.05		**80**[#12]	730[#23]	<0.2	<0.2	<0.1	<0.1	<0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.4	<0.2	<0.1	<0.1	<0.1	0.1	<0.1	<0.2
Molybdenum	mg/kg	5		**390**[#14]	5,800[#25]	-	<5	-	-	-	<5	<5	<5	-	-	-	<5	-	-	-	-	-	-	<5
Nickel	mg/kg	2	35[#3]	**1,200**[#12]	6,000[#23]	16	47	9.7	8.1	38	29	6.0	<5	5.6	7.7	<5	33	23	7.7	27	14	17	11	16
Selenium	mg/kg	2		**700**[#12]	10,000[#23]	-	<2	-	-	-	<2	<2	<2	-	-	-	<2	-	-	-	-	-	-	<2
Silver	mg/kg	2		**390**[#14]	5,800[#25]	-	<2	-	-	-	<2	<2	<2	-	-	-	<2	-	-	-	-	-	-	<2
Tin	mg/kg	5		**47,000**[#14]	700,000[#25]	-	<10	-	-	-	<10	<10	<10	-	-	-	18	-	-	-	-	-	-	<10
Zinc	mg/kg	5	110[#3]	**30,000**[#12]	400,000[#23]	230	240	9.1	91	420	46	71	55	57	42	<5	320	470	53	60	120	150	112	180
BTEX																								
Benzene	mg/kg	0.1	50	**120**[#17]	3[#28]	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1
Toluene	mg/kg	0.1	85	**18,000**[#17]	99,000[#28]	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1
Ethylbenzene	mg/kg	0.1	70	**5,300**[#17]	27,000[#28]	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1
Xylene (m & p)	mg/kg	0.2				<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2
Xylene (o)	mg/kg	0.1				<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1
Total Xylene	mg/kg	0.3	45	**15,000**[#17]	230[#28]	<0.3	<0.3	<0.3	<0.3	<0.3	-	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.5	<0.3
Total BTEX	mg/kg	0.2				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.2	-
Total Recoverable Hydrocarbons																								
C6-C10 Fraction	mg/kg	10	180			<20	<20	<20	<20	<20	-	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<10	<20
C6-C10 Fraction minus BTEX (F1)	mg/kg	10	180	**5,100**[#20]	260[#29]	<20	<20	<20	<20	<20	-	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<10	<20
>C10-C16 Fraction	mg/kg	20	120			<50	140	<50	<50	<50	-	<50	580	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
>C10-C16 Fraction minus naphthalene (F2)	mg/kg	20	120	**3,800**[#20]	20,000[#20]	<50	140	<50	<50	<50	-	<50	580	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
>C16-C34 Fraction	mg/kg	50	300	**5,300**[#21]	27,000[#21]	1,200	5,900	<100	120	<100	-	160	2,300	<100	950	<100	870	900	120	<100	300	410	160	310
>C34-C40 Fraction	mg/kg	50	2800	**7,400**[#21]	38,000[#21]	260	940	<100	<100	<100	-	<100	450	<100	350	<100	210	250	110	<100	120	200	<100	150
>C10-C40 Fraction (Sum)	mg/kg	50				1,460	6,980	<100	120	<100	-	160	3,330	<100	1,300	<100	1,080	1,150	230	<100	420	610	160	460
PAHs																								
Acenaphthene	mg/kg	0.1				<0.5	1.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.1				3.5	1.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	mg/kg	0.1				5.2	33	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	0.5	2.6	<0.5	<0.5	<0.5	<0.5	<0.5	0.6
Benz(a)anthracene	mg/kg	0.1				15	67	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	3.9	<0.5	3.3	6.2	<0.5	0.6	1.3	3.2	1.0	2.2
2-Chloronaphthalene	mg/kg	0.1		**4,800**[#14]	60,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1	0.7			18	110	<0.5	0.6	0.6	<0.5	1.0	<0.5	<0.5	11	<0.5	7.5	13	<0.5	0.6	2.3	2.9	1.2	4.8
Benzo(b)fluoranthene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoranthene	mg/kg	0.5				17	83	<0.5	0.5	0.5	<0.5	1.0	<0.5	<0.5	9.8	<0.5	6.1	11	<0.5	0.5	1.7	2.8	1.4	3.5
Benzo(g,h,i)perylene	mg/kg	0.1				8.1	24	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	4.4	<0.5	5.4	7.5	<0.5	<0.5	1.6	2.3	0.8	3.4
Benzo(b+j+k)fluoranthene	mg/kg	0.2				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1				15	81	<0.5	0.5	0.6	<0.5	0.9	<0.5	<0.5	7.7	<0.5	4.4	7.9	<0.5	0.6	2.0	3.0	<0.5	3.7
Chrysene	mg/kg	0.1				22	63	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	8.2	<0.5	3.3	6.2	<0.5	0.5	1.7	2.9	0.9	3.4
Dibenz(a,h)anthracene	mg/kg	0.1				4.2	11	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.1	<0.5	<0.5	2.2	<0.5	<0.5	<0.5	1.1	<0.5	<0.5
Fluoranthene	mg/kg	0.1				39	130	<0.5	0.6	0.7	0.8	1.0	0.5	<0.5	10	<0.5	6.2	17	<0.5	0.7	3.0	5.9	1.7	5.5
Fluorene	mg/kg	0.1				2.5	3.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1				11	36	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	7.8	<0.5	4.3	6.4	<0.5	<0.5	1.3	2.1	0.6	3.0
Naphthalene	mg/kg	0.1	170[#11]	**1,900**[#17]	NL [#28]	<0.5	4.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	mg/kg	0.1				37	72	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.8	<0.5	2.1	11	<0.5	<0.5	1.1	1.8	0.5	2.2
Pyrene	mg/kg	0.1				41	140	<0.5	0.6	0.8	0.9	1.2	0.5	<0.5	11	<0.5	6.8	17	<0.5	0.8	3.2	5.9	1.9	6.1
Benzo(a)pyrene TEQ (Zero)	mg/kg	0.1		**3**[#12]	40[#23]	**28**	**150**	<0.5	0.7	0.7	<0.5	1.3	<0.5	<0.5	**16**	<0.5	**9.4**	**18**	<0.5	0.8	3.0	**5.2**	1.5	**6.1**
Sum of Polycyclic aromatic hydrocarbons (PAH)	mg/kg	0.1		**300**[#12]	4,000[#23]	238.5	**861.8**	<0.5	2.8	3.2	1.7	7.8	1	<0.5	79.3	<0.5	49.9	109.9	<0.5	4.3	19.2	33.9	10.0	38.4

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria
Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**
					Location Code	SB32	SB33	SB34	SB34	SB35	SB35	SB35	SB36	SB36	SB37	SB37	SB37	SB38
					Field ID	SB32_0.9-1.0	SB33_0.1-0.2	SB34_0.1-0.2	SB34_0.4-0.5	SB35_0.1-0.2	QC01	QC02	SB36_0.1-0.2	SB36_0.4-0.5	SB37_0.1-0.2	SB37_0.5-0.6	SB37_1.4-1.5	SB38_0.1-0.2
					Date	5/03/2021	12/01/2021	13/01/2021	13/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	5/03/2021	12/01/2021
					Depth	0.9 - 1.0	0.1 - 0.2	0.1 - 0.2	0.4 - 0.5	0.1 - 0.2	0.1 - 0.2	0.1 - 0.2	0.1 - 0.2	0.4 - 0.5	0.1 - 0.2	0.5 - 0.6	1.4 - 1.5	0.1 - 0.2
					Sample Type	Normal	Normal	Normal	Normal	Normal	Field_D	Interlab_D	Normal	Normal	Normal	Normal	Normal	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
					Lab Report No.	778664	767787	767787	767787	767787	767787	EM2100608	767787	767787	767787	767787	778664	767787
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial													
Physical Parameters																		
Moisture Content	%	0.1				14	8.1	12	15	9.8	8.9	8.1	7.1	6.9	7.7	8.8	20	14
Resistivity	Ω m	0.5				-	-	-	-	-	-	-	-	-	130	-	-	-
Electrical Conductivity	µS/cm	10				-	-	210	-	-	-	-	-	-	76	-	-	-
pH (aqueous extract)	pH Units	0.1				-	-	-	7.5	7.0	-	-	-	-	7.5	-	-	7.9
pH (Lab)	pH Units	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-
Inorganics																		
Cyanide (Free)	mg/kg	5		**240**[#12]	1,500[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide (Total)	mg/kg	5		**240**[#13]	1,500[#24]	-	-	-	<5	<5	-	-	-	-	-	-	-	<5
Fluoride	mg/kg	100		**3,100**[#14]	47,000[#25]	-	-	-	<100	160	-	-	-	-	-	-	-	100
Exchangeable Calcium	meq/100g	0.1				-	-	6.0	-	-	-	-	-	-	-	-	-	-
Exchangeable Magnesium	meq/100g	0.1				-	-	2.3	-	-	-	-	-	-	-	-	-	-
Exchangeable Potassium	meq/100g	0.1				-	-	0.9	-	-	-	-	-	-	-	-	-	-
Exchangeable Sodium	meq/100g	0.1				-	-	1.2	-	-	-	-	-	-	-	-	-	-
Exchangeable Sodium Percent	%	0.1				-	-	11	-	-	-	-	-	-	-	-	-	-
Cation Exchange Capacity	meq/100g	0.05				-	-	10	-	-	-	-	-	-	-	-	-	-
Major Ions																		
Chloride	mg/kg	5				-	-	-	-	-	-	-	-	-	150	-	-	-
Sulfate (as SO4)	mg/kg	30				-	-	-	-	-	-	-	-	-	37	-	-	-
Metals																		
Arsenic	mg/kg	2	100[#1]	**300**[#12]	3,000[#23]	4.9	17	2.2	25	21	26	17	13	22	5.8	9.0	40	22
Barium	mg/kg	10		**15,000**[#14]	220,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium	mg/kg	2		**90**[#12]	500[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-
Boron	mg/kg			**20,000**[#12]	300,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	mg/kg	0.2		**90**[#12]	900[#23]	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<1	0.4	0.5	<0.4	0.4	< 0.4	<0.4
Chromium	mg/kg	2	200[#2]	**300**[#15]	3,600[#26]	47	23	6.9	26	26	32	20	24	39	9.2	21	61	26
Chromium(VI)	mg/kg	1		**300**[#12]	3,600[#23]	-	-	-	<1	<1	-	-	-	-	-	-	-	<1
Cobalt	mg/kg	5		**300**[#12]	4,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	mg/kg	5	70[#3]	**17,000**[#12]	240,000[#23]	8.2	19	8.3	49	17	12	15	38	140	20	47	17	27
Lead	mg/kg	5	1,130[#4]	**600**[#16]	1,500[#27]	12	75	36	190	100	56	81	230	410	220	400	14	260
Manganese	mg/kg	5		**19,000**[#12]	60,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	mg/kg	0.05		**80**[#12]	730[#23]	<0.1	<0.1	<0.1	<0.2	<0.1	0.1	<0.1	<0.2	0.2	0.1	0.2	<0.1	0.3
Molybdenum	mg/kg	5		**390**[#14]	5,800[#25]	-	-	-	<5	<5	-	-	-	-	-	-	-	<5
Nickel	mg/kg	2	35[#3]	**1,200**[#12]	6,000[#23]	13	14	<5	29	16	16	15	25	51	12	36	20	35
Selenium	mg/kg	2		**700**[#12]	10,000[#23]	-	-	-	<2	<2	-	-	-	-	-	-	-	<2
Silver	mg/kg	2		**390**[#14]	5,800[#25]	-	-	-	<2	<2	-	-	-	-	-	-	-	<2
Tin	mg/kg	5		**47,000**[#14]	700,000[#25]	-	-	-	52	<10	-	-	-	-	-	-	-	<10
Zinc	mg/kg	5	110[#3]	**30,000**[#12]	400,000[#23]	15	84	51	220	100	72	87	280	380	140	350	22	160
BTEX																		
Benzene	mg/kg	0.1	50	**120**[#17]	3[#28]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	85	**18,000**[#17]	99,000[#28]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	70	**5,300**[#17]	27,000[#28]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Xylene (m & p)	mg/kg	0.2				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Xylene (o)	mg/kg	0.1				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Xylene	mg/kg	0.3	45	**15,000**[#17]	230[#28]	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.5	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Total BTEX	mg/kg	0.2				-	-	-	-	-	-	<0.2	-	-	-	-	-	-
Total Recoverable Hydrocarbons																		
C6-C10 Fraction	mg/kg	10	180			<20	<20	<20	<20	<20	<20	<10	<20	<20	<20	<20	<20	<20
C6-C10 Fraction minus BTEX (F1)	mg/kg	10	180	**5,100**[#20]	260[#29]	<20	<20	<20	<20	<20	<20	<10	<20	<20	<20	<20	<20	<20
>C10-C16 Fraction	mg/kg	20	120			<50	<50	<50	410	<50	<50	<50	<50	<50	<50	<50	<50	<50
>C10-C16 Fraction minus naphthalene (F2)	mg/kg	20	120	**3,800**[#20]	20,000[#20]	<50	<50	<50	410	<50	<50	<50	<50	<50	<50	<50	<50	<50
>C16-C34 Fraction	mg/kg	50	300	**5,300**[#21]	27,000[#21]	<100	200	130	1,500	410	180	310	620	500	640	900	<100	1,200
>C34-C40 Fraction	mg/kg	50	2800	**7,400**[#21]	38,000[#21]	<100	<100	<100	230	110	<100	<100	160	190	190	280	<100	370
>C10-C40 Fraction (Sum)	mg/kg	50				<100	200	130	2,140	520	180	310	780	690	830	1,180	<100	1,570
PAHs																		
Acenaphthene	mg/kg	0.1				<0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.1				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	0.6	<0.5	1.8
Anthracene	mg/kg	0.1				<0.5	<0.5	<0.5	5.8	<0.5	<0.5	0.7	0.8	0.6	<0.5	0.8	<0.5	2.3
Benz(a)anthracene	mg/kg	0.1				<0.5	1.3	<0.5	8.2	3.1	0.9	2.7	2.6	4.4	2.7	5.8	<0.5	10
2-Chloronaphthalene	mg/kg	0.1		**4,800**[#14]	60,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1	0.7			<0.5	1.9	<0.5	14	5.9	1.5	3.6	7.3	7.5	6.7	11	<0.5	21
Benzo(b)fluoranthene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoranthene	mg/kg	0.5				<0.5	1.3	<0.5	10	4.1	1.2	4.1	5.7	5.0	5.8	8.4	<0.5	14
Benzo(g,h,i)perylene	mg/kg	0.1				<0.5	1.3	<0.5	6.8	2.4	0.7	2.5	4.1	4.0	5.0	6.3	<0.5	15
Benzo(b+j+k)fluoranthene	mg/kg	0.2				-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1				<0.5	1.6	<0.5	9.6	4.0	1.3	1.3	4.2	3.7	4.2	7.5	<0.5	18
Chrysene	mg/kg	0.1				<0.5	1.4	<0.5	16	6.1	1.1	2.5	2.6	6.0	2.7	8.8	<0.5	14
Dibenz(a,h)anthracene	mg/kg	0.1				<0.5	<0.5	<0.5	1.2	<0.5	<0.5	<0.5	<0.5	1.3	1.3	1.0	<0.5	2.9
Fluoranthene	mg/kg	0.1				<0.5	2.6	0.6	21	4.9	1.7	5.2	8.3	11	4.6	15	<0.5	22
Fluorene	mg/kg	0.1				<0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1				<0.5	1.0	<0.5	6.6	1.4	0.6	1.9	3.6	2.8	4.0	3.0	<0.5	12
Naphthalene	mg/kg	0.1	170[#11]	**1,900**[#17]	NL [#28]	<0.5	<0.5	<0.5	1.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6
Phenanthrene	mg/kg	0.1				<0.5	1.1	<0.5	16	2.5	0.6	2.3	3.3	2.7	1.1	4.6	<0.5	8.1
Pyrene	mg/kg	0.1				<0.5	2.8	0.5	24	6.1	1.8	5.4	8.8	12	5.4	16	<0.5	24
Benzo(a)pyrene TEQ (Zero)	mg/kg	0.1		**3**[#12]	40[#23]	<0.5	2.4	<0.5	**19**	**7.2**	1.9	**4.6**	**9.0**	**10**	**9.7**	**15**	<0.5	**30**
Sum of Polycyclic aromatic hydrocarbons (PAH)	mg/kg	0.1		**300**[#12]	4,000[#23]	<0.5	16.3	1.1	142.3	40.5	11.4	32.2	51.3	61.6	43.5	89.4	<0.5	165.7

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria
Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**
					Location Code	BH01	BH01	BH01	BH02	BH02	BH03	BH03	BH04	BH05	BH05	BH05	BH06	BH06	BH06	BH06	BH07	BH07	BH08	BH08	BH09	BH09	BH10	BH10	BH11
					Field ID	BH1/0.1	DUP-140720A	SPLIT140720A	BH2/0.1	BH2/0.5	BH3/0.1	BH3/0.5	BH4/0.1	BH5/0.1	BH5/0.5	BH5/1.0	BH6/0.1	DUP-140720B	SPLIT140720B	BH6/0.5	BH7/0.1	BH7/0.5	BH8/0.1	BH8/0.5	BH9/0.1	BH9/0.5	BH10/0.1	BH10/0.5	BH11/0.1
					Date	14/07/2020	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020	14/07/2020	15/07/2020	15/07/2020	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020
					Depth	0.1	0.1	0.1	0.1	0.5	0.1	0.5	0.1	0.1	0.5	1	0.1	0.1	0.1	0.5	0.1	0.5	0.1	0.5	0.1	0.5	0.1	0.5	0.1
					Sample Type	Normal	Field_D	Interlab_D	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Field_D	Interlab_D	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
					Lab Report No.	732366	732366	EM2012544	732366	733886	732366	733886	732366	732366	733886	734380	732366	732366	EM2012544	733886	732366	733886	732366	733886	732366	733886	732366	733886	732366
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																								
Phenols																													
2-Methylphenol	mg/kg	0.2		**3,200**$^{\#14}$	41,000$^{\#25}$	-	-	-	-	-	<0.2	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitrophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	mg/kg	0.5		**1,300**$^{\#14}$	16,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrophenol	mg/kg	5		**130**$^{\#14}$	1,600$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-&4-Methylphenol (m&p-cresol)	mg/kg	0.4				-	-	-	-	-	<0.4	-	-	-	-	-	<0.4	-	-	-	-	-	-	-	-	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.5		**6,300**$^{\#14}$	82,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitrophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	mg/kg	5		**5.1**$^{\#14}$	66$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,6-Dinitro-o-cyclohexyl phenol	mg/kg	20		**130**$^{\#14}$	1,600$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cresol Total	mg/kg	1		**4,000**$^{\#12}$	25,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	mg/kg	0.5		**40,000**$^{\#12}$	240,000$^{\#23}$	-	-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-	-	-
Phenols (non-halogenated)	mg/kg	20				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MAH																													
1,2,4-Trimethylbenzene	mg/kg	0.5		**300**$^{\#14}$	1,800$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	mg/kg	0.5		**270**$^{\#14}$	1,500$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropylbenzene	mg/kg	0.5		**1,900**$^{\#14}$	9,900$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	mg/kg	0.5		**6,000**$^{\#14}$	35,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Monocylic Aromatic Hydrocarbons	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Halogenated Benzenes																													
1,2,3-Trichlorobenzene	mg/kg	0.1		**63**$^{\#14}$	930$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1		**1,800**$^{\#14}$	9,300$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,3,4-Tetrachlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,3,5-Tetrachlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4,5-Tetrachlorobenzene	mg/kg	0.1		**23**$^{\#14}$	350$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.05		**24**$^{\#14}$	110$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-Trichlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chlorotoluene	mg/kg	0.5		**1,600**$^{\#14}$	23,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.1		**2.6**$^{\#14}$	11$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chlorotoluene	mg/kg	0.5		**1,600**$^{\#14}$	23,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromobenzene	mg/kg	0.5		**290**$^{\#14}$	1,800$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	mg/kg	0.5		**280**$^{\#14}$	1,300$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorobenzene	mg/kg	0.1		**63**$^{\#14}$	930$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Halogenated Hydrocarbons																													
1,2-Dibromoethane	mg/kg	0.5		**0.036**$^{\#14}$	0.16$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromomethane	mg/kg	0.5		**6.8**$^{\#14}$	30$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane	mg/kg	0.5		**87**$^{\#14}$	370$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iodomethane	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	mg/kg	0.5		**23,000**$^{\#14}$	350,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorinated Hydrocarbons																													
1,1-Dichloropropene	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	mg/kg	0.5		**3.6**$^{\#14}$	16$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	mg/kg	0.5		**230**$^{\#14}$	1,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,1,2-Tetrachloroethane	mg/kg	0.5		**2**$^{\#14}$	8.8$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,1-Trichloroethane	mg/kg	0.5		**8,100**$^{\#14}$	36,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane	mg/kg	0.5		**0.0053**$^{\#14}$	0.064$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2-Trichloroethane	mg/kg	0.5		**1.1**$^{\#14}$	5$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	mg/kg	0.5		**0.6**$^{\#14}$	2.7$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,3-Trichloropropane	mg/kg	0.5		**0.0051**$^{\#14}$	0.11$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	mg/kg	0.5		**0.46**$^{\#14}$	2$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichloropropane	mg/kg	0.5		**1,600**$^{\#14}$	23,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	mg/kg	0.5		**2.5**$^{\#14}$	11$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,2-Dichloropropane	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzal Chloride	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzotrichloride	mg/kg	0.1		**0.053**$^{\#14}$	0.25$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromochloromethane	mg/kg	0.5		**150**$^{\#14}$	630$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzyl Chloride	mg/kg	0.1		**1.1**$^{\#14}$	4.8$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	mg/kg	0.5		**0.29**$^{\#14}$	1.3$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromoform	mg/kg	0.5		**19**$^{\#14}$	86$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon Tetrachloride	mg/kg	0.5		**0.65**$^{\#14}$	2.9$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorodibromomethane	mg/kg	0.5		**8.3**$^{\#14}$	39$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroethane	mg/kg	0.5		**14,000**$^{\#14}$	57,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform	mg/kg	0.5		**0.32**$^{\#14}$	1.4$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloromethane	mg/kg	0.5		**110**$^{\#14}$	460$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	mg/kg	0.5		**160**$^{\#14}$	2,300$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromomethane	mg/kg	0.5		**24**$^{\#14}$	99$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dichloromethane	mg/kg	0.5		**57**$^{\#14}$	1,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/kg	0.1		**1.2**$^{\#14}$	5.3$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorocyclopentadiene	mg/kg	0.1		**1.8**$^{\#14}$	7.5$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	mg/kg	0.1		**1.8**$^{\#14}$	8$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	0.5		**24**$^{\#14}$	100$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	mg/kg	0.5		**1,600**$^{\#14}$	23,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,3-Dichloropropene	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	mg/kg	0.5		**0.94**$^{\#14}$	6$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vinyl Chloride	mg/kg	0.5		**0.059**$^{\#14}$	1.7$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Chlorinated Hydrocarbons	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Other Chlorinated Hydrocarbons	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria

Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020	Atma, 2020
					Location Code	BH12	BH12	BH13	BH13	BH14	BH14	BH15	BH16	BH17	BH18	BH18	BH19	BH19	BH19	BH19	BH20	BH21	BH22	BH22	BH23	BH24	BH24	BH25	BH25
					Field ID	BH12/0.1	BH12/0.1	BH13/0.1	BH13/0.5	BH14/0.1	BH14/0.5	BH15/0.1	BH16/0.1	BH17/0.1	BH18/0.1	BH18/0.5	BH19/0.1	BH19/0.5	BH19/0.5	BH19/1.0	BH20/0.1	BH21/0.1	BH22/0.1	BH22/0.5	BH23/0.1	BH24/0.1	BH24/0.5	BH25/0.1	BH25/0.5
					Date	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	15/07/2020	15/07/2020	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020
					Depth	0.1	0.1	0.1	0.5	0.1	0.5	0.1	0.1	0.1	0.1	0.5	0.1	0.5	0.5	1	0.1	0.1	0.1	0.5	0.1	0.1	0.5	0.1	0.5
					Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
					Lab Report No.	732366	733886	732366	733886	732366	733886	732366	732366	732366	732366	733886	732366	733886	734380	734380	732366	732366	732366	733886	732366	732366	733886	732366	733886
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	NEPC 2013 - Human Health Setting 'C' - Public Open Space	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																								
Phenols																													
2-Methylphenol	mg/kg	0.2		3,200$^{\#14}$	41,000$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.2	-	<0.2	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitrophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	mg/kg	0.5		1,300$^{\#14}$	16,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrophenol	mg/kg	5		130$^{\#14}$	1,600$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-&4-Methylphenol (m&p-cresol)	mg/kg	0.4				-	-	-	-	-	-	-	-	-	<0.4	-	<0.4	-	-	-	-	-	-	-	-	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.5		6,300$^{\#14}$	82,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitrophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	mg/kg	5		5.1$^{\#14}$	66$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,6-Dinitro-o-cyclohexyl phenol	mg/kg	20		130$^{\#14}$	1,600$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cresol Total	mg/kg	1		4,000$^{\#12}$	25,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	mg/kg	0.5		40,000$^{\#12}$	240,000$^{\#23}$	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	-	-	-	-	-	-	-	-	-	-	-	-
Phenols (non-halogenated)	mg/kg	20				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MAH																													
1,2,4-Trimethylbenzene	mg/kg	0.5		300$^{\#14}$	1,800$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	mg/kg	0.5		270$^{\#14}$	1,500$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropylbenzene	mg/kg	0.5		1,900$^{\#14}$	9,900$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	mg/kg	0.5		6,000$^{\#14}$	35,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Monocylic Aromatic Hydrocarbons	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Halogenated Benzenes																													
1,2,3-Trichlorobenzene	mg/kg	0.1		63$^{\#14}$	930$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1		1,800$^{\#14}$	9,300$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,3,4-Tetrachlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,3,5-Tetrachlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4,5-Tetrachlorobenzene	mg/kg	0.1		23$^{\#14}$	350$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.05		24$^{\#14}$	110$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-Trichlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chlorotoluene	mg/kg	0.5		1,600$^{\#14}$	23,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.1		2.6$^{\#14}$	11$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chlorotoluene	mg/kg	0.5		1,600$^{\#14}$	23,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromobenzene	mg/kg	0.5		290$^{\#14}$	1,800$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	mg/kg	0.5		280$^{\#14}$	1,300$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorobenzene	mg/kg	0.1		63$^{\#14}$	930$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Halogenated Hydrocarbons																													
1,2-Dibromoethane	mg/kg	0.5		0.036$^{\#14}$	0.16$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromomethane	mg/kg	0.5		6.8$^{\#14}$	30$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane	mg/kg	0.5		87$^{\#14}$	370$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iodomethane	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	mg/kg	0.5		23,000$^{\#14}$	350,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorinated Hydrocarbons																													
1,1-Dichloropropene	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	mg/kg	0.5		3.6$^{\#14}$	16$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	mg/kg	0.5		230$^{\#14}$	1,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,1,2-Tetrachloroethane	mg/kg	0.5		2$^{\#14}$	8.8$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,1-Trichloroethane	mg/kg	0.5		8,100$^{\#14}$	36,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane	mg/kg	0.5		0.0053$^{\#14}$	0.064$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2-Trichloroethane	mg/kg	0.5		1.1$^{\#14}$	5$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	mg/kg	0.5		0.6$^{\#14}$	2.7$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,3-Trichloropropane	mg/kg	0.5		0.0051$^{\#14}$	0.11$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	mg/kg	0.5		0.46$^{\#14}$	2$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichloropropane	mg/kg	0.5		1,600$^{\#14}$	23,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	mg/kg	0.5		2.5$^{\#14}$	11$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,2-Dichloropropane	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzal Chloride	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzotrichloride	mg/kg	0.1		0.053$^{\#14}$	0.25$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromochloromethane	mg/kg	0.5		150$^{\#14}$	630$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzyl Chloride	mg/kg	0.1		1.1$^{\#14}$	4.8$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	mg/kg	0.5		0.29$^{\#14}$	1.3$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromoform	mg/kg	0.5		19$^{\#14}$	86$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon Tetrachloride	mg/kg	0.5		0.65$^{\#14}$	2.9$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorodibromomethane	mg/kg	0.5		8.3$^{\#14}$	39$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroethane	mg/kg	0.5		14,000$^{\#14}$	57,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform	mg/kg	0.5		0.32$^{\#14}$	1.4$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloromethane	mg/kg	0.5		110$^{\#14}$	460$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	mg/kg	0.5		160$^{\#14}$	2,300$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromomethane	mg/kg	0.5		24$^{\#14}$	99$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dichloromethane	mg/kg	0.5		57$^{\#14}$	1,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/kg	0.1		1.2$^{\#14}$	5.3$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorocyclopentadiene	mg/kg	0.1		1.8$^{\#14}$	7.5$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	mg/kg	0.1		1.8$^{\#14}$	8$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	0.5		24$^{\#14}$	100$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	mg/kg	0.5		1,600$^{\#14}$	23,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,3-Dichloropropene	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	mg/kg	0.5		0.94$^{\#14}$	6$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vinyl Chloride	mg/kg	0.5		0.059$^{\#14}$	1.7$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Chlorinated Hydrocarbons	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Other Chlorinated Hydrocarbons	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria
Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**
					Location Code	BH26	BH26	BH26	BH26	BH27	BH28	BH28	BH29	BH29	BH29	BH30	BH31	BH32	BH33	BH33	BH33	BH33	BH34	BH35	BH35	BH35	BH36	BH36	BH37
					Field ID	BH26/0.1	DUP-140720C	SPLIT140720C	BH26/0.5	BH27/0.1	BH28/0.1	BH28/0.5	BH29/0.1	BH29/0.5	BH29/1.0	BH30/0.1	BH31/0.1	BH32/0.1	BH33/0.1	DUP-140720D	SPLIT140720D	BH33/0.5	BH34/0.1	BH35/0.1	SPLIT140720E	BH35/0.5	BH36/0.1	BH36/0.5	BH37/0.1
					Date	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	15/07/2020	14/07/2020	14/07/2020	14/07/2020	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020
					Depth	0.1	0.1	0.1	0.5	0.1	0.1	0.5	0.1	0.5	1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.1	0.1	0.1	0.5	0.1	0.5	0.1
					Sample Type	Normal	Field_D	Interlab_D	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Field_D	Interlab_D	Normal	Normal	Normal	Interlab_D	Normal	Normal	Normal	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
					Lab Report No.	732366	732366	EM2012544	733886	732366	732366	733886	732366	733886	733886	732366	732366	732366	732366	732366	EM2012544	733886	732366	732366	EM2012544	733886	732366	733886	732366
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																								
Phenols																													
2-Methylphenol	mg/kg	0.2		**3,200**[#14]	41,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitrophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	mg/kg	0.5		**1,300**[#14]	16,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrophenol	mg/kg	5		**130**[#14]	1,600[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3-&4-Methylphenol (m&p-cresol)	mg/kg	0.4				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.5		**6,300**[#14]	82,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitrophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	mg/kg	5		**5.1**[#14]	66[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,6-Dinitro-o-cyclohexyl phenol	mg/kg	20		**130**[#14]	1,600[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cresol Total	mg/kg	1		**4,000**[#12]	25,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	mg/kg	0.5		**40,000**[#12]	240,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenols (non-halogenated)	mg/kg	20				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MAH																													
1,2,4-Trimethylbenzene	mg/kg	0.5		**300**[#14]	1,800[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	mg/kg	0.5		**270**[#14]	1,500[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropylbenzene	mg/kg	0.5		**1,900**[#14]	9,900[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	mg/kg	0.5		**6,000**[#14]	35,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Monocylic Aromatic Hydrocarbons	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Halogenated Benzenes																													
1,2,3-Trichlorobenzene	mg/kg	0.1		**63**[#14]	930[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1		**1,800**[#14]	9,300[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,3,4-Tetrachlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,3,5-Tetrachlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4,5-Tetrachlorobenzene	mg/kg	0.1		**23**[#14]	350[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.05		**24**[#14]	110[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-Trichlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chlorotoluene	mg/kg	0.5		**1,600**[#14]	23,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.1		**2.6**[#14]	11[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chlorotoluene	mg/kg	0.5		**1,600**[#14]	23,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromobenzene	mg/kg	0.5		**290**[#14]	1,800[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	mg/kg	0.5		**280**[#14]	1,300[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorobenzene	mg/kg	0.1		**63**[#14]	930[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Halogenated Hydrocarbons																													
1,2-Dibromoethane	mg/kg	0.5		**0.036**[#14]	0.16[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromomethane	mg/kg	0.5		**6.8**[#14]	30[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane	mg/kg	0.5		**87**[#14]	370[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iodomethane	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	mg/kg	0.5		**23,000**[#14]	350,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorinated Hydrocarbons																													
1,1-Dichloropropene	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	mg/kg	0.5		**3.6**[#14]	16[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	mg/kg	0.5		**230**[#14]	1,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,1,2-Tetrachloroethane	mg/kg	0.5		**2**[#14]	8.8[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,1-Trichloroethane	mg/kg	0.5		**8,100**[#14]	36,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane	mg/kg	0.5		**0.0053**[#14]	0.064[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2-Trichloroethane	mg/kg	0.5		**1.1**[#14]	5[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	mg/kg	0.5		**0.6**[#14]	2.7[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,3-Trichloropropane	mg/kg	0.5		**0.0051**[#14]	0.11[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	mg/kg	0.5		**0.46**[#14]	2[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichloropropane	mg/kg	0.5		**1,600**[#14]	23,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	mg/kg	0.5		**2.5**[#14]	11[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,2-Dichloropropane	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzal Chloride	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzotrichloride	mg/kg	0.1		**0.053**[#14]	0.25[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromochloromethane	mg/kg	0.5		**150**[#14]	630[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzyl Chloride	mg/kg	0.1		**1.1**[#14]	4.8[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	mg/kg	0.5		**0.29**[#14]	1.3[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromoform	mg/kg	0.5		**19**[#14]	86[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon Tetrachloride	mg/kg	0.5		**0.65**[#14]	2.9[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlorodibromomethane	mg/kg	0.5		**8.3**[#14]	39[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroethane	mg/kg	0.5		**14,000**[#14]	57,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform	mg/kg	0.5		**0.32**[#14]	1.4[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloromethane	mg/kg	0.5		**110**[#14]	460[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	mg/kg	0.5		**160**[#14]	2,300[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibromomethane	mg/kg	0.5		**24**[#14]	99[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dichloromethane	mg/kg	0.5		**57**[#14]	1,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/kg	0.1		**1.2**[#14]	5.3[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorocyclopentadiene	mg/kg	0.1		**1.8**[#14]	7.5[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	mg/kg	0.1		**1.8**[#14]	8[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	0.5		**24**[#14]	100[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	mg/kg	0.5		**1,600**[#14]	23,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
trans-1,3-Dichloropropene	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethene	mg/kg	0.5		**0.94**[#14]	6[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vinyl Chloride	mg/kg	0.5		**0.059**[#14]	1.7[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Chlorinated Hydrocarbons	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Other Chlorinated Hydrocarbons	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria
Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**
					Location Code	MW03	MW03	MW03	T1	T2	T2	BH01	BH01	BH01	BH01	BH02	BH02	BH02	BH03	BH03	BH04	BH05	BH05	BH05	BH06
					Field ID	MW03/0.1	MW03/0.5	MW03/1.0	T1/0.1	T2/0.1	T2/0.5	BH01/0-0.05	BH01/0.4-0.5	BH01/0.6-0.7	BH01/1.4-1.5	BH02/0.15-0.25	BH02/0.9-1.0	BH02/1.4-1.5	BH03/0-0.05	BH03/0.6-0.7	BH04/0.15-0.25	BH05/0-0.05	BH05/0.15-0.25	BH05/0.4-0.5	BH06/0.15-0.25
					Date	15/07/2020	15/07/2020	15/07/2020	14/07/2020	14/07/2020	15/07/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020
					Depth	0.1	0.5	1	0.1	0.1	0.5	0 - 0.05	0.4 - 0.5	0.6 - 0.7	1.4 - 1.5	0.15 - 0.25	0.9 - 1	1.4 - 1.5	0 - 0.05	0.6 - 0.7	0.15 - 0.25	0 - 0.05	0.15 - 0.25	0.4 - 0.5	0.15 - 0.25
					Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
					Lab Report No.	732271	732271	733886	732366	732366	733886	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																				
Phenols																									
2-Methylphenol	mg/kg	0.2		**3,200**$^{\#14}$	41,000$^{\#25}$	-	-	-	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitrophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	<10	-	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	mg/kg	0.5		**1,300**$^{\#14}$	16,000$^{\#25}$	-	-	-	-	-	-	-	-	-	<10	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrophenol	mg/kg	5		**130**$^{\#14}$	1,600$^{\#25}$	-	-	-	-	-	-	-	-	-	<600	-	-	-	-	-	-	-	-	-	-
3-&4-Methylphenol (m&p-cresol)	mg/kg	0.4				-	-	-	<0.4	<0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.5		**6,300**$^{\#14}$	82,000$^{\#25}$	-	-	-	-	-	-	-	-	-	<10	-	-	-	-	-	-	-	-	-	-
4-Nitrophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	<10	-	-	-	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	mg/kg	5		**5.1**$^{\#14}$	66$^{\#25}$	-	-	-	-	-	-	-	-	-	<200	-	-	-	-	-	-	-	-	-	-
4,6-Dinitro-o-cyclohexyl phenol	mg/kg	20		**130**$^{\#14}$	1,600$^{\#25}$	-	-	-	-	-	-	-	-	-	<600	-	-	-	-	-	-	-	-	-	-
Cresol Total	mg/kg	1		**4,000**$^{\#12}$	25,000$^{\#23}$	-	-	-	-	-	-	-	-	-	<20	-	-	-	-	-	-	-	-	-	-
Phenol	mg/kg	0.5		**40,000**$^{\#12}$	240,000$^{\#23}$	-	-	-	<0.5	<0.5	-	-	-	-	<10	-	-	-	-	-	-	-	-	-	-
Phenols (non-halogenated)	mg/kg	20				-	-	-	-	-	-	-	-	-	<600	-	-	-	-	-	-	-	-	-	-
MAH																									
1,2,4-Trimethylbenzene	mg/kg	0.5		**300**$^{\#14}$	1,800$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	mg/kg	0.5		**270**$^{\#14}$	1,500$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropylbenzene	mg/kg	0.5		**1,900**$^{\#14}$	9,900$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	mg/kg	0.5		**6,000**$^{\#14}$	35,000$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
Total Monocylic Aromatic Hydrocarbons	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Halogenated Benzenes																									
1,2,3-Trichlorobenzene	mg/kg	0.1		**63**$^{\#14}$	930$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1		**1,800**$^{\#14}$	9,300$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
1,2,3,4-Tetrachlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
1,2,3,5-Tetrachlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
1,2,4,5-Tetrachlorobenzene	mg/kg	0.1		**23**$^{\#14}$	350$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.05		**24**$^{\#14}$	110$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
1,3,5-Trichlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
2-Chlorotoluene	mg/kg	0.5		**1,600**$^{\#14}$	23,000$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.1		**2.6**$^{\#14}$	11$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
4-Chlorotoluene	mg/kg	0.5		**1,600**$^{\#14}$	23,000$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
Bromobenzene	mg/kg	0.5		**290**$^{\#14}$	1,800$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
Chlorobenzene	mg/kg	0.5		**280**$^{\#14}$	1,300$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
Pentachlorobenzene	mg/kg	0.1		**63**$^{\#14}$	930$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
Halogenated Hydrocarbons																									
1,2-Dibromoethane	mg/kg	0.5		**0.036**$^{\#14}$	0.16$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
Bromomethane	mg/kg	0.5		**6.8**$^{\#14}$	30$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane	mg/kg	0.5		**87**$^{\#14}$	370$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iodomethane	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	mg/kg	0.5		**23,000**$^{\#14}$	350,000$^{\#25}$	-	-	-	-	-	-	-	-	-	<2	-	-	-	-	-	-	-	-	-	-
Chlorinated Hydrocarbons																									
1,1-Dichloropropene	mg/kg	0.5				-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	mg/kg	0.5		**3.6**$^{\#14}$	16$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethene	mg/kg	0.5		**230**$^{\#14}$	1,000$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
1,1,1,2-Tetrachloroethane	mg/kg	0.5		**2**$^{\#14}$	8.8$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
1,1,1-Trichloroethane	mg/kg	0.5		**8,100**$^{\#14}$	36,000$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane	mg/kg	0.5		**0.0053**$^{\#14}$	0.064$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
1,1,2-Trichloroethane	mg/kg	0.5		**1.1**$^{\#14}$	5$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	mg/kg	0.5		**0.6**$^{\#14}$	2.7$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
1,2,3-Trichloropropane	mg/kg	0.5		**0.0051**$^{\#14}$	0.11$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	mg/kg	0.5		**0.46**$^{\#14}$	2$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
1,3-Dichloropropane	mg/kg	0.5		**1,600**$^{\#14}$	23,000$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	mg/kg	0.5		**2.5**$^{\#14}$	11$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
2,2-Dichloropropane	mg/kg	0.5				-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
Benzal Chloride	mg/kg	0.1				-	-	-	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
Benzotrichloride	mg/kg	0.1		**0.053**$^{\#14}$	0.25$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
Bromochloromethane	mg/kg	0.5		**150**$^{\#14}$	630$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
Benzyl Chloride	mg/kg	0.1		**1.1**$^{\#14}$	4.8$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	mg/kg	0.5		**0.29**$^{\#14}$	1.3$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
Bromoform	mg/kg	0.5		**19**$^{\#14}$	86$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
Carbon Tetrachloride	mg/kg	0.5		**0.65**$^{\#14}$	2.9$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
Chlorodibromomethane	mg/kg	0.5		**8.3**$^{\#14}$	39$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
Chloroethane	mg/kg	0.5		**14,000**$^{\#14}$	57,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform	mg/kg	0.5		**0.32**$^{\#14}$	1.4$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
Chloromethane	mg/kg	0.5		**110**$^{\#14}$	460$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	mg/kg	0.5		**160**$^{\#14}$	2,300$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
Dibromomethane	mg/kg	0.5		**24**$^{\#14}$	99$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	mg/kg	0.5				-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
Dichloromethane	mg/kg	0.5		**57**$^{\#14}$	1,000$^{\#25}$	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/kg	0.1		**1.2**$^{\#14}$	5.3$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
Hexachlorocyclopentadiene	mg/kg	0.1		**1.8**$^{\#14}$	7.5$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	mg/kg	0.1		**1.8**$^{\#14}$	8$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	0.5		**24**$^{\#14}$	100$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	mg/kg	0.5		**1,600**$^{\#14}$	23,000$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
trans-1,3-Dichloropropene	mg/kg	0.5				-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
Trichloroethene	mg/kg	0.5		**0.94**$^{\#14}$	6$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.5	-	-	-	-	-	-	-	-	-	-
Vinyl Chloride	mg/kg	0.5		**0.059**$^{\#14}$	1.7$^{\#25}$	-	-	-	-	-	-	-	-	-	<1	-	-	-	-	-	-	-	-	-	-
Total Chlorinated Hydrocarbons	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Other Chlorinated Hydrocarbons	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria
Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**
					Location Code	BH06	BH07	BH08	BH08	BH09	BH09	BH10	BH11	BH12	BH12	BH13	BH13	BH14	BH14	BH15	BH16	BH16	BH17	BH17
					Field ID	BH06/0.4-0.5	BH07/0.4-0.5	BH08/0-0.05	BH08/0.6-0.7	BH09/0-0.05	BH09/0.6-0.7	BH10/0.15-0.25	BH11/0.4-0.5	BH12/0.15-0.25	BH12/0.4-0.5	BH13/0-0.05	BH13/0.6-0.7	BH14/0-0.05	BH14/0.4-0.5	BH15/0.15-0.25	BH16/0.15-0.25	BH16/0.4-0.5	BH17/0.4-0.5	BH17/0.6-0.7
					Date	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020
					Depth	0.4 - 0.5	0.4 - 0.5	0 - 0.05	0.6 - 0.7	0 - 0.05	0.6 - 0.7	0.15 - 0.25	0.4 - 0.5	0.15 - 0.25	0.4 - 0.5	0 - 0.05	0.6 - 0.7	0 - 0.05	0.4 - 0.5	0.15 - 0.25	0.15 - 0.25	0.4 - 0.5	0.4 - 0.5	0.6 - 0.7
					Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
					Lab Report No.	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																			
Phenols																								
2-Methylphenol	mg/kg	0.2		**3,200**[#14]	41,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitrophenol	mg/kg	0.5				-	-	<2	-	-	-	<2	-	-	-	-	<2	-	-	-	-	-	-	<2
2,4-Dimethylphenol	mg/kg	0.5		**1,300**[#14]	16,000[#25]	-	-	<2	-	-	-	<2	-	-	-	-	<2	-	-	-	-	-	-	<2
2,4-Dinitrophenol	mg/kg	5		**130**[#14]	1,600[#25]	-	-	<150	-	-	-	<150	-	-	-	-	<150	-	-	-	-	-	-	<150
3-&4-Methylphenol (m&p-cresol)	mg/kg	0.4				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.5		**6,300**[#14]	82,000[#25]	-	-	<2	-	-	-	<2	-	-	-	-	<2	-	-	-	-	-	-	<2
4-Nitrophenol	mg/kg	0.5				-	-	<2	-	-	-	<2	-	-	-	-	<2	-	-	-	-	-	-	<2
4,6-Dinitro-2-methylphenol	mg/kg	5		**5.1**[#14]	66[#25]	-	-	<50	-	-	-	<50	-	-	-	-	<50	-	-	-	-	-	-	<50
4,6-Dinitro-o-cyclohexyl phenol	mg/kg	20		**130**[#14]	1,600[#25]	-	-	<150	-	-	-	<150	-	-	-	-	<150	-	-	-	-	-	-	<150
Cresol Total	mg/kg	1		**4,000**[#12]	25,000[#23]	-	-	<5	-	-	-	<5	-	-	-	-	<5	-	-	-	-	-	-	<5
Phenol	mg/kg	0.5		**40,000**[#12]	240,000[#23]	-	-	<2	-	-	-	<2	-	-	-	-	<2	-	-	-	-	-	-	<2
Phenols (non-halogenated)	mg/kg	20				-	-	<150	-	-	-	<150	-	-	-	-	<150	-	-	-	-	-	-	<150
MAH																								
1,2,4-Trimethylbenzene	mg/kg	0.5		**300**[#14]	1,800[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	mg/kg	0.5		**270**[#14]	1,500[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropylbenzene	mg/kg	0.5		**1,900**[#14]	9,900[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	mg/kg	0.5		**6,000**[#14]	35,000[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Total Monocylic Aromatic Hydrocarbons	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Halogenated Benzenes																								
1,2,3-Trichlorobenzene	mg/kg	0.1		**63**[#14]	930[#25]	-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
1,2-Dichlorobenzene	mg/kg	0.1		**1,800**[#14]	9,300[#25]	-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
1,2,3,4-Tetrachlorobenzene	mg/kg	0.1				-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
1,2,3,5-Tetrachlorobenzene	mg/kg	0.1				-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
1,2,4,5-Tetrachlorobenzene	mg/kg	0.1		**23**[#14]	350[#25]	-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
1,2,4-Trichlorobenzene	mg/kg	0.05		**24**[#14]	110[#25]	-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
1,3-Dichlorobenzene	mg/kg	0.1				-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
1,3,5-Trichlorobenzene	mg/kg	0.1				-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
2-Chlorotoluene	mg/kg	0.5		**1,600**[#14]	23,000[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,4-Dichlorobenzene	mg/kg	0.1		**2.6**[#14]	11[#25]	-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
4-Chlorotoluene	mg/kg	0.5		**1,600**[#14]	23,000[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Bromobenzene	mg/kg	0.5		**290**[#14]	1,800[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Chlorobenzene	mg/kg	0.5		**280**[#14]	1,300[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Pentachlorobenzene	mg/kg	0.1		**63**[#14]	930[#25]	-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
Halogenated Hydrocarbons																								
1,2-Dibromoethane	mg/kg	0.5		**0.036**[#14]	0.16[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Bromomethane	mg/kg	0.5		**6.8**[#14]	30[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane	mg/kg	0.5		**87**[#14]	370[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iodomethane	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	mg/kg	0.5		**23,000**[#14]	350,000[#25]	-	-	<2	-	-	-	<2	-	-	-	-	<2	-	-	-	-	-	-	<2
Chlorinated Hydrocarbons																								
1,1-Dichloropropene	mg/kg	0.5				-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,1-Dichloroethane	mg/kg	0.5		**3.6**[#14]	16[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,1-Dichloroethene	mg/kg	0.5		**230**[#14]	1,000[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,1,1,2-Tetrachloroethane	mg/kg	0.5		**2**[#14]	8.8[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,1,1-Trichloroethane	mg/kg	0.5		**8,100**[#14]	36,000[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,2-Dibromo-3-chloropropane	mg/kg	0.5		**0.0053**[#14]	0.064[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,1,2-Trichloroethane	mg/kg	0.5		**1.1**[#14]	5[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,1,2,2-Tetrachloroethane	mg/kg	0.5		**0.6**[#14]	2.7[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,2,3-Trichloropropane	mg/kg	0.5		**0.0051**[#14]	0.11[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,2-Dichloroethane	mg/kg	0.5		**0.46**[#14]	2[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,3-Dichloropropane	mg/kg	0.5		**1,600**[#14]	23,000[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,2-Dichloropropane	mg/kg	0.5		**2.5**[#14]	11[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
2,2-Dichloropropane	mg/kg	0.5				-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Benzal Chloride	mg/kg	0.1				-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
Benzotrichloride	mg/kg	0.1		**0.053**[#14]	0.25[#25]	-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
Bromochloromethane	mg/kg	0.5		**150**[#14]	630[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Benzyl Chloride	mg/kg	0.1		**1.1**[#14]	4.8[#25]	-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
Bromodichloromethane	mg/kg	0.5		**0.29**[#14]	1.3[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Bromoform	mg/kg	0.5		**19**[#14]	86[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Carbon Tetrachloride	mg/kg	0.5		**0.65**[#14]	2.9[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Chlorodibromomethane	mg/kg	0.5		**8.3**[#14]	39[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Chloroethane	mg/kg	0.5		**14,000**[#14]	57,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform	mg/kg	0.5		**0.32**[#14]	1.4[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Chloromethane	mg/kg	0.5		**110**[#14]	460[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	mg/kg	0.5		**160**[#14]	2,300[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Dibromomethane	mg/kg	0.5		**24**[#14]	99[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
cis-1,3-Dichloropropene	mg/kg	0.5				-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Dichloromethane	mg/kg	0.5		**57**[#14]	1,000[#25]	-	-	<1	-	-	-	<1	-	-	-	-	<1	-	-	-	-	-	-	<1
Hexachlorobutadiene	mg/kg	0.1		**1.2**[#14]	5.3[#25]	-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
Hexachlorocyclopentadiene	mg/kg	0.1		**1.8**[#14]	7.5[#25]	-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
Hexachloroethane	mg/kg	0.1		**1.8**[#14]	8[#25]	-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
Tetrachloroethene	mg/kg	0.5		**24**[#14]	100[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
trans-1,2-Dichloroethene	mg/kg	0.5		**1,600**[#14]	23,000[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
trans-1,3-Dichloropropene	mg/kg	0.5				-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Trichloroethene	mg/kg	0.5		**0.94**[#14]	6[#25]	-	-	<0.5	-	-	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Vinyl Chloride	mg/kg	0.5		**0.059**[#14]	1.7[#25]	-	-	<1	-	-	-	<1	-	-	-	-	<1	-	-	-	-	-	-	<1
Total Chlorinated Hydrocarbons	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Other Chlorinated Hydrocarbons	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria
Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**
					Location Code	BH18	BH18	BH18	BH19	BH19	BH20	BH21	BH22	BH23	BH23	BH24	BH25	BH25	BH25	BH26	SB01	SB02	SB02	SB02	SB03
					Field ID	BH18/0.0-0.05	BH18/0.4-0.5	BH18/0.6-0.7	BH19/0.0-0.05	BH19/0.6-0.7	BH20/0.15-0.25	BH21/0.15-0.25	BH22/0.4-0.5	BH23/0.0-0.05	BH23/0.6-0.7	BH24/0.4-0.5	BH25/0.0-0.05	BH25/0.4-0.5	BH25/0.6-0.7	BH26/0.4-0.5	SB01_0.45	SB02_0.4	QC01	QC02	SB03_0.1
					Date	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020
					Depth	0 - 0.05	0.4 - 0.5	0.6 - 0.7	0 - 0.05	0.6 - 0.7	0.15 - 0.25	0.15 - 0.25	0.4 - 0.5	0 - 0.05	0.6 - 0.7	0.4 - 0.5	0 - 0.05	0.4 - 0.5	0.6 - 0.7	0.4 - 0.5	0.45	0.4			0.1
					Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Field_D	Interlab_D	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
					Lab Report No.	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	762416	762416	762416	EM2021988	762416
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																				
Phenols																									
2-Methylphenol	mg/kg	0.2		**3,200$^{\#14}$**	41,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitrophenol	mg/kg	0.5				-	<2	-	-	-	-	<2	-	-	-	-	<2	-	-	<2	-	-	-	-	-
2,4-Dimethylphenol	mg/kg	0.5		**1,300$^{\#14}$**	16,000$^{\#25}$	-	<2	-	-	-	-	<2	-	-	-	-	<2	-	-	<2	-	-	-	-	-
2,4-Dinitrophenol	mg/kg	5		**130$^{\#14}$**	1,600$^{\#25}$	-	<150	-	-	-	-	<150	-	-	-	-	<150	-	-	<150	-	-	-	-	-
3-&4-Methylphenol (m&p-cresol)	mg/kg	0.4				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.5		**6,300$^{\#14}$**	82,000$^{\#25}$	-	<2	-	-	-	-	<2	-	-	-	-	<2	-	-	<2	-	-	-	-	-
4-Nitrophenol	mg/kg	0.5				-	<2	-	-	-	-	<2	-	-	-	-	<2	-	-	<2	-	-	-	-	-
4,6-Dinitro-2-methylphenol	mg/kg	5		**5.1$^{\#14}$**	66$^{\#25}$	-	<50	-	-	-	-	<50	-	-	-	-	<50	-	-	<50	-	-	-	-	-
4,6-Dinitro-o-cyclohexyl phenol	mg/kg	20		**130$^{\#14}$**	1,600$^{\#25}$	-	<150	-	-	-	-	<150	-	-	-	-	<150	-	-	<150	-	-	-	-	-
Cresol Total	mg/kg	1		**4,000$^{\#12}$**	25,000$^{\#23}$	-	<5	-	-	-	-	<5	-	-	-	-	<5	-	-	<5	-	-	-	-	-
Phenol	mg/kg	0.5		**40,000$^{\#12}$**	240,000$^{\#23}$	-	<2	-	-	-	-	<2	-	-	-	-	<2	-	-	<2	-	-	-	-	-
Phenols (non-halogenated)	mg/kg	20				-	<150	-	-	-	-	<150	-	-	-	-	<150	-	-	<150	-	-	-	-	-
MAH																									
1,2,4-Trimethylbenzene	mg/kg	0.5		**300$^{\#14}$**	1,800$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	mg/kg	0.5		**270$^{\#14}$**	1,500$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropylbenzene	mg/kg	0.5		**1,900$^{\#14}$**	9,900$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Styrene	mg/kg	0.5		**6,000$^{\#14}$**	35,000$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
Total Monocylic Aromatic Hydrocarbons	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Halogenated Benzenes																									
1,2,3-Trichlorobenzene	mg/kg	0.1		**63$^{\#14}$**	930$^{\#25}$	-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1		**1,800$^{\#14}$**	9,300$^{\#25}$	-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
1,2,3,4-Tetrachlorobenzene	mg/kg	0.1				-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
1,2,3,5-Tetrachlorobenzene	mg/kg	0.1				-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
1,2,4,5-Tetrachlorobenzene	mg/kg	0.1		**23$^{\#14}$**	350$^{\#25}$	-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.05		**24$^{\#14}$**	110$^{\#25}$	-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.1				-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
1,3,5-Trichlorobenzene	mg/kg	0.1				-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
2-Chlorotoluene	mg/kg	0.5		**1,600$^{\#14}$**	23,000$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.1		**2.6$^{\#14}$**	11$^{\#25}$	-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
4-Chlorotoluene	mg/kg	0.5		**1,600$^{\#14}$**	23,000$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
Bromobenzene	mg/kg	0.5		**290$^{\#14}$**	1,800$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
Chlorobenzene	mg/kg	0.5		**280$^{\#14}$**	1,300$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
Pentachlorobenzene	mg/kg	0.1		**63$^{\#14}$**	930$^{\#25}$	-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
Halogenated Hydrocarbons																									
1,2-Dibromoethane	mg/kg	0.5		**0.036$^{\#14}$**	0.16$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
Bromomethane	mg/kg	0.5		**6.8$^{\#14}$**	30$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dichlorodifluoromethane	mg/kg	0.5		**87$^{\#14}$**	370$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iodomethane	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane	mg/kg	0.5		**23,000$^{\#14}$**	350,000$^{\#25}$	-	<2	-	-	-	-	<2	-	-	-	-	<2	-	-	<2	-	-	-	-	-
Chlorinated Hydrocarbons																									
1,1-Dichloropropene	mg/kg	0.5				-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
1,1-Dichloroethane	mg/kg	0.5		**3.6$^{\#14}$**	16$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
1,1-Dichloroethene	mg/kg	0.5		**230$^{\#14}$**	1,000$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
1,1,1,2-Tetrachloroethane	mg/kg	0.5		**2$^{\#14}$**	8.8$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
1,1,1-Trichloroethane	mg/kg	0.5		**8,100$^{\#14}$**	36,000$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
1,2-Dibromo-3-chloropropane	mg/kg	0.5		**0.0053$^{\#14}$**	0.064$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
1,1,2-Trichloroethane	mg/kg	0.5		**1.1$^{\#14}$**	5$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
1,1,2,2-Tetrachloroethane	mg/kg	0.5		**0.6$^{\#14}$**	2.7$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
1,2,3-Trichloropropane	mg/kg	0.5		**0.0051$^{\#14}$**	0.11$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
1,2-Dichloroethane	mg/kg	0.5		**0.46$^{\#14}$**	2$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
1,3-Dichloropropane	mg/kg	0.5		**1,600$^{\#14}$**	23,000$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
1,2-Dichloropropane	mg/kg	0.5		**2.5$^{\#14}$**	11$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
2,2-Dichloropropane	mg/kg	0.5				-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
Benzal Chloride	mg/kg	0.1				-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
Benzotrichloride	mg/kg	0.1		**0.053$^{\#14}$**	0.25$^{\#25}$	-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
Bromochloromethane	mg/kg	0.5		**150$^{\#14}$**	630$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
Benzyl Chloride	mg/kg	0.1		**1.1$^{\#14}$**	4.8$^{\#25}$	-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
Bromodichloromethane	mg/kg	0.5		**0.29$^{\#14}$**	1.3$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
Bromoform	mg/kg	0.5		**19$^{\#14}$**	86$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
Carbon Tetrachloride	mg/kg	0.5		**0.65$^{\#14}$**	2.9$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
Chlorodibromomethane	mg/kg	0.5		**8.3$^{\#14}$**	39$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
Chloroethane	mg/kg	0.5		**14,000$^{\#14}$**	57,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloroform	mg/kg	0.5		**0.32$^{\#14}$**	1.4$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
Chloromethane	mg/kg	0.5		**110$^{\#14}$**	460$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	mg/kg	0.5		**160$^{\#14}$**	2,300$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
Dibromomethane	mg/kg	0.5		**24$^{\#14}$**	99$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
cis-1,3-Dichloropropene	mg/kg	0.5				-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
Dichloromethane	mg/kg	0.5		**57$^{\#14}$**	1,000$^{\#25}$	-	<1	-	-	-	-	<1	-	-	-	-	<1	-	-	<1	-	-	-	-	-
Hexachlorobutadiene	mg/kg	0.1		**1.2$^{\#14}$**	5.3$^{\#25}$	-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
Hexachlorocyclopentadiene	mg/kg	0.1		**1.8$^{\#14}$**	7.5$^{\#25}$	-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
Hexachloroethane	mg/kg	0.1		**1.8$^{\#14}$**	8$^{\#25}$	-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
Tetrachloroethene	mg/kg	0.5		**24$^{\#14}$**	100$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
trans-1,2-Dichloroethene	mg/kg	0.5		**1,600$^{\#14}$**	23,000$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
trans-1,3-Dichloropropene	mg/kg	0.5				-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
Trichloroethene	mg/kg	0.5		**0.94$^{\#14}$**	6$^{\#25}$	-	<0.5	-	-	-	-	<0.5	-	-	-	-	<0.5	-	-	<0.5	-	-	-	-	-
Vinyl Chloride	mg/kg	0.5		**0.059$^{\#14}$**	1.7$^{\#25}$	-	<1	-	-	-	-	<1	-	-	-	-	<1	-	-	<1	-	-	-	-	-
Total Chlorinated Hydrocarbons	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Other Chlorinated Hydrocarbons	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria
Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**
					Location Code	SB03	SB04	SB04	SB05	SB05	SB06	SB07	SB07	SB08	SB09	SB09	SB10	SB10	SB11	SB11	SB12	SB12	SB13	SB13	SB13
					Field ID	SB03_0.4	SB04_0.1	SB04_0.4	SB05_0.1	SB05_0.5	SB06_0.48	SB07_0.1-0.2	SB07_0.7-0.8	SB08_0.1-0.2	SB09_0.1-0.2	SB09_0.4-0.5	SB10_0.1-0.2	SB10_0.7-0.8	SB11_0.1-0.2	SB11_0.8-0.9	SB12_0.1-0.2	SB12_1.9-2.0	SB13_0.1-0.2	SB13_0.8_0.9	SB13_1.9-2.0
					Date	8/12/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020	12/01/2021	12/01/2021	12/01/2021	8/12/2020	8/12/2020	12/01/2021	12/01/2021	8/12/2020	8/12/2020	8/12/2020	5/03/2021	12/01/2021	12/02/2021	5/03/2021
					Depth	0.4	0.1	0.4	0.1	0.5	0.48	0.1 - 0.2	0.7 - 0.8	0.1 - 0.2	0.1 - 0.2	0.4 - 0.5	0.1 - 0.2	0.7 - 0.8	0.1 - 0.2	0.8 - 0.9	0.1 - 0.2	1.9 - 2.0	0.1 - 0.2	0.8 - 0.9	1.9 - 2.0
					Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Natural	Fill	Fill	Natural
					Lab Report No.	762416	762416	762416	762416	762416	762416	767787	767787	767787	767787	767787	767787	767787	767787	767787	767787	778664	767787	773807	778664
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																				
Phenols																									
2-Methylphenol	mg/kg	0.2		**3,200**$^{\#14}$	41,000$^{\#25}$	-	-	-	-	-	-	-	-	<0.2	-	-	-	<0.2	<0.2	-	-	-	-	-	-
2-Nitrophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	<1	-	-	-	<1	<1	-	-	-	-	-	-
2,4-Dimethylphenol	mg/kg	0.5		**1,300**$^{\#14}$	16,000$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
2,4-Dinitrophenol	mg/kg	5		**130**$^{\#14}$	1,600$^{\#25}$	-	-	-	-	-	-	-	-	<5	-	-	-	<5	<5	-	-	-	-	-	-
3-&4-Methylphenol (m&p-cresol)	mg/kg	0.4				-	-	-	-	-	-	-	-	<0.4	-	-	-	<0.4	<0.4	-	-	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.5		**6,300**$^{\#14}$	82,000$^{\#25}$	-	-	-	-	-	-	-	-	<1	-	-	-	<1	<1	-	-	-	-	-	-
4-Nitrophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	<5	-	-	-	<5	<5	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	mg/kg	5		**5.1**$^{\#14}$	66$^{\#25}$	-	-	-	-	-	-	-	-	<5	-	-	-	<5	<5	-	-	-	-	-	-
4,6-Dinitro-o-cyclohexyl phenol	mg/kg	20		**130**$^{\#14}$	1,600$^{\#25}$	-	-	-	-	-	-	-	-	<20	-	-	-	<20	<20	-	-	-	-	-	-
Cresol Total	mg/kg	1		**4,000**$^{\#12}$	25,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	mg/kg	0.5		**40,000**$^{\#12}$	240,000$^{\#23}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Phenols (non-halogenated)	mg/kg	20				-	-	-	-	-	-	-	-	<20	-	-	-	<20	<20	-	-	-	-	-	-
MAH																									
1,2,4-Trimethylbenzene	mg/kg	0.5		**300**$^{\#14}$	1,800$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
1,3,5-Trimethylbenzene	mg/kg	0.5		**270**$^{\#14}$	1,500$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Isopropylbenzene	mg/kg	0.5		**1,900**$^{\#14}$	9,900$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Styrene	mg/kg	0.5		**6,000**$^{\#14}$	35,000$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Total Monocylic Aromatic Hydrocarbons	mg/kg	0.5				-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Halogenated Benzenes																									
1,2,3-Trichlorobenzene	mg/kg	0.1		**63**$^{\#14}$	930$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1		**1,800**$^{\#14}$	9,300$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
1,2,3,4-Tetrachlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,3,5-Tetrachlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4,5-Tetrachlorobenzene	mg/kg	0.1		**23**$^{\#14}$	350$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.05		**24**$^{\#14}$	110$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
1,3,5-Trichlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chlorotoluene	mg/kg	0.5		**1,600**$^{\#14}$	23,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.1		**2.6**$^{\#14}$	11$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
4-Chlorotoluene	mg/kg	0.5		**1,600**$^{\#14}$	23,000$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Bromobenzene	mg/kg	0.5		**290**$^{\#14}$	1,800$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Chlorobenzene	mg/kg	0.5		**280**$^{\#14}$	1,300$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Pentachlorobenzene	mg/kg	0.1		**63**$^{\#14}$	930$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Halogenated Hydrocarbons																									
1,2-Dibromoethane	mg/kg	0.5		**0.036**$^{\#14}$	0.16$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Bromomethane	mg/kg	0.5		**6.8**$^{\#14}$	30$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Dichlorodifluoromethane	mg/kg	0.5		**87**$^{\#14}$	370$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Iodomethane	mg/kg	0.5				-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Trichlorofluoromethane	mg/kg	0.5		**23,000**$^{\#14}$	350,000$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Chlorinated Hydrocarbons																									
1,1-Dichloropropene	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	mg/kg	0.5		**3.6**$^{\#14}$	16$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
1,1-Dichloroethene	mg/kg	0.5		**230**$^{\#14}$	1,000$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
1,1,1,2-Tetrachloroethane	mg/kg	0.5		**2**$^{\#14}$	8.8$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
1,1,1-Trichloroethane	mg/kg	0.5		**8,100**$^{\#14}$	36,000$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane	mg/kg	0.5		**0.0053**$^{\#14}$	0.064$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2-Trichloroethane	mg/kg	0.5		**1.1**$^{\#14}$	5$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	mg/kg	0.5		**0.6**$^{\#14}$	2.7$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
1,2,3-Trichloropropane	mg/kg	0.5		**0.0051**$^{\#14}$	0.11$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
1,2-Dichloroethane	mg/kg	0.5		**0.46**$^{\#14}$	2$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
1,3-Dichloropropane	mg/kg	0.5		**1,600**$^{\#14}$	23,000$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
1,2-Dichloropropane	mg/kg	0.5		**2.5**$^{\#14}$	11$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
2,2-Dichloropropane	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzal Chloride	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzotrichloride	mg/kg	0.1		**0.053**$^{\#14}$	0.25$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromochloromethane	mg/kg	0.5		**150**$^{\#14}$	630$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Benzyl Chloride	mg/kg	0.1		**1.1**$^{\#14}$	4.8$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	mg/kg	0.5		**0.29**$^{\#14}$	1.3$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Bromoform	mg/kg	0.5		**19**$^{\#14}$	86$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Carbon Tetrachloride	mg/kg	0.5		**0.65**$^{\#14}$	2.9$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Chlorodibromomethane	mg/kg	0.5		**8.3**$^{\#14}$	39$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Chloroethane	mg/kg	0.5		**14,000**$^{\#14}$	57,000$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Chloroform	mg/kg	0.5		**0.32**$^{\#14}$	1.4$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Chloromethane	mg/kg	0.5		**110**$^{\#14}$	460$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
cis-1,2-Dichloroethene	mg/kg	0.5		**160**$^{\#14}$	2,300$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Dibromomethane	mg/kg	0.5		**24**$^{\#14}$	99$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
cis-1,3-Dichloropropene	mg/kg	0.5				-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Dichloromethane	mg/kg	0.5		**57**$^{\#14}$	1,000$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Hexachlorobutadiene	mg/kg	0.1		**1.2**$^{\#14}$	5.3$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Hexachlorocyclopentadiene	mg/kg	0.1		**1.8**$^{\#14}$	7.5$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	mg/kg	0.1		**1.8**$^{\#14}$	8$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	0.5		**24**$^{\#14}$	100$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
trans-1,2-Dichloroethene	mg/kg	0.5		**1,600**$^{\#14}$	23,000$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
trans-1,3-Dichloropropene	mg/kg	0.5				-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Trichloroethene	mg/kg	0.5		**0.94**$^{\#14}$	6$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Vinyl Chloride	mg/kg	0.5		**0.059**$^{\#14}$	1.7$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Total Chlorinated Hydrocarbons	mg/kg	0.5				-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Total Other Chlorinated Hydrocarbons	mg/kg	0.5				-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria
Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**
					Location Code	SB14	SB14	SB14	SB15	SB16	SB16	SB16	SB16	SB17	SB18	SB18	SB19	SB19	SB20	SB20	SB20	SB21	SB22	SB22
					Field ID	SB14_0.1-0.2	SB14_0.8-0.9	SB14_1.9-2.0	SB15_0.1-0.2	SB16_0.05-0.15	SB16_0.45-0.55	QC03	QC04	SB17_0.05-0.15	SB18_0.1-0.2	SB18_0.4-0.5	SB19_0.1-0.2	SB19_0.35-0.45	SB20_0.1-0.2	SB20_0.5-0.6	SB20_2.4-2.5	SB21_0.1-0.2	SB22_0.1-0.2	SB22_1.4-1.5
					Date	12/01/2021	12/02/2021	5/03/2021	12/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021	2/02/2021	2/02/2021	2/02/2021	2/02/2021	5/03/2021	13/01/2021	13/01/2021	5/03/2021
					Depth	0.1 - 0.2	0.8 - 0.9	1.9 - 2.0	0.1 - 0.2	0.05 - 0.15	0.45 - 0.55	0.45 - 0.55	0.45 - 0.55	0.05 - 0.15	0.1 - 0.2	0.4 - 0.5	0.1 - 0.2	0.35 - 0.45	0.1 - 0.2	0.5 - 0.6	2.4 - 2.5	0.1 - 0.2	0.1 - 0.2	1.4 - 1.5
					Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Field_D	Interlab_D	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
					Fill/Natural	Fill	Fill	Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Natural
					Lab Report No.	767787	773807	778664	767787	767787	767787	767787	EM2100608	767787	767787	767787	771075	771075	771075	771075	778664	767787	767787	778664
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																			
Phenols																								
2-Methylphenol	mg/kg	0.2		**3,200**$^{\#14}$	41,000$^{\#25}$	<0.2	-	-	<0.2	-	<0.2	-	-	-	-	<0.2	-	-	-	-	-	-	-	-
2-Nitrophenol	mg/kg	0.5				<1	-	-	<1	-	<1	-	-	-	-	<1	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	mg/kg	0.5		**1,300**$^{\#14}$	16,000$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
2,4-Dinitrophenol	mg/kg	5		**130**$^{\#14}$	1,600$^{\#25}$	<5	-	-	<5	-	<5	-	-	-	-	<5	-	-	-	-	-	-	-	-
3-&4-Methylphenol (m&p-cresol)	mg/kg	0.4				<0.4	-	-	<0.4	-	<0.4	-	-	-	-	<0.4	-	-	-	-	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.5		**6,300**$^{\#14}$	82,000$^{\#25}$	<1	-	-	<1	-	<1	-	-	-	-	<1	-	-	-	-	-	-	-	-
4-Nitrophenol	mg/kg	0.5				<5	-	-	<5	-	<5	-	-	-	-	<5	-	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	mg/kg	5		**5.1**$^{\#14}$	66$^{\#25}$	<5	-	-	<5	-	<5	-	-	-	-	<5	-	-	-	-	-	-	-	-
4,6-Dinitro-o-cyclohexyl phenol	mg/kg	20		**130**$^{\#14}$	1,600$^{\#25}$	<20	-	-	<20	-	<20	-	-	-	-	<20	-	-	-	-	-	-	-	-
Cresol Total	mg/kg	1		**4,000**$^{\#12}$	25,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	mg/kg	0.5		**40,000**$^{\#12}$	240,000$^{\#23}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Phenols (non-halogenated)	mg/kg	20				<20	-	-	<20	-	<20	-	-	-	-	<20	-	-	-	-	-	-	-	-
MAH																								
1,2,4-Trimethylbenzene	mg/kg	0.5		**300**$^{\#14}$	1,800$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	mg/kg	0.5		**270**$^{\#14}$	1,500$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Isopropylbenzene	mg/kg	0.5		**1,900**$^{\#14}$	9,900$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Styrene	mg/kg	0.5		**6,000**$^{\#14}$	35,000$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Total Monocylic Aromatic Hydrocarbons	mg/kg	0.5				<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Halogenated Benzenes																								
1,2,3-Trichlorobenzene	mg/kg	0.1		**63**$^{\#14}$	930$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1		**1,800**$^{\#14}$	9,300$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
1,2,3,4-Tetrachlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,3,5-Tetrachlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4,5-Tetrachlorobenzene	mg/kg	0.1		**23**$^{\#14}$	350$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.05		**24**$^{\#14}$	110$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.1				<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
1,3,5-Trichlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chlorotoluene	mg/kg	0.5		**1,600**$^{\#14}$	23,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.1		**2.6**$^{\#14}$	11$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
4-Chlorotoluene	mg/kg	0.5		**1,600**$^{\#14}$	23,000$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Bromobenzene	mg/kg	0.5		**290**$^{\#14}$	1,800$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Chlorobenzene	mg/kg	0.5		**280**$^{\#14}$	1,300$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Pentachlorobenzene	mg/kg	0.1		**63**$^{\#14}$	930$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Halogenated Hydrocarbons																								
1,2-Dibromoethane	mg/kg	0.5		**0.036**$^{\#14}$	0.16$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Bromomethane	mg/kg	0.5		**6.8**$^{\#14}$	30$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Dichlorodifluoromethane	mg/kg	0.5		**87**$^{\#14}$	370$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Iodomethane	mg/kg	0.5				<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Trichlorofluoromethane	mg/kg	0.5		**23,000**$^{\#14}$	350,000$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Chlorinated Hydrocarbons																								
1,1-Dichloropropene	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	mg/kg	0.5		**3.6**$^{\#14}$	16$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
1,1-Dichloroethene	mg/kg	0.5		**230**$^{\#14}$	1,000$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
1,1,1,2-Tetrachloroethane	mg/kg	0.5		**2**$^{\#14}$	8.8$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
1,1,1-Trichloroethane	mg/kg	0.5		**8,100**$^{\#14}$	36,000$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane	mg/kg	0.5		**0.0053**$^{\#14}$	0.064$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2-Trichloroethane	mg/kg	0.5		**1.1**$^{\#14}$	5$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	mg/kg	0.5		**0.6**$^{\#14}$	2.7$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
1,2,3-Trichloropropane	mg/kg	0.5		**0.0051**$^{\#14}$	0.11$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
1,2-Dichloroethane	mg/kg	0.5		**0.46**$^{\#14}$	2$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
1,3-Dichloropropane	mg/kg	0.5		**1,600**$^{\#14}$	23,000$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
1,2-Dichloropropane	mg/kg	0.5		**2.5**$^{\#14}$	11$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
2,2-Dichloropropane	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzal Chloride	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzotrichloride	mg/kg	0.1		**0.053**$^{\#14}$	0.25$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromochloromethane	mg/kg	0.5		**150**$^{\#14}$	630$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Benzyl Chloride	mg/kg	0.1		**1.1**$^{\#14}$	4.8$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	mg/kg	0.5		**0.29**$^{\#14}$	1.3$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Bromoform	mg/kg	0.5		**19**$^{\#14}$	86$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Carbon Tetrachloride	mg/kg	0.5		**0.65**$^{\#14}$	2.9$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Chlorodibromomethane	mg/kg	0.5		**8.3**$^{\#14}$	39$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Chloroethane	mg/kg	0.5		**14,000**$^{\#14}$	57,000$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Chloroform	mg/kg	0.5		**0.32**$^{\#14}$	1.4$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Chloromethane	mg/kg	0.5		**110**$^{\#14}$	460$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	mg/kg	0.5		**160**$^{\#14}$	2,300$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Dibromomethane	mg/kg	0.5		**24**$^{\#14}$	99$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	mg/kg	0.5				<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Dichloromethane	mg/kg	0.5		**57**$^{\#14}$	1,000$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/kg	0.1		**1.2**$^{\#14}$	5.3$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Hexachlorocyclopentadiene	mg/kg	0.1		**1.8**$^{\#14}$	7.5$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	mg/kg	0.1		**1.8**$^{\#14}$	8$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	0.5		**24**$^{\#14}$	100$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
trans-1,2-Dichloroethene	mg/kg	0.5		**1,600**$^{\#14}$	23,000$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
trans-1,3-Dichloropropene	mg/kg	0.5				<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Trichloroethene	mg/kg	0.5		**0.94**$^{\#14}$	6$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Vinyl Chloride	mg/kg	0.5		**0.059**$^{\#14}$	1.7$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Total Chlorinated Hydrocarbons	mg/kg	0.5				<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Total Other Chlorinated Hydrocarbons	mg/kg	0.5				<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria
Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	NEPC 2013 - Human Health Setting 'C' - Public Open Space	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																			
Report						**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**
Location Code						SB23	SB23	SB23	SB24	SB24	SB24	SB25	SB26	SB27	SB27	SB28	SB28	SB29	SB30	SB30	SB31	SB31	SB31	SB32
Field ID						SB23_0.1-0.2	SB23_0.35-0.45	SB23_1.4-1.5	SB24_0.1-0.2	SB24_0.9-1.0	SB24_0.9_1.0	SB25_0.1-0.2	SB26_0.1-0.2	SB27_0.1-0.2	SB27_0.3-0.4	SB28_0.1-0.2	SB28_0.6-0.7	SB29_0.05-0.15	SB30_0.1-0.2	SB30_0.3-0.4	SB31_0.1-0.2	QC05	QC06	SB32_0.05-0.15
Date						12/01/2021	12/01/2021	5/03/2021	12/01/2021	12/01/2021	12/02/2021	12/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021	12/01/2021	12/01/2021	12/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
Depth						0.1 - 0.2	0.35 - 0.45	1.4 - 1.5	0.1 - 0.2	0.9 - 1	0.9 - 1	0.1 - 0.2	0.1 - 0.2	0.1 - 0.2	0.3 - 0.4	0.1 - 0.2	0.6 - 0.7	0.05 - 0.15	0.1 - 0.2	0.3 - 0.4	0.1 - 0.2	0.1 - 0.2	0.1 - 0.2	0.05 - 0.15
Sample Type						Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Field_D	Interlab_D	Normal
Fill/Natural						Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
Lab Report No.						767787	767787	778664	767787	767787	773807	767787	767787	767787	767787	767787	767787	767787	767787	767787	767787	767787	EM2100608	767787
Phenols																								
2-Methylphenol	mg/kg	0.2		**3,200$^{\#14}$**	41,000$^{\#25}$	-	<0.2	-	-	-	-	<0.2	<0.2	-	-	-	<0.2	-	-	-	-	-	-	<0.2
2-Nitrophenol	mg/kg	0.5				-	<1	-	-	-	-	<1	<1	-	-	-	<1	-	-	-	-	-	-	<1
2,4-Dimethylphenol	mg/kg	0.5		**1,300$^{\#14}$**	16,000$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
2,4-Dinitrophenol	mg/kg	5		**130$^{\#14}$**	1,600$^{\#25}$	-	<5	-	-	-	-	<5	<5	-	-	-	<5	-	-	-	-	-	-	<5
3-&4-Methylphenol (m&p-cresol)	mg/kg	0.4				-	<0.4	-	-	-	-	<0.4	<0.4	-	-	-	<0.4	-	-	-	-	-	-	<0.4
4-Chloro-3-methylphenol	mg/kg	0.5		**6,300$^{\#14}$**	82,000$^{\#25}$	-	<1	-	-	-	-	<1	<1	-	-	-	<1	-	-	-	-	-	-	<1
4-Nitrophenol	mg/kg	0.5				-	<5	-	-	-	-	<5	<5	-	-	-	<5	-	-	-	-	-	-	<5
4,6-Dinitro-2-methylphenol	mg/kg	5		**5.1$^{\#14}$**	66$^{\#25}$	-	<5	-	-	-	-	<5	<5	-	-	-	<5	-	-	-	-	-	-	<5
4,6-Dinitro-o-cyclohexyl phenol	mg/kg	20		**130$^{\#14}$**	1,600$^{\#25}$	-	<20	-	-	-	-	<20	<20	-	-	-	<20	-	-	-	-	-	-	<20
Cresol Total	mg/kg	1		**4,000$^{\#12}$**	25,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	mg/kg	0.5		**40,000$^{\#12}$**	240,000$^{\#23}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Phenols (non-halogenated)	mg/kg	20				-	<20	-	-	-	-	<20	<20	-	-	-	<20	-	-	-	-	-	-	<20
MAH																								
1,2,4-Trimethylbenzene	mg/kg	0.5		**300$^{\#14}$**	1,800$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,3,5-Trimethylbenzene	mg/kg	0.5		**270$^{\#14}$**	1,500$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Isopropylbenzene	mg/kg	0.5		**1,900$^{\#14}$**	9,900$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Styrene	mg/kg	0.5		**6,000$^{\#14}$**	35,000$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Total Monocylic Aromatic Hydrocarbons	mg/kg	0.5				-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Halogenated Benzenes																								
1,2,3-Trichlorobenzene	mg/kg	0.1		**63$^{\#14}$**	930$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1		**1,800$^{\#14}$**	9,300$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,2,3,4-Tetrachlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,3,5-Tetrachlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4,5-Tetrachlorobenzene	mg/kg	0.1		**23$^{\#14}$**	350$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.05		**24$^{\#14}$**	110$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,3-Dichlorobenzene	mg/kg	0.1				-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,3,5-Trichlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chlorotoluene	mg/kg	0.5		**1,600$^{\#14}$**	23,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.1		**2.6$^{\#14}$**	11$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
4-Chlorotoluene	mg/kg	0.5		**1,600$^{\#14}$**	23,000$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Bromobenzene	mg/kg	0.5		**290$^{\#14}$**	1,800$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Chlorobenzene	mg/kg	0.5		**280$^{\#14}$**	1,300$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Pentachlorobenzene	mg/kg	0.1		**63$^{\#14}$**	930$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Halogenated Hydrocarbons																								
1,2-Dibromoethane	mg/kg	0.5		**0.036$^{\#14}$**	0.16$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Bromomethane	mg/kg	0.5		**6.8$^{\#14}$**	30$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Dichlorodifluoromethane	mg/kg	0.5		**87$^{\#14}$**	370$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Iodomethane	mg/kg	0.5				-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Trichlorofluoromethane	mg/kg	0.5		**23,000$^{\#14}$**	350,000$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Chlorinated Hydrocarbons																								
1,1-Dichloropropene	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	mg/kg	0.5		**3.6$^{\#14}$**	16$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,1-Dichloroethene	mg/kg	0.5		**230$^{\#14}$**	1,000$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,1,1,2-Tetrachloroethane	mg/kg	0.5		**2$^{\#14}$**	8.8$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,1,1-Trichloroethane	mg/kg	0.5		**8,100$^{\#14}$**	36,000$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,2-Dibromo-3-chloropropane	mg/kg	0.5		**0.0053$^{\#14}$**	0.064$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2-Trichloroethane	mg/kg	0.5		**1.1$^{\#14}$**	5$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,1,2,2-Tetrachloroethane	mg/kg	0.5		**0.6$^{\#14}$**	2.7$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,2,3-Trichloropropane	mg/kg	0.5		**0.0051$^{\#14}$**	0.11$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,2-Dichloroethane	mg/kg	0.5		**0.46$^{\#14}$**	2$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,3-Dichloropropane	mg/kg	0.5		**1,600$^{\#14}$**	23,000$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
1,2-Dichloropropane	mg/kg	0.5		**2.5$^{\#14}$**	11$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
2,2-Dichloropropane	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzal Chloride	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzotrichloride	mg/kg	0.1		**0.053$^{\#14}$**	0.25$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromochloromethane	mg/kg	0.5		**150$^{\#14}$**	630$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Benzyl Chloride	mg/kg	0.1		**1.1$^{\#14}$**	4.8$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	mg/kg	0.5		**0.29$^{\#14}$**	1.3$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Bromoform	mg/kg	0.5		**19$^{\#14}$**	86$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Carbon Tetrachloride	mg/kg	0.5		**0.65$^{\#14}$**	2.9$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Chlorodibromomethane	mg/kg	0.5		**8.3$^{\#14}$**	39$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Chloroethane	mg/kg	0.5		**14,000$^{\#14}$**	57,000$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Chloroform	mg/kg	0.5		**0.32$^{\#14}$**	1.4$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Chloromethane	mg/kg	0.5		**110$^{\#14}$**	460$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
cis-1,2-Dichloroethene	mg/kg	0.5		**160$^{\#14}$**	2,300$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Dibromomethane	mg/kg	0.5		**24$^{\#14}$**	99$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
cis-1,3-Dichloropropene	mg/kg	0.5				-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Dichloromethane	mg/kg	0.5		**57$^{\#14}$**	1,000$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Hexachlorobutadiene	mg/kg	0.1		**1.2$^{\#14}$**	5.3$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Hexachlorocyclopentadiene	mg/kg	0.1		**1.8$^{\#14}$**	7.5$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	mg/kg	0.1		**1.8$^{\#14}$**	8$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	0.5		**24$^{\#14}$**	100$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
trans-1,2-Dichloroethene	mg/kg	0.5		**1,600$^{\#14}$**	23,000$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
trans-1,3-Dichloropropene	mg/kg	0.5				-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Trichloroethene	mg/kg	0.5		**0.94$^{\#14}$**	6$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Vinyl Chloride	mg/kg	0.5		**0.059$^{\#14}$**	1.7$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Total Chlorinated Hydrocarbons	mg/kg	0.5				-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Total Other Chlorinated Hydrocarbons	mg/kg	0.5				-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria
Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**
					Location Code	SB32	SB33	SB34	SB34	SB35	SB35	SB35	SB36	SB36	SB37	SB37	SB37	SB38
					Field ID	SB32_0.9-1.0	SB33_0.1-0.2	SB34_0.1-0.2	SB34_0.4-0.5	SB35_0.1-0.2	QC01	QC02	SB36_0.1-0.2	SB36_0.4-0.5	SB37_0.1-0.2	SB37_0.5-0.6	SB37_1.4-1.5	SB38_0.1-0.2
					Date	5/03/2021	12/01/2021	13/01/2021	13/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	5/03/2021	12/01/2021
					Depth	0.9 - 1.0	0.1 - 0.2	0.1 - 0.2	0.4 - 0.5	0.1 - 0.2	0.1 - 0.2	0.1 - 0.2	0.1 - 0.2	0.4 - 0.5	0.1 - 0.2	0.5 - 0.6	1.4 - 1.5	0.1 - 0.2
					Sample Type	Normal	Normal	Normal	Normal	Normal	Field_D	Interlab_D	Normal	Normal	Normal	Normal	Normal	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
					Lab Report No.	778664	767787	767787	767787	767787	767787	EM2100608	767787	767787	767787	767787	778664	767787
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial													
Phenols																		
2-Methylphenol	mg/kg	0.2		**3,200**$^{\#14}$	41,000$^{\#25}$	-	-	-	<0.2	<0.2	-	-	-	-	-	-	-	<0.2
2-Nitrophenol	mg/kg	0.5				-	-	-	<1	<1	-	-	-	-	-	-	-	<1
2,4-Dimethylphenol	mg/kg	0.5		**1,300**$^{\#14}$	16,000$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
2,4-Dinitrophenol	mg/kg	5		**130**$^{\#14}$	1,600$^{\#25}$	-	-	-	<5	<5	-	-	-	-	-	-	-	<5
3-&4-Methylphenol (m&p-cresol)	mg/kg	0.4				-	-	-	<0.4	<0.4	-	-	-	-	-	-	-	<0.4
4-Chloro-3-methylphenol	mg/kg	0.5		**6,300**$^{\#14}$	82,000$^{\#25}$	-	-	-	<1	<1	-	-	-	-	-	-	-	<1
4-Nitrophenol	mg/kg	0.5				-	-	-	<5	<5	-	-	-	-	-	-	-	<5
4,6-Dinitro-2-methylphenol	mg/kg	5		**5.1**$^{\#14}$	66$^{\#25}$	-	-	-	<5	<5	-	-	-	-	-	-	-	<5
4,6-Dinitro-o-cyclohexyl phenol	mg/kg	20		**130**$^{\#14}$	1,600$^{\#25}$	-	-	-	<20	<20	-	-	-	-	-	-	-	<20
Cresol Total	mg/kg	1		**4,000**$^{\#12}$	25,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	mg/kg	0.5		**40,000**$^{\#12}$	240,000$^{\#23}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Phenols (non-halogenated)	mg/kg	20				-	-	-	<20	<20	-	-	-	-	-	-	-	<20
MAH																		
1,2,4-Trimethylbenzene	mg/kg	0.5		**300**$^{\#14}$	1,800$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
1,3,5-Trimethylbenzene	mg/kg	0.5		**270**$^{\#14}$	1,500$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Isopropylbenzene	mg/kg	0.5		**1,900**$^{\#14}$	9,900$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Styrene	mg/kg	0.5		**6,000**$^{\#14}$	35,000$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Total Monocylic Aromatic Hydrocarbons	mg/kg	0.5				-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Halogenated Benzenes																		
1,2,3-Trichlorobenzene	mg/kg	0.1		**63**$^{\#14}$	930$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1		**1,800**$^{\#14}$	9,300$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
1,2,3,4-Tetrachlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,3,5-Tetrachlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4,5-Tetrachlorobenzene	mg/kg	0.1		**23**$^{\#14}$	350$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.05		**24**$^{\#14}$	110$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
1,3-Dichlorobenzene	mg/kg	0.1				-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
1,3,5-Trichlorobenzene	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chlorotoluene	mg/kg	0.5		**1,600**$^{\#14}$	23,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.1		**2.6**$^{\#14}$	11$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
4-Chlorotoluene	mg/kg	0.5		**1,600**$^{\#14}$	23,000$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Bromobenzene	mg/kg	0.5		**290**$^{\#14}$	1,800$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Chlorobenzene	mg/kg	0.5		**280**$^{\#14}$	1,300$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Pentachlorobenzene	mg/kg	0.1		**63**$^{\#14}$	930$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-
Halogenated Hydrocarbons																		
1,2-Dibromoethane	mg/kg	0.5		**0.036**$^{\#14}$	0.16$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Bromomethane	mg/kg	0.5		**6.8**$^{\#14}$	30$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Dichlorodifluoromethane	mg/kg	0.5		**87**$^{\#14}$	370$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Iodomethane	mg/kg	0.5				-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Trichlorofluoromethane	mg/kg	0.5		**23,000**$^{\#14}$	350,000$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Chlorinated Hydrocarbons																		
1,1-Dichloropropene	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	mg/kg	0.5		**3.6**$^{\#14}$	16$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
1,1-Dichloroethene	mg/kg	0.5		**230**$^{\#14}$	1,000$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
1,1,1,2-Tetrachloroethane	mg/kg	0.5		**2**$^{\#14}$	8.8$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
1,1,1-Trichloroethane	mg/kg	0.5		**8,100**$^{\#14}$	36,000$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
1,2-Dibromo-3-chloropropane	mg/kg	0.5		**0.0053**$^{\#14}$	0.064$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2-Trichloroethane	mg/kg	0.5		**1.1**$^{\#14}$	5$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
1,1,2,2-Tetrachloroethane	mg/kg	0.5		**0.6**$^{\#14}$	2.7$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
1,2,3-Trichloropropane	mg/kg	0.5		**0.0051**$^{\#14}$	0.11$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
1,2-Dichloroethane	mg/kg	0.5		**0.46**$^{\#14}$	2$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
1,3-Dichloropropane	mg/kg	0.5		**1,600**$^{\#14}$	23,000$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
1,2-Dichloropropane	mg/kg	0.5		**2.5**$^{\#14}$	11$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
2,2-Dichloropropane	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-
Benzal Chloride	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-
Benzotrichloride	mg/kg	0.1		**0.053**$^{\#14}$	0.25$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromochloromethane	mg/kg	0.5		**150**$^{\#14}$	630$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Benzyl Chloride	mg/kg	0.1		**1.1**$^{\#14}$	4.8$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromodichloromethane	mg/kg	0.5		**0.29**$^{\#14}$	1.3$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Bromoform	mg/kg	0.5		**19**$^{\#14}$	86$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Carbon Tetrachloride	mg/kg	0.5		**0.65**$^{\#14}$	2.9$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Chlorodibromomethane	mg/kg	0.5		**8.3**$^{\#14}$	39$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Chloroethane	mg/kg	0.5		**14,000**$^{\#14}$	57,000$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Chloroform	mg/kg	0.5		**0.32**$^{\#14}$	1.4$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Chloromethane	mg/kg	0.5		**110**$^{\#14}$	460$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
cis-1,2-Dichloroethene	mg/kg	0.5		**160**$^{\#14}$	2,300$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Dibromomethane	mg/kg	0.5		**24**$^{\#14}$	99$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
cis-1,3-Dichloropropene	mg/kg	0.5				-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Dichloromethane	mg/kg	0.5		**57**$^{\#14}$	1,000$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Hexachlorobutadiene	mg/kg	0.1		**1.2**$^{\#14}$	5.3$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Hexachlorocyclopentadiene	mg/kg	0.1		**1.8**$^{\#14}$	7.5$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	mg/kg	0.1		**1.8**$^{\#14}$	8$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	mg/kg	0.5		**24**$^{\#14}$	100$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
trans-1,2-Dichloroethene	mg/kg	0.5		**1,600**$^{\#14}$	23,000$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
trans-1,3-Dichloropropene	mg/kg	0.5				-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Trichloroethene	mg/kg	0.5		**0.94**$^{\#14}$	6$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Vinyl Chloride	mg/kg	0.5		**0.059**$^{\#14}$	1.7$^{\#25}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Total Chlorinated Hydrocarbons	mg/kg	0.5				-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Total Other Chlorinated Hydrocarbons	mg/kg	0.5				-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria

Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**
					Location Code	BH01	BH01	BH01	BH02	BH02	BH03	BH03	BH04	BH05	BH05	BH05
					Field ID	BH1/0.1	DUP-140720A	SPLIT140720A	BH2/0.1	BH2/0.5	BH3/0.1	BH3/0.5	BH4/0.1	BH5/0.1	BH5/0.5	BH5/1.0
					Date	14/07/2020	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020	14/07/2020	15/07/2020	15/07/2020
					Depth	0.1	0.1	0.1	0.1	0.5	0.1	0.5	0.1	0.1	0.5	1
					Sample Type	Normal	Field_D	Interlab_D	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Natural	Fill	Fill	Fill	Fill	Fill	Fill
					Lab Report No.	732366	732366	EM2012544	732366	733886	732366	733886	732366	732366	733886	734380
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial											
Halogenated Phenols																
2,4,5-Trichlorophenol	mg/kg	0.5		**6,300**$^{\#14}$	82,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.5		**49**$^{\#14}$	210$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorophenol	mg/kg	0.5		**190**$^{\#14}$	2,500$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-
2,6-Dichlorophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-
2-Chlorophenol	mg/kg	0.5		**390**$^{\#14}$	5,800$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	mg/kg	0.5		**120**$^{\#12}$	660$^{\#23}$	-	-	-	-	-	<1	-	-	-	-	-
2,3,4,6-Tetrachlorophenol	mg/kg	0.5		**1,900**$^{\#14}$	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-
2,3,5,6-Tetrachlorophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-
2,3,4,5-Tetrachlorophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-
Tetrachlorophenols	mg/kg	10				-	-	-	-	-	-	-	-	-	-	-
Phenols (Halogenated)	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-
Organochlorine Pesticides																
a-BHC	mg/kg	0.05		**0.086**$^{\#14}$	0.36$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-
b-BHC	mg/kg	0.05		**0.3**$^{\#14}$	1.3$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-
d-BHC	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-
Dieldrin	mg/kg	0.05				-	-	-	-	-	<0.05	-	-	-	-	-
g-BHC (Lindane)	mg/kg	0.05		**0.57**$^{\#14}$	2.5$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-
Aldrin	mg/kg	0.05				-	-	-	-	-	<0.05	-	-	-	-	-
Aldrin + Dieldrin	mg/kg	0.05		**10**$^{\#12}$	45$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-
Chlordane	mg/kg	0.05		**70**$^{\#12}$	530$^{\#23}$	-	-	-	-	-	<0.1	-	-	-	-	-
DDT	mg/kg	0.05	180$^{\#11}$			-	-	-	-	-	<0.05	-	-	-	-	-
4,4-DDE	mg/kg	0.05				-	-	-	-	-	<0.05	-	-	-	-	-
DDD	mg/kg	0.05				-	-	-	-	-	<0.05	-	-	-	-	-
DDT+DDE+DDD	mg/kg	0.05		**400**$^{\#12}$	3,600$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-
Endosulfan I	mg/kg	0.05				-	-	-	-	-	<0.05	-	-	-	-	-
Endosulfan II	mg/kg	0.05				-	-	-	-	-	<0.05	-	-	-	-	-
Endosulfan sulfate	mg/kg	0.05		**380**$^{\#14}$	4,900$^{\#25}$	-	-	-	-	-	<0.05	-	-	-	-	-
Endrin	mg/kg	0.05		**20**$^{\#12}$	100$^{\#23}$	-	-	-	-	-	<0.05	-	-	-	-	-
Chlordane (cis)	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-
Chlordane (trans)	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-
Endrin aldehyde	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-
Endrin ketone	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-
Heptachlor	mg/kg	0.05		**10**$^{\#12}$	50$^{\#23}$	-	-	-	-	-	<0.05	-	-	-	-	-
Heptachlor epoxide	mg/kg	0.05		**0.07**$^{\#14}$	0.33$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-
Methoxychlor	mg/kg	0.05		**400**$^{\#12}$	2,500$^{\#23}$	-	-	-	-	-	<0.05	-	-	-	-	-
Endosulfan	mg/kg	0.05		**340**$^{\#12}$	2,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-
Oxychlordane	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-
Toxaphene	mg/kg	0.1		**30**$^{\#12}$	160$^{\#23}$	-	-	-	-	-	<1	-	-	-	-	-
Organochlorine Pesticides (EPAVic)	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-
Other Organochlorine Pesticides (EPAVic)	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-
Organophosphorus Pesticides																
Chlorpyrifos	mg/kg	0.2		**250**$^{\#12}$	2,000$^{\#23}$	-	-	-	-	-	<0.2	-	-	-	-	-
Pesticides																
Bifenthrin	mg/kg	0.05		**730**$^{\#12}$	4,500$^{\#23}$	-	-	-	-	-	<0.05	-	-	-	-	-
Mirex	mg/kg			**20**$^{\#12}$	100$^{\#23}$	-	-	-	-	-	<0.01	-	-	-	-	-
Herbicides																
Dinoseb	mg/kg	10		**63**$^{\#14}$	820$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenoxy Acetic Acid	mg/kg	0.5		**800**$^{\#12}$	5,000$^{\#23}$	-	-	-	-	-	<0.5	-	-	-	-	-
2,4,5-TP (Silvex)	mg/kg	0.5		**510**$^{\#14}$	6,600$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-
Hedonal	mg/kg	0.5		**1,300**$^{\#12}$	9,000$^{\#23}$	-	-	-	-	-	<0.5	-	-	-	-	-
2,4-Dichlorprop	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-
4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	mg/kg	0.5		**1,900**$^{\#14}$	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-
Actril (loxynil)	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-
Atrazine	mg/kg	0.2		**400**$^{\#12}$	2,500$^{\#23}$	-	-	-	-	-	<0.2	-	-	-	-	-
Dicamba	mg/kg	0.5		**1,900**$^{\#14}$	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4-chlorophenoxyacetic Acid	mg/kg	0.5		**800**$^{\#12}$	5,000$^{\#23}$	-	-	-	-	-	<0.5	-	-	-	-	-
2-Methyl-4-Chlorophenoxy Butanoic Acid	mg/kg	0.5		**800**$^{\#12}$	5,000$^{\#23}$	-	-	-	-	-	<0.5	-	-	-	-	-
Mecoprop	mg/kg	0.5		**800**$^{\#12}$	5,000$^{\#23}$	-	-	-	-	-	<0.5	-	-	-	-	-
Picloram	mg/kg			**5,700**$^{\#12}$	35,000$^{\#23}$	-	-	-	-	-	<0.5	-	-	-	-	-
Fungicides																
Hexachlorobenzene	mg/kg	0.05		**10**$^{\#12}$	80$^{\#23}$	-	-	-	-	-	<0.05	-	-	-	-	-
Polychlorinated Biphenyls																
Aroclor 1016	mg/kg	0.1				-	-	-	-	-	<0.1	-	-	-	-	-
Aroclor 1221	mg/kg	0.1				-	-	-	-	-	<0.1	-	-	-	-	-
Aroclor 1232	mg/kg	0.1				-	-	-	-	-	<0.1	-	-	-	-	-
Aroclor 1242	mg/kg	0.1				-	-	-	-	-	<0.1	-	-	-	-	-
Aroclor 1248	mg/kg	0.1				-	-	-	-	-	<0.1	-	-	-	-	-
Aroclor 1254	mg/kg	0.1				-	-	-	-	-	<0.1	-	-	-	-	-
Aroclor 1260	mg/kg	0.1				-	-	-	-	-	<0.1	-	-	-	-	-
PCBs (Sum of total)	mg/kg	0.1		**1**$^{\#22}$	7$^{\#30}$	-	-	-	-	-	<0.1	-	-	-	-	-
Solvents																
Methyl Ethyl Ketone (MEK)	mg/kg	0.5		**27,000**$^{\#14}$	190,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone	mg/kg	0.5		**33,000**$^{\#14}$	140,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-
Acetone	mg/kg	0.5		**61,000**$^{\#14}$	670,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-
Allyl chloride	mg/kg	0.5		**0.72**$^{\#14}$	3.2$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-
Carbon disulfide	mg/kg	0.5		**770**$^{\#14}$	3,500$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-

		Report	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**
		Location Code	BH06	BH06	BH06	BH06	BH07	BH07	BH08	BH08	BH09	BH09	BH10	BH10	BH11
		Field ID	BH6/0.1	DUP-140720B	SPLIT140720B	BH6/0.5	BH7/0.1	BH7/0.5	BH8/0.1	BH8/0.5	BH9/0.1	BH9/0.5	BH10/0.1	BH10/0.5	BH11/0.1
		Date	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020
		Depth	0.1	0.1	0.1	0.5	0.1	0.5	0.1	0.5	0.1	0.5	0.1	0.5	0.1
		Sample Type	Normal	Field_D	Interlab_D	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
		Fill/Natural	Fill	Fill	Fill	Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
		Lab Report No.	732366	732366	EM2012544	733886	732366	733886	732366	733886	732366	733886	732366	733886	732366
	Unit	EQL													
Halogenated Phenols															
2,4,5-Trichlorophenol	mg/kg	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorophenol	mg/kg	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
2,6-Dichlorophenol	mg/kg	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chlorophenol	mg/kg	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	mg/kg	0.5	<1	-	-	-	-	-	-	-	-	-	-	-	-
2,3,4,6-Tetrachlorophenol	mg/kg	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
2,3,5,6-Tetrachlorophenol	mg/kg	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
2,3,4,5-Tetrachlorophenol	mg/kg	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachlorophenols	mg/kg	10	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenols (Halogenated)	mg/kg	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
Organochlorine Pesticides															
a-BHC	mg/kg	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
b-BHC	mg/kg	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
d-BHC	mg/kg	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
Dieldrin	mg/kg	0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
g-BHC (Lindane)	mg/kg	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
Aldrin	mg/kg	0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
Aldrin + Dieldrin	mg/kg	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlordane	mg/kg	0.05	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
DDT	mg/kg	0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
4,4-DDE	mg/kg	0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
DDD	mg/kg	0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
DDT+DDE+DDD	mg/kg	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan I	mg/kg	0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan II	mg/kg	0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan sulfate	mg/kg	0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
Endrin	mg/kg	0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
Chlordane (cis)	mg/kg	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlordane (trans)	mg/kg	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin aldehyde	mg/kg	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin ketone	mg/kg	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor	mg/kg	0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor epoxide	mg/kg	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
Methoxychlor	mg/kg	0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan	mg/kg	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxychlordane	mg/kg	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
Toxaphene	mg/kg	0.1	<1	-	-	-	-	-	-	-	-	-	-	-	-
Organochlorine Pesticides (EPAVic)	mg/kg	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Organochlorine Pesticides (EPAVic)	mg/kg	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-
Organophosphorus Pesticides															
Chlorpyrifos	mg/kg	0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	-
Pesticides															
Bifenthrin	mg/kg	0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
Mirex	mg/kg		<0.01	-	-	-	-	-	-	-	-	-	-	-	-
Herbicides															
Dinoseb	mg/kg	10	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenoxy Acetic Acid	mg/kg	0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-TP (Silvex)	mg/kg	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
Hedonal	mg/kg	0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorprop	mg/kg	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	mg/kg	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
Actril (loxynil)	mg/kg	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
Atrazine	mg/kg	0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	-
Dicamba	mg/kg	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4-chlorophenoxyacetic Acid	mg/kg	0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4-Chlorophenoxy Butanoic Acid	mg/kg	0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-
Mecoprop	mg/kg	0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-
Picloram	mg/kg		<0.5	-	-	-	-	-	-	-	-	-	-	-	-
Fungicides															
Hexachlorobenzene	mg/kg	0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
Polychlorinated Biphenyls															
Aroclor 1016	mg/kg	0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1221	mg/kg	0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1232	mg/kg	0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1242	mg/kg	0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1248	mg/kg	0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1254	mg/kg	0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1260	mg/kg	0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
PCBs (Sum of total)	mg/kg	0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
Solvents															
Methyl Ethyl Ketone (MEK)	mg/kg	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone	mg/kg	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	mg/kg	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
Allyl chloride	mg/kg	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon disulfide	mg/kg	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria
Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**
					Location Code	BH12	BH12	BH13	BH13	BH14	BH14	BH15	BH16	BH17	BH18	BH18	BH19	BH19	BH19	BH19	BH20	BH21	BH22	BH22	BH23	BH24	BH24	BH25	BH25
					Field ID	BH12/0.1	BH12/0.1	BH13/0.1	BH13/0.5	BH14/0.1	BH14/0.5	BH15/0.1	BH16/0.1	BH17/0.1	BH18/0.1	BH18/0.5	BH19/0.1	BH19/0.5	BH19/0.5	BH19/1.0	BH20/0.1	BH21/0.1	BH22/0.1	BH22/0.5	BH23/0.1	BH24/0.1	BH24/0.5	BH25/0.1	BH25/0.5
					Date	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	15/07/2020	15/07/2020	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020
					Depth	0.1	0.1	0.1	0.5	0.1	0.5	0.1	0.1	0.1	0.1	0.5	0.1	0.5	0.5	1	0.1	0.1	0.1	0.5	0.1	0.1	0.5	0.1	0.5
					Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
					Lab Report No.	732366	733886	732366	733886	732366	733886	732366	732366	732366	732366	733886	732366	733886	734380	734380	732366	732366	732366	733886	732366	732366	733886	732366	733886
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																								
Halogenated Phenols																													
2,4,5-Trichlorophenol	mg/kg	0.5		**6,300$^{\#14}$**	82,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.5		**49$^{\#14}$**	210$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorophenol	mg/kg	0.5		**190$^{\#14}$**	2,500$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,6-Dichlorophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chlorophenol	mg/kg	0.5		**390$^{\#14}$**	5,800$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	mg/kg	0.5		**120$^{\#12}$**	660$^{\#23}$	-	-	-	-	-	-	-	-	-	<1	-	<1	-	-	-	-	-	-	-	-	-	-	-	-
2,3,4,6-Tetrachlorophenol	mg/kg	0.5		**1,900$^{\#14}$**	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,3,5,6-Tetrachlorophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,3,4,5-Tetrachlorophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachlorophenols	mg/kg	10				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenols (Halogenated)	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organochlorine Pesticides																													
a-BHC	mg/kg	0.05		**0.086$^{\#14}$**	0.36$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
b-BHC	mg/kg	0.05		**0.3$^{\#14}$**	1.3$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
d-BHC	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dieldrin	mg/kg	0.05				-	-	-	-	-	-	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
g-BHC (Lindane)	mg/kg	0.05		**0.57$^{\#14}$**	2.5$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aldrin	mg/kg	0.05				-	-	-	-	-	-	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
Aldrin + Dieldrin	mg/kg	0.05		**10$^{\#12}$**	45$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlordane	mg/kg	0.05		**70$^{\#12}$**	530$^{\#23}$	-	-	-	-	-	-	-	-	-	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
DDT	mg/kg	0.05	180$^{\#11}$			-	-	-	-	-	-	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
4,4-DDE	mg/kg	0.05				-	-	-	-	-	-	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
DDD	mg/kg	0.05				-	-	-	-	-	-	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
DDT+DDE+DDD	mg/kg	0.05		**400$^{\#12}$**	3,600$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan I	mg/kg	0.05				-	-	-	-	-	-	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan II	mg/kg	0.05				-	-	-	-	-	-	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan sulfate	mg/kg	0.05		**380$^{\#14}$**	4,900$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
Endrin	mg/kg	0.05		**20$^{\#12}$**	100$^{\#23}$	-	-	-	-	-	-	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
Chlordane (cis)	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlordane (trans)	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin aldehyde	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin ketone	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor	mg/kg	0.05		**10$^{\#12}$**	50$^{\#23}$	-	-	-	-	-	-	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor epoxide	mg/kg	0.05		**0.07$^{\#14}$**	0.33$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methoxychlor	mg/kg	0.05		**400$^{\#12}$**	2,500$^{\#23}$	-	-	-	-	-	-	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan	mg/kg	0.05		**340$^{\#12}$**	2,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxychlordane	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toxaphene	mg/kg	0.1		**30$^{\#12}$**	160$^{\#23}$	-	-	-	-	-	-	-	-	-	<1	-	<1	-	-	-	-	-	-	-	-	-	-	-	-
Organochlorine Pesticides (EPAVic)	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Organochlorine Pesticides (EPAVic)	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organophosphorus Pesticides																													
Chlorpyrifos	mg/kg	0.2		**250$^{\#12}$**	2,000$^{\#23}$	-	-	-	-	-	-	-	-	-	<0.2	-	<0.2	-	-	-	-	-	-	-	-	-	-	-	-
Pesticides																													
Bifenthrin	mg/kg	0.05		**730$^{\#12}$**	4,500$^{\#23}$	-	-	-	-	-	-	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
Mirex	mg/kg			**20$^{\#12}$**	100$^{\#23}$	-	-	-	-	-	-	-	-	-	<0.01	-	<0.01	-	-	-	-	-	-	-	-	-	-	-	-
Herbicides																													
Dinoseb	mg/kg	10		**63$^{\#14}$**	820$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenoxy Acetic Acid	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-TP (Silvex)	mg/kg	0.5		**510$^{\#14}$**	6,600$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hedonal	mg/kg	0.5		**1,300$^{\#12}$**	9,000$^{\#23}$	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorprop	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	mg/kg	0.5		**1,900$^{\#14}$**	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Actril (Ioxynil)	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Atrazine	mg/kg	0.2		**400$^{\#12}$**	2,500$^{\#23}$	-	-	-	-	-	-	-	-	-	<0.2	-	<0.2	-	-	-	-	-	-	-	-	-	-	-	-
Dicamba	mg/kg	0.5		**1,900$^{\#14}$**	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4-chlorophenoxyacetic Acid	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	-	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4-Chlorophenoxy Butanoic Acid	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	-	-	-	-	-	-	-	-	-	-	-	-
Mecoprop	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	-	-	-	-	-	-	-	-	-	-	-	-
Picloram	mg/kg			**5,700$^{\#12}$**	35,000$^{\#23}$	-	-	-	-	-	-	-	-	-	<0.5	-	<0.5	-	-	-	-	-	-	-	-	-	-	-	-
Fungicides																													
Hexachlorobenzene	mg/kg	0.05		**10$^{\#12}$**	80$^{\#23}$	-	-	-	-	-	-	-	-	-	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-
Polychlorinated Biphenyls																													
Aroclor 1016	mg/kg	0.1				-	-	-	-	-	-	-	-	-	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1221	mg/kg	0.1				-	-	-	-	-	-	-	-	-	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1232	mg/kg	0.1				-	-	-	-	-	-	-	-	-	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1242	mg/kg	0.1				-	-	-	-	-	-	-	-	-	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1248	mg/kg	0.1				-	-	-	-	-	-	-	-	-	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1254	mg/kg	0.1				-	-	-	-	-	-	-	-	-	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1260	mg/kg	0.1				-	-	-	-	-	-	-	-	-	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
PCBs (Sum of total)	mg/kg	0.1		**1$^{\#22}$**	7$^{\#30}$	-	-	-	-	-	-	-	-	-	<0.1	-	<0.1	-	-	-	-	-	-	-	-	-	-	-	-
Solvents																													
Methyl Ethyl Ketone (MEK)	mg/kg	0.5		**27,000$^{\#14}$**	190,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone	mg/kg	0.5		**33,000$^{\#14}$**	140,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	mg/kg	0.5		**61,000$^{\#14}$**	670,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Allyl chloride	mg/kg	0.5		**0.72$^{\#14}$**	3.2$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon disulfide	mg/kg	0.5		**770$^{\#14}$**	3,500$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria
Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**
					Location Code	BH26	BH26	BH26	BH26	BH27	BH28	BH28	BH29	BH29	BH29	BH30	BH31	BH32	BH33	BH33	BH33	BH33	BH34	BH35	BH35	BH35	BH36	BH36	BH37
					Field ID	BH26/0.1	DUP-140720C	SPLIT140720C	BH26/0.5	BH27/0.1	BH28/0.1	BH28/0.5	BH29/0.1	BH29/0.5	BH29/1.0	BH30/0.1	BH31/0.1	BH32/0.1	BH33/0.1	DUP-140720D	SPLIT140720D	BH33/0.5	BH34/0.1	BH35/0.1	SPLIT140720E	BH35/0.5	BH36/0.1	BH36/0.5	BH37/0.1
					Date	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	15/07/2020	14/07/2020	14/07/2020	14/07/2020	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020
					Depth	0.1	0.1	0.1	0.5	0.1	0.1	0.5	0.1	0.5	1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.1	0.1	0.1	0.5	0.1	0.5	0.1
					Sample Type	Normal	Field_D	Interlab_D	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Field_D	Interlab_D	Normal	Normal	Normal	Interlab_D	Normal	Normal	Normal	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
					Lab Report No.	732366	732366	EM2012544	733886	732366	732366	733886	732366	733886	733886	732366	732366	732366	732366	732366	EM2012544	733886	732366	732366	EM2012544	733886	732366	733886	732366
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																								
Halogenated Phenols																													
2,4,5-Trichlorophenol	mg/kg	0.5		**6,300$^{\#14}$**	82,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.5		**49$^{\#14}$**	210$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorophenol	mg/kg	0.5		**190$^{\#14}$**	2,500$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,6-Dichlorophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chlorophenol	mg/kg	0.5		**390$^{\#14}$**	5,800$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	mg/kg	0.5		**120$^{\#12}$**	660$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,3,4,6-Tetrachlorophenol	mg/kg	0.5		**1,900$^{\#14}$**	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,3,5,6-Tetrachlorophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,3,4,5-Tetrachlorophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachlorophenols	mg/kg	10				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenols (Halogenated)	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organochlorine Pesticides																													
a-BHC	mg/kg	0.05		**0.086$^{\#14}$**	0.36$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
b-BHC	mg/kg	0.05		**0.3$^{\#14}$**	1.3$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
d-BHC	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dieldrin	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
g-BHC (Lindane)	mg/kg	0.05		**0.57$^{\#14}$**	2.5$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aldrin	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aldrin + Dieldrin	mg/kg	0.05		**10$^{\#12}$**	45$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlordane	mg/kg	0.05		**70$^{\#12}$**	530$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DDT	mg/kg	0.05	180$^{\#11}$			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4,4-DDE	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DDD	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DDT+DDE+DDD	mg/kg	0.05		**400$^{\#12}$**	3,600$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan I	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan II	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan sulfate	mg/kg	0.05		**380$^{\#14}$**	4,900$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin	mg/kg	0.05		**20$^{\#12}$**	100$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlordane (cis)	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlordane (trans)	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin aldehyde	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin ketone	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor	mg/kg	0.05		**10$^{\#12}$**	50$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor epoxide	mg/kg	0.05		**0.07$^{\#14}$**	0.33$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methoxychlor	mg/kg	0.05		**400$^{\#12}$**	2,500$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan	mg/kg	0.05		**340$^{\#12}$**	2,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxychlordane	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toxaphene	mg/kg	0.1		**30$^{\#12}$**	160$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organochlorine Pesticides (EPAVic)	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Organochlorine Pesticides (EPAVic)	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organophosphorus Pesticides																													
Chlorpyrifos	mg/kg	0.2		**250$^{\#12}$**	2,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pesticides																													
Bifenthrin	mg/kg	0.05		**730$^{\#12}$**	4,500$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mirex	mg/kg			**20$^{\#12}$**	100$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Herbicides																													
Dinoseb	mg/kg	10		**63$^{\#14}$**	820$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenoxy Acetic Acid	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-TP (Silvex)	mg/kg	0.5		**510$^{\#14}$**	6,600$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hedonal	mg/kg	0.5		**1,300$^{\#12}$**	9,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorprop	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	mg/kg	0.5		**1,900$^{\#14}$**	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Actril (Ioxynil)	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Atrazine	mg/kg	0.2		**400$^{\#12}$**	2,500$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dicamba	mg/kg	0.5		**1,900$^{\#14}$**	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4-chlorophenoxyacetic Acid	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4-Chlorophenoxy Butanoic Acid	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mecoprop	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Picloram	mg/kg			**5,700$^{\#12}$**	35,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fungicides																													
Hexachlorobenzene	mg/kg	0.05		**10$^{\#12}$**	80$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polychlorinated Biphenyls																													
Aroclor 1016	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1221	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1232	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1242	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1248	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1254	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor 1260	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PCBs (Sum of total)	mg/kg	0.1		**1$^{\#22}$**	7$^{\#30}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Solvents																													
Methyl Ethyl Ketone (MEK)	mg/kg	0.5		**27,000$^{\#14}$**	190,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone	mg/kg	0.5		**33,000$^{\#14}$**	140,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	mg/kg	0.5		**61,000$^{\#14}$**	670,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Allyl chloride	mg/kg	0.5		**0.72$^{\#14}$**	3.2$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon disulfide	mg/kg	0.5		**770$^{\#14}$**	3,500$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria
Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**
					Location Code	MW03	MW03	MW03	T1	T2	T2	BH01	BH01	BH01	BH01	BH02	BH02	BH02	BH03	BH03	BH04	BH05	BH05	BH05	BH06
					Field ID	MW03/0.1	MW03/0.5	MW03/1.0	T1/0.1	T2/0.1	T2/0.5	BH01/0-0.05	BH01/0.4-0.5	BH01/0.6-0.7	BH01/1.4-1.5	BH02/0.15-0.25	BH02/0.9-1.0	BH02/1.4-1.5	BH03/0-0.05	BH03/0.6-0.7	BH04/0.15-0.25	BH05/0-0.05	BH05/0.15-0.25	BH05/0.4-0.5	BH06/0.15-0.25
					Date	15/07/2020	15/07/2020	15/07/2020	14/07/2020	14/07/2020	15/07/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020
					Depth	0.1	0.5	1	0.1	0.1	0.5	0 - 0.05	0.4 - 0.5	0.6 - 0.7	1.4 - 1.5	0.15 - 0.25	0.9 - 1	1.4 - 1.5	0 - 0.05	0.6 - 0.7	0.15 - 0.25	0 - 0.05	0.15 - 0.25	0.4 - 0.5	0.15 - 0.25
					Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
					Lab Report No.	732271	732271	733886	732366	732366	733886	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																				
Halogenated Phenols																									
2,4,5-Trichlorophenol	mg/kg	0.5		**6,300$^{\#14}$**	82,000$^{\#25}$	-	-	-	-	-	-	-	-	-	<10	-	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.5		**49$^{\#14}$**	210$^{\#25}$	-	-	-	-	-	-	-	-	-	<10	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorophenol	mg/kg	0.5		**190$^{\#14}$**	2,500$^{\#25}$	-	-	-	-	-	-	-	-	-	<10	-	-	-	-	-	-	-	-	-	-
2,6-Dichlorophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	<10	-	-	-	-	-	-	-	-	-	-
2-Chlorophenol	mg/kg	0.5		**390$^{\#14}$**	5,800$^{\#25}$	-	-	-	-	-	-	-	-	-	<10	-	-	-	-	-	-	-	-	-	-
Pentachlorophenol	mg/kg	0.5		**120$^{\#12}$**	660$^{\#23}$	-	-	-	<1	<1	-	-	-	-	<10	-	-	-	-	-	-	-	-	-	-
2,3,4,6-Tetrachlorophenol	mg/kg	0.5		**1,900$^{\#14}$**	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	<10	-	-	-	-	-	-	-	-	-	-
2,3,5,6-Tetrachlorophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	<10	-	-	-	-	-	-	-	-	-	-
2,3,4,5-Tetrachlorophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	<10	-	-	-	-	-	-	-	-	-	-
Tetrachlorophenols	mg/kg	10				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenols (Halogenated)	mg/kg	0.5				-	-	-	-	-	-	-	-	-	<10	-	-	-	-	-	-	-	-	-	-
Organochlorine Pesticides																									
a-BHC	mg/kg	0.05		**0.086$^{\#14}$**	0.36$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
b-BHC	mg/kg	0.05		**0.3$^{\#14}$**	1.3$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
d-BHC	mg/kg	0.05				-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
Dieldrin	mg/kg	0.05				-	-	-	<0.05	<0.05	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
g-BHC (Lindane)	mg/kg	0.05		**0.57$^{\#14}$**	2.5$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
Aldrin	mg/kg	0.05				-	-	-	<0.05	<0.05	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
Aldrin + Dieldrin	mg/kg	0.05		**10$^{\#12}$**	45$^{\#23}$	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
Chlordane	mg/kg	0.05		**70$^{\#12}$**	530$^{\#23}$	-	-	-	<0.1	<0.1	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
DDT	mg/kg	0.05	180$^{\#11}$			-	-	-	<0.05	<0.05	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
4,4-DDE	mg/kg	0.05				-	-	-	<0.05	<0.05	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
DDD	mg/kg	0.05				-	-	-	<0.05	<0.05	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
DDT+DDE+DDD	mg/kg	0.05		**400$^{\#12}$**	3,600$^{\#23}$	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
Endosulfan I	mg/kg	0.05				-	-	-	<0.05	<0.05	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
Endosulfan II	mg/kg	0.05				-	-	-	<0.05	<0.05	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
Endosulfan sulfate	mg/kg	0.05		**380$^{\#14}$**	4,900$^{\#25}$	-	-	-	<0.05	<0.05	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
Endrin	mg/kg	0.05		**20$^{\#12}$**	100$^{\#23}$	-	-	-	<0.05	<0.05	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
Chlordane (cis)	mg/kg	0.05				-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
Chlordane (trans)	mg/kg	0.05				-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
Endrin aldehyde	mg/kg	0.05				-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
Endrin ketone	mg/kg	0.05				-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
Heptachlor	mg/kg	0.05		**10$^{\#12}$**	50$^{\#23}$	-	-	-	<0.05	<0.05	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
Heptachlor epoxide	mg/kg	0.05		**0.07$^{\#14}$**	0.33$^{\#25}$	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
Methoxychlor	mg/kg	0.05		**400$^{\#12}$**	2,500$^{\#23}$	-	-	-	<0.05	<0.05	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
Endosulfan	mg/kg	0.05		**340$^{\#12}$**	2,000$^{\#23}$	-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
Oxychlordane	mg/kg	0.05				-	-	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
Toxaphene	mg/kg	0.1		**30$^{\#12}$**	160$^{\#23}$	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organochlorine Pesticides (EPAVic)	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Organochlorine Pesticides (EPAVic)	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organophosphorus Pesticides																									
Chlorpyrifos	mg/kg	0.2		**250$^{\#12}$**	2,000$^{\#23}$	-	-	-	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pesticides																									
Bifenthrin	mg/kg	0.05		**730$^{\#12}$**	4,500$^{\#23}$	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mirex	mg/kg			**20$^{\#12}$**	100$^{\#23}$	-	-	-	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Herbicides																									
Dinoseb	mg/kg	10		**63$^{\#14}$**	820$^{\#25}$	-	-	-	-	-	-	-	-	-	<200	-	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenoxy Acetic Acid	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-TP (Silvex)	mg/kg	0.5		**510$^{\#14}$**	6,600$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hedonal	mg/kg	0.5		**1,300$^{\#12}$**	9,000$^{\#23}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorprop	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	mg/kg	0.5		**1,900$^{\#14}$**	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Actril (Ioxynil)	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Atrazine	mg/kg	0.2		**400$^{\#12}$**	2,500$^{\#23}$	-	-	-	<0.2	<0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dicamba	mg/kg	0.5		**1,900$^{\#14}$**	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4-chlorophenoxyacetic Acid	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4-Chlorophenoxy Butanoic Acid	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mecoprop	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Picloram	mg/kg			**5,700$^{\#12}$**	35,000$^{\#23}$	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fungicides																									
Hexachlorobenzene	mg/kg	0.05		**10$^{\#12}$**	80$^{\#23}$	-	-	-	<0.05	<0.05	-	-	-	-	<0.2	-	-	-	-	-	-	-	-	-	-
Polychlorinated Biphenyls																									
Aroclor 1016	mg/kg	0.1				-	-	-	<0.1	<0.1	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
Aroclor 1221	mg/kg	0.1				-	-	-	<0.1	<0.1	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
Aroclor 1232	mg/kg	0.1				-	-	-	<0.1	<0.1	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
Aroclor 1242	mg/kg	0.1				-	-	-	<0.1	<0.1	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
Aroclor 1248	mg/kg	0.1				-	-	-	<0.1	<0.1	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
Aroclor 1254	mg/kg	0.1				-	-	-	<0.1	<0.1	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
Aroclor 1260	mg/kg	0.1				-	-	-	<0.1	<0.1	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
PCBs (Sum of total)	mg/kg	0.1		**1$^{\#22}$**	7$^{\#30}$	-	-	-	<0.1	<0.1	-	-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-
Solvents																									
Methyl Ethyl Ketone (MEK)	mg/kg	0.5		**27,000$^{\#14}$**	190,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone	mg/kg	0.5		**33,000$^{\#14}$**	140,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	mg/kg	0.5		**61,000$^{\#14}$**	670,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Allyl chloride	mg/kg	0.5		**0.72$^{\#14}$**	3.2$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon disulfide	mg/kg	0.5		**770$^{\#14}$**	3,500$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria

Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**
					Location Code	BH06	BH07	BH08	BH08	BH09	BH09	BH10	BH11	BH12	BH12	BH13	BH13	BH14	BH14	BH15	BH16	BH16	BH17	BH17
					Field ID	BH06/0.4-0.5	BH07/0.4-0.5	BH08/0-0.05	BH08/0.6-0.7	BH09/0-0.05	BH09/0.6-0.7	BH10/0.15-0.25	BH11/0.4-0.5	BH12/0.15-0.25	BH12/0.4-0.5	BH13/0-0.05	BH13/0.6-0.7	BH14/0-0.05	BH14/0.4-0.5	BH15/0.15-0.25	BH16/0.15-0.25	BH16/0.4-0.5	BH17/0.4-0.5	BH17/0.6-0.7
					Date	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020
					Depth	0.4 - 0.5	0.4 - 0.5	0 - 0.05	0.6 - 0.7	0 - 0.05	0.6 - 0.7	0.15 - 0.25	0.4 - 0.5	0.15 - 0.25	0.4 - 0.5	0 - 0.05	0.6 - 0.7	0 - 0.05	0.4 - 0.5	0.15 - 0.25	0.15 - 0.25	0.4 - 0.5	0.4 - 0.5	0.6 - 0.7
					Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
					Lab Report No.	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																			
Halogenated Phenols																								
2,4,5-Trichlorophenol	mg/kg	0.5		**6,300**$^{\#14}$	82,000$^{\#25}$	-	-	<2	-	-	-	<2	-	-	-	-	<2	-	-	-	-	-	-	<2
2,4,6-Trichlorophenol	mg/kg	0.5		**49**$^{\#14}$	210$^{\#25}$	-	-	<2	-	-	-	<2	-	-	-	-	<2	-	-	-	-	-	-	<2
2,4-Dichlorophenol	mg/kg	0.5		**190**$^{\#14}$	2,500$^{\#25}$	-	-	<2	-	-	-	<2	-	-	-	-	<2	-	-	-	-	-	-	<2
2,6-Dichlorophenol	mg/kg	0.5				-	-	<2	-	-	-	<2	-	-	-	-	<2	-	-	-	-	-	-	<2
2-Chlorophenol	mg/kg	0.5		**390**$^{\#14}$	5,800$^{\#25}$	-	-	<2	-	-	-	<2	-	-	-	-	<2	-	-	-	-	-	-	<2
Pentachlorophenol	mg/kg	0.5		**120**$^{\#12}$	660$^{\#23}$	-	-	<2	-	-	-	<2	-	-	-	-	<2	-	-	-	-	-	-	<2
2,3,4,6-Tetrachlorophenol	mg/kg	0.5		**1,900**$^{\#14}$	25,000$^{\#25}$	-	-	<2	-	-	-	<2	-	-	-	-	<2	-	-	-	-	-	-	<2
2,3,5,6-Tetrachlorophenol	mg/kg	0.5				-	-	<2	-	-	-	<2	-	-	-	-	<2	-	-	-	-	-	-	<2
2,3,4,5-Tetrachlorophenol	mg/kg	0.5				-	-	<2	-	-	-	<2	-	-	-	-	<2	-	-	-	-	-	-	<2
Tetrachlorophenols	mg/kg	10				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenols (Halogenated)	mg/kg	0.5				-	-	<2	-	-	-	<2	-	-	-	-	<2	-	-	-	-	-	-	<2
Organochlorine Pesticides																								
a-BHC	mg/kg	0.05		**0.086**$^{\#14}$	0.36$^{\#25}$	-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
b-BHC	mg/kg	0.05		**0.3**$^{\#14}$	1.3$^{\#25}$	-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
d-BHC	mg/kg	0.05				-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
Dieldrin	mg/kg	0.05				-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
g-BHC (Lindane)	mg/kg	0.05		**0.57**$^{\#14}$	2.5$^{\#25}$	-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
Aldrin	mg/kg	0.05				-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
Aldrin + Dieldrin	mg/kg	0.05		**10**$^{\#12}$	45$^{\#23}$	-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
Chlordane	mg/kg	0.05		**70**$^{\#12}$	530$^{\#23}$	-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
DDT	mg/kg	0.05	180$^{\#11}$			-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
4,4-DDE	mg/kg	0.05				-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
DDD	mg/kg	0.05				-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
DDT+DDE+DDD	mg/kg	0.05		**400**$^{\#12}$	3,600$^{\#23}$	-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
Endosulfan I	mg/kg	0.05				-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
Endosulfan II	mg/kg	0.05				-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
Endosulfan sulfate	mg/kg	0.05		**380**$^{\#14}$	4,900$^{\#25}$	-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
Endrin	mg/kg	0.05		**20**$^{\#12}$	100$^{\#23}$	-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
Chlordane (cis)	mg/kg	0.05				-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
Chlordane (trans)	mg/kg	0.05				-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
Endrin aldehyde	mg/kg	0.05				-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
Endrin ketone	mg/kg	0.05				-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
Heptachlor	mg/kg	0.05		**10**$^{\#12}$	50$^{\#23}$	-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
Heptachlor epoxide	mg/kg	0.05		**0.07**$^{\#14}$	0.33$^{\#25}$	-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
Methoxychlor	mg/kg	0.05		**400**$^{\#12}$	2,500$^{\#23}$	-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
Endosulfan	mg/kg	0.05		**340**$^{\#12}$	2,000$^{\#23}$	-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
Oxychlordane	mg/kg	0.05				-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
Toxaphene	mg/kg	0.1		**30**$^{\#12}$	160$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organochlorine Pesticides (EPAVic)	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Organochlorine Pesticides (EPAVic)	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organophosphorus Pesticides																								
Chlorpyrifos	mg/kg	0.2		**250**$^{\#12}$	2,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pesticides																								
Bifenthrin	mg/kg	0.05		**730**$^{\#12}$	4,500$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mirex	mg/kg			**20**$^{\#12}$	100$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Herbicides																								
Dinoseb	mg/kg	10		**63**$^{\#14}$	820$^{\#25}$	-	-	<50	-	-	-	<50	-	-	-	-	<50	-	-	-	-	-	-	<50
2,4,5-Trichlorophenoxy Acetic Acid	mg/kg	0.5		**800**$^{\#12}$	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-TP (Silvex)	mg/kg	0.5		**510**$^{\#14}$	6,600$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hedonal	mg/kg	0.5		**1,300**$^{\#12}$	9,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorprop	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	mg/kg	0.5		**1,900**$^{\#14}$	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Actril (Ioxynil)	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Atrazine	mg/kg	0.2		**400**$^{\#12}$	2,500$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dicamba	mg/kg	0.5		**1,900**$^{\#14}$	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4-chlorophenoxyacetic Acid	mg/kg	0.5		**800**$^{\#12}$	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4-Chlorophenoxy Butanoic Acid	mg/kg	0.5		**800**$^{\#12}$	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mecoprop	mg/kg	0.5		**800**$^{\#12}$	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Picloram	mg/kg			**5,700**$^{\#12}$	35,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fungicides																								
Hexachlorobenzene	mg/kg	0.05		**10**$^{\#12}$	80$^{\#23}$	-	-	<0.08	-	-	-	<0.07	-	-	-	-	<0.3	-	-	-	-	-	-	<0.3
Polychlorinated Biphenyls																								
Aroclor 1016	mg/kg	0.1				-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
Aroclor 1221	mg/kg	0.1				-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
Aroclor 1232	mg/kg	0.1				-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
Aroclor 1242	mg/kg	0.1				-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
Aroclor 1248	mg/kg	0.1				-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
Aroclor 1254	mg/kg	0.1				-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
Aroclor 1260	mg/kg	0.1				-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
PCBs (Sum of total)	mg/kg	0.1		**1**$^{\#22}$	7$^{\#30}$	-	-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-	-	-	-	<0.6
Solvents																								
Methyl Ethyl Ketone (MEK)	mg/kg	0.5		**27,000**$^{\#14}$	190,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone	mg/kg	0.5		**33,000**$^{\#14}$	140,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	mg/kg	0.5		**61,000**$^{\#14}$	670,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Allyl chloride	mg/kg	0.5		**0.72**$^{\#14}$	3.2$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon disulfide	mg/kg	0.5		**770**$^{\#14}$	3,500$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria
Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Senversa, 202**	**Senversa, 202**	**Senversa, 202**	**Senversa, 202**	**Senversa, 202**
					Location Code	BH18	BH18	BH18	BH19	BH19	BH20	BH21	BH22	BH23	BH23	BH24	BH25	BH25	BH25	BH26	SB01	SB02	SB02	SB02	SB03
					Field ID	BH18/0.0-0.05	BH18/0.4-0.5	BH18/0.6-0.7	BH19/0.0-0.05	BH19/0.6-0.7	BH20/0.15-0.25	BH21/0.15-0.25	BH22/0.4-0.5	BH23/0.0-0.05	BH23/0.6-0.7	BH24/0.4-0.5	BH25/0.0-0.05	BH25/0.4-0.5	BH25/0.6-0.7	BH26/0.4-0.5	SB01_0.45	SB02_0.4	QC01	QC02	SB03_0.1
					Date	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020
					Depth	0 - 0.05	0.4 - 0.5	0.6 - 0.7	0 - 0.05	0.6 - 0.7	0.15 - 0.25	0.15 - 0.25	0.4 - 0.5	0 - 0.05	0.6 - 0.7	0.4 - 0.5	0 - 0.05	0.4 - 0.5	0.6 - 0.7	0.4 - 0.5	0.45	0.4			0.1
					Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Field_D	Interlab_D	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
					Lab Report No.	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	762416	762416	762416	EM2021988	762416
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																				
Halogenated Phenols																									
2,4,5-Trichlorophenol	mg/kg	0.5		**6,300$^{\#14}$**	82,000$^{\#25}$	-	<2	-	-	-	-	<2	-	-	-	-	<2	-	-	<2	-	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.5		**49$^{\#14}$**	210$^{\#25}$	-	<2	-	-	-	-	<2	-	-	-	-	<2	-	-	<2	-	-	-	-	-
2,4-Dichlorophenol	mg/kg	0.5		**190$^{\#14}$**	2,500$^{\#25}$	-	<2	-	-	-	-	<2	-	-	-	-	<2	-	-	<2	-	-	-	-	-
2,6-Dichlorophenol	mg/kg	0.5				-	<2	-	-	-	-	<2	-	-	-	-	<2	-	-	<2	-	-	-	-	-
2-Chlorophenol	mg/kg	0.5		**390$^{\#14}$**	5,800$^{\#25}$	-	<2	-	-	-	-	<2	-	-	-	-	<2	-	-	<2	-	-	-	-	-
Pentachlorophenol	mg/kg	0.5		**120$^{\#12}$**	660$^{\#23}$	-	<2	-	-	-	-	<2	-	-	-	-	<2	-	-	<2	-	-	-	-	-
2,3,4,6-Tetrachlorophenol	mg/kg	0.5		**1,900$^{\#14}$**	25,000$^{\#25}$	-	<2	-	-	-	-	<2	-	-	-	-	<2	-	-	<2	-	-	-	-	-
2,3,5,6-Tetrachlorophenol	mg/kg	0.5				-	<2	-	-	-	-	<2	-	-	-	-	<2	-	-	<2	-	-	-	-	-
2,3,4,5-Tetrachlorophenol	mg/kg	0.5				-	<2	-	-	-	-	<2	-	-	-	-	<2	-	-	<2	-	-	-	-	-
Tetrachlorophenols	mg/kg	10				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenols (Halogenated)	mg/kg	0.5				-	<2	-	-	-	-	<2	-	-	-	-	<2	-	-	<2	-	-	-	-	-
Organochlorine Pesticides																									
a-BHC	mg/kg	0.05		**0.086$^{\#14}$**	0.36$^{\#25}$	-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
b-BHC	mg/kg	0.05		**0.3$^{\#14}$**	1.3$^{\#25}$	-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
d-BHC	mg/kg	0.05				-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
Dieldrin	mg/kg	0.05				-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
g-BHC (Lindane)	mg/kg	0.05		**0.57$^{\#14}$**	2.5$^{\#25}$	-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
Aldrin	mg/kg	0.05				-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
Aldrin + Dieldrin	mg/kg	0.05		**10$^{\#12}$**	45$^{\#23}$	-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
Chlordane	mg/kg	0.05		**70$^{\#12}$**	530$^{\#23}$	-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
DDT	mg/kg	0.05	180$^{\#11}$			-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
4,4-DDE	mg/kg	0.05				-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
DDD	mg/kg	0.05				-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
DDT+DDE+DDD	mg/kg	0.05		**400$^{\#12}$**	3,600$^{\#23}$	-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
Endosulfan I	mg/kg	0.05				-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
Endosulfan II	mg/kg	0.05				-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
Endosulfan sulfate	mg/kg	0.05		**380$^{\#14}$**	4,900$^{\#25}$	-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
Endrin	mg/kg	0.05		**20$^{\#12}$**	100$^{\#23}$	-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
Chlordane (cis)	mg/kg	0.05				-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
Chlordane (trans)	mg/kg	0.05				-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
Endrin aldehyde	mg/kg	0.05				-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
Endrin ketone	mg/kg	0.05				-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
Heptachlor	mg/kg	0.05		**10$^{\#12}$**	50$^{\#23}$	-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
Heptachlor epoxide	mg/kg	0.05		**0.07$^{\#14}$**	0.33$^{\#25}$	-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
Methoxychlor	mg/kg	0.05		**400$^{\#12}$**	2,500$^{\#23}$	-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
Endosulfan	mg/kg	0.05		**340$^{\#12}$**	2,000$^{\#23}$	-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
Oxychlordane	mg/kg	0.05				-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
Toxaphene	mg/kg	0.1		**30$^{\#12}$**	160$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organochlorine Pesticides (EPAVic)	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Organochlorine Pesticides (EPAVic)	mg/kg	0.1				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Organophosphorus Pesticides																									
Chlorpyrifos	mg/kg	0.2		**250$^{\#12}$**	2,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pesticides																									
Bifenthrin	mg/kg	0.05		**730$^{\#12}$**	4,500$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mirex	mg/kg			**20$^{\#12}$**	100$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Herbicides																									
Dinoseb	mg/kg	10		**63$^{\#14}$**	820$^{\#25}$	-	<50	-	-	-	-	<50	-	-	-	-	<50	-	-	<50	-	-	-	-	-
2,4,5-Trichlorophenoxy Acetic Acid	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-TP (Silvex)	mg/kg	0.5		**510$^{\#14}$**	6,600$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hedonal	mg/kg	0.5		**1,300$^{\#12}$**	9,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorprop	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	mg/kg	0.5		**1,900$^{\#14}$**	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Actril (Ioxynil)	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Atrazine	mg/kg	0.2		**400$^{\#12}$**	2,500$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dicamba	mg/kg	0.5		**1,900$^{\#14}$**	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4-chlorophenoxyacetic Acid	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4-Chlorophenoxy Butanoic Acid	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mecoprop	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Picloram	mg/kg			**5,700$^{\#12}$**	35,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fungicides																									
Hexachlorobenzene	mg/kg	0.05		**10$^{\#12}$**	80$^{\#23}$	-	<0.3	-	-	-	-	<0.3	-	-	-	-	<0.3	-	-	<0.3	-	-	-	-	-
Polychlorinated Biphenyls																									
Aroclor 1016	mg/kg	0.1				-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
Aroclor 1221	mg/kg	0.1				-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
Aroclor 1232	mg/kg	0.1				-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
Aroclor 1242	mg/kg	0.1				-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
Aroclor 1248	mg/kg	0.1				-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
Aroclor 1254	mg/kg	0.1				-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
Aroclor 1260	mg/kg	0.1				-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
PCBs (Sum of total)	mg/kg	0.1		**1$^{\#22}$**	7$^{\#30}$	-	<0.5	-	-	-	-	<0.6	-	-	-	-	<0.7	-	-	<0.7	-	-	-	-	-
Solvents																									
Methyl Ethyl Ketone (MEK)	mg/kg	0.5		**27,000$^{\#14}$**	190,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone	mg/kg	0.5		**33,000$^{\#14}$**	140,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	mg/kg	0.5		**61,000$^{\#14}$**	670,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Allyl chloride	mg/kg	0.5		**0.72$^{\#14}$**	3.2$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon disulfide	mg/kg	0.5		**770$^{\#14}$**	3,500$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria
Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**
					Location Code	SB03	SB04	SB04	SB05	SB05	SB06	SB07	SB07	SB08	SB09	SB09	SB10	SB10	SB11	SB11	SB12	SB12	SB13	SB13	SB13
					Field ID	SB03_0.4	SB04_0.1	SB04_0.4	SB05_0.1	SB05_0.5	SB06_0.48	SB07_0.1-0.2	SB07_0.7-0.8	SB08_0.1-0.2	SB09_0.1-0.2	SB09_0.4-0.5	SB10_0.1-0.2	SB10_0.7-0.8	SB11_0.1-0.2	SB11_0.8-0.9	SB12_0.1-0.2	SB12_1.9-2.0	SB13_0.1-0.2	SB13_0.8_0.9	SB13_1.9-2.0
					Date	8/12/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020	12/01/2021	12/01/2021	12/01/2021	8/12/2020	8/12/2020	12/01/2021	12/01/2021	8/12/2020	8/12/2020	8/12/2020	5/03/2021	12/01/2021	12/02/2021	5/03/2021
					Depth	0.4	0.1	0.4	0.1	0.5	0.48	0.1 - 0.2	0.7 - 0.8	0.1 - 0.2	0.1 - 0.2	0.4 - 0.5	0.1 - 0.2	0.7 - 0.8	0.1 - 0.2	0.8 - 0.9	0.1 - 0.2	1.9 - 2.0	0.1 - 0.2	0.8 - 0.9	1.9 - 2.0
					Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Natural	Fill	Fill	Natural
					Lab Report No.	762416	762416	762416	762416	762416	762416	767787	767787	767787	767787	767787	767787	767787	767787	767787	767787	778664	767787	773807	778664
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																				
Halogenated Phenols																									
2,4,5-Trichlorophenol	mg/kg	0.5		**6,300$^{\#14}$**	82,000$^{\#25}$	-	-	-	-	-	-	-	-	<1	-	-	-	<1	<1	-	-	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.5		**49$^{\#14}$**	210$^{\#25}$	-	-	-	-	-	-	-	-	<1	-	-	-	<1	<1	-	-	-	-	-	-
2,4-Dichlorophenol	mg/kg	0.5		**190$^{\#14}$**	2,500$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
2,6-Dichlorophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
2-Chlorophenol	mg/kg	0.5		**390$^{\#14}$**	5,800$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Pentachlorophenol	mg/kg	0.5		**120$^{\#12}$**	660$^{\#23}$	-	-	-	-	-	-	-	-	<1	-	-	-	<1	<1	-	-	-	-	-	-
2,3,4,6-Tetrachlorophenol	mg/kg	0.5		**1,900$^{\#14}$**	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,3,5,6-Tetrachlorophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,3,4,5-Tetrachlorophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachlorophenols	mg/kg	10				-	-	-	-	-	-	-	-	<10	-	-	-	<10	<10	-	-	-	-	-	-
Phenols (Halogenated)	mg/kg	0.5				-	-	-	-	-	-	-	-	<1	-	-	-	<1	<1	-	-	-	-	-	-
Organochlorine Pesticides																									
a-BHC	mg/kg	0.05		**0.086$^{\#14}$**	0.36$^{\#25}$	-	-	-	-	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-	-	-	-	-	-
b-BHC	mg/kg	0.05		**0.3$^{\#14}$**	1.3$^{\#25}$	-	-	-	-	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-	-	-	-	-	-
d-BHC	mg/kg	0.05				-	-	-	-	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-	-	-	-	-	-
Dieldrin	mg/kg	0.05				-	-	-	-	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-	-	-	-	-	-
g-BHC (Lindane)	mg/kg	0.05		**0.57$^{\#14}$**	2.5$^{\#25}$	-	-	-	-	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-	-	-	-	-	-
Aldrin	mg/kg	0.05				-	-	-	-	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-	-	-	-	-	-
Aldrin + Dieldrin	mg/kg	0.05		**10$^{\#12}$**	45$^{\#23}$	-	-	-	-	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-	-	-	-	-	-
Chlordane	mg/kg	0.05		**70$^{\#12}$**	530$^{\#23}$	-	-	-	-	-	-	-	-	<0.1	-	-	-	<0.1	<0.1	-	-	-	-	-	-
DDT	mg/kg	0.05	180$^{\#11}$			-	-	-	-	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-	-	-	-	-	-
4,4-DDE	mg/kg	0.05				-	-	-	-	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-	-	-	-	-	-
DDD	mg/kg	0.05				-	-	-	-	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-	-	-	-	-	-
DDT+DDE+DDD	mg/kg	0.05		**400$^{\#12}$**	3,600$^{\#23}$	-	-	-	-	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-	-	-	-	-	-
Endosulfan I	mg/kg	0.05				-	-	-	-	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-	-	-	-	-	-
Endosulfan II	mg/kg	0.05				-	-	-	-	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-	-	-	-	-	-
Endosulfan sulfate	mg/kg	0.05		**380$^{\#14}$**	4,900$^{\#25}$	-	-	-	-	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-	-	-	-	-	-
Endrin	mg/kg	0.05		**20$^{\#12}$**	100$^{\#23}$	-	-	-	-	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-	-	-	-	-	-
Chlordane (cis)	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlordane (trans)	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin aldehyde	mg/kg	0.05				-	-	-	-	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-	-	-	-	-	-
Endrin ketone	mg/kg	0.05				-	-	-	-	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-	-	-	-	-	-
Heptachlor	mg/kg	0.05		**10$^{\#12}$**	50$^{\#23}$	-	-	-	-	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-	-	-	-	-	-
Heptachlor epoxide	mg/kg	0.05		**0.07$^{\#14}$**	0.33$^{\#25}$	-	-	-	-	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-	-	-	-	-	-
Methoxychlor	mg/kg	0.05		**400$^{\#12}$**	2,500$^{\#23}$	-	-	-	-	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-	-	-	-	-	-
Endosulfan	mg/kg	0.05		**340$^{\#12}$**	2,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxychlordane	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toxaphene	mg/kg	0.1		**30$^{\#12}$**	160$^{\#23}$	-	-	-	-	-	-	-	-	<0.1	-	-	-	<0.1	<0.1	-	-	-	-	-	-
Organochlorine Pesticides (EPAVic)	mg/kg	0.1				-	-	-	-	-	-	-	-	<0.1	-	-	-	<0.1	<0.1	-	-	-	-	-	-
Other Organochlorine Pesticides (EPAVic)	mg/kg	0.1				-	-	-	-	-	-	-	-	<0.1	-	-	-	<0.1	<0.1	-	-	-	-	-	-
Organophosphorus Pesticides																									
Chlorpyrifos	mg/kg	0.2		**250$^{\#12}$**	2,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pesticides																									
Bifenthrin	mg/kg	0.05		**730$^{\#12}$**	4,500$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mirex	mg/kg			**20$^{\#12}$**	100$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Herbicides																									
Dinoseb	mg/kg	10		**63$^{\#14}$**	820$^{\#25}$	-	-	-	-	-	-	-	-	<20	-	-	-	<20	<20	-	-	-	-	-	-
2,4,5-Trichlorophenoxy Acetic Acid	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-TP (Silvex)	mg/kg	0.5		**510$^{\#14}$**	6,600$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hedonal	mg/kg	0.5		**1,300$^{\#12}$**	9,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorprop	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	mg/kg	0.5		**1,900$^{\#14}$**	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Actril (Ioxynil)	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Atrazine	mg/kg	0.2		**400$^{\#12}$**	2,500$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dicamba	mg/kg	0.5		**1,900$^{\#14}$**	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4-chlorophenoxyacetic Acid	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4-Chlorophenoxy Butanoic Acid	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mecoprop	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Picloram	mg/kg			**5,700$^{\#12}$**	35,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fungicides																									
Hexachlorobenzene	mg/kg	0.05		**10$^{\#12}$**	80$^{\#23}$	-	-	-	-	-	-	-	-	<0.05	-	-	-	<0.05	<0.05	-	-	-	-	-	-
Polychlorinated Biphenyls																									
Aroclor 1016	mg/kg	0.1				-	-	-	-	-	-	-	-	<0.1	-	-	-	<0.1	<0.1	-	-	-	-	-	-
Aroclor 1221	mg/kg	0.1				-	-	-	-	-	-	-	-	<0.1	-	-	-	<0.1	<0.1	-	-	-	-	-	-
Aroclor 1232	mg/kg	0.1				-	-	-	-	-	-	-	-	<0.1	-	-	-	<0.1	<0.1	-	-	-	-	-	-
Aroclor 1242	mg/kg	0.1				-	-	-	-	-	-	-	-	<0.1	-	-	-	<0.1	<0.1	-	-	-	-	-	-
Aroclor 1248	mg/kg	0.1				-	-	-	-	-	-	-	-	<0.1	-	-	-	<0.1	<0.1	-	-	-	-	-	-
Aroclor 1254	mg/kg	0.1				-	-	-	-	-	-	-	-	<0.1	-	-	-	<0.1	<0.1	-	-	-	-	-	-
Aroclor 1260	mg/kg	0.1				-	-	-	-	-	-	-	-	<0.1	-	-	-	<0.1	<0.1	-	-	-	-	-	-
PCBs (Sum of total)	mg/kg	0.1		**1$^{\#22}$**	7$^{\#30}$	-	-	-	-	-	-	-	-	<0.1	-	-	-	<0.1	<0.1	-	-	-	-	-	-
Solvents																									
Methyl Ethyl Ketone (MEK)	mg/kg	0.5		**27,000$^{\#14}$**	190,000$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
4-Methyl-2-pentanone	mg/kg	0.5		**33,000$^{\#14}$**	140,000$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Acetone	mg/kg	0.5		**61,000$^{\#14}$**	670,000$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Allyl chloride	mg/kg	0.5		**0.72$^{\#14}$**	3.2$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-
Carbon disulfide	mg/kg	0.5		**770$^{\#14}$**	3,500$^{\#25}$	-	-	-	-	-	-	-	-	<0.5	-	-	-	<0.5	<0.5	-	-	-	-	-	-

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria
Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

Report						**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**
Location Code						SB14	SB14	SB14	SB15	SB16	SB16	SB16	SB16	SB17	SB18	SB18	SB19	SB19	SB20	SB20	SB20	SB21	SB22	SB22
Field ID						SB14_0.1-0.2	SB14_0.8-0.9	SB14_1.9-2.0	SB15_0.1-0.2	SB16_0.05-0.15	SB16_0.45-0.55	QC03	QC04	SB17_0.05-0.15	SB18_0.1-0.2	SB18_0.4-0.5	SB19_0.1-0.2	SB19_0.35-0.45	SB20_0.1-0.2	SB20_0.5-0.6	SB20_2.4-2.5	SB21_0.1-0.2	SB22_0.1-0.2	SB22_1.4-1.5
Date						12/01/2021	12/02/2021	5/03/2021	12/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021	2/02/2021	2/02/2021	2/02/2021	2/02/2021	5/03/2021	13/01/2021	13/01/2021	5/03/2021
Depth						0.1 - 0.2	0.8 - 0.9	1.9 - 2.0	0.1 - 0.2	0.05 - 0.15	0.45 - 0.55	0.45 - 0.55	0.45 - 0.55	0.05 - 0.15	0.1 - 0.2	0.4 - 0.5	0.1 - 0.2	0.35 - 0.45	0.1 - 0.2	0.5 - 0.6	2.4 - 2.5	0.1 - 0.2	0.1 - 0.2	1.4 - 1.5
Sample Type						Normal	Normal	Normal	Normal	Normal	Normal	Field_D	Interlab_D	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Fill/Natural						Fill	Fill	Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Natural
Lab Report No.						767787	773807	778664	767787	767787	767787	767787	EM2100608	767787	767787	767787	771075	771075	771075	771075	778664	767787	767787	778664
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																			
Halogenated Phenols																								
2,4,5-Trichlorophenol	mg/kg	0.5		**6,300$^{\#14}$**	82,000$^{\#25}$	<1	-	-	<1	-	<1	-	-	-	-	<1	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.5		**49$^{\#14}$**	210$^{\#25}$	<1	-	-	<1	-	<1	-	-	-	-	<1	-	-	-	-	-	-	-	-
2,4-Dichlorophenol	mg/kg	0.5		**190$^{\#14}$**	2,500$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
2,6-Dichlorophenol	mg/kg	0.5				<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
2-Chlorophenol	mg/kg	0.5		**390$^{\#14}$**	5,800$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Pentachlorophenol	mg/kg	0.5		**120$^{\#12}$**	660$^{\#23}$	<1	-	-	<1	-	<1	-	-	-	-	<1	-	-	-	-	-	-	-	-
2,3,4,6-Tetrachlorophenol	mg/kg	0.5		**1,900$^{\#14}$**	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,3,5,6-Tetrachlorophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,3,4,5-Tetrachlorophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachlorophenols	mg/kg	10				<10	-	-	<10	-	<10	-	-	-	-	<10	-	-	-	-	-	-	-	-
Phenols (Halogenated)	mg/kg	0.5				<1	-	-	<1	-	<1	-	-	-	-	<1	-	-	-	-	-	-	-	-
Organochlorine Pesticides																								
a-BHC	mg/kg	0.05		**0.086$^{\#14}$**	0.36$^{\#25}$	<0.05	-	-	<0.05	-	<0.2	-	-	-	-	<0.05	-	-	-	-	-	-	-	-
b-BHC	mg/kg	0.05		**0.3$^{\#14}$**	1.3$^{\#25}$	<0.05	-	-	<0.05	-	<0.2	-	-	-	-	<0.05	-	-	-	-	-	-	-	-
d-BHC	mg/kg	0.05				<0.05	-	-	<0.05	-	<0.2	-	-	-	-	<0.05	-	-	-	-	-	-	-	-
Dieldrin	mg/kg	0.05				<0.05	-	-	<0.05	-	<0.2	-	-	-	-	<0.05	-	-	-	-	-	-	-	-
g-BHC (Lindane)	mg/kg	0.05		**0.57$^{\#14}$**	2.5$^{\#25}$	<0.05	-	-	<0.05	-	<0.2	-	-	-	-	<0.05	-	-	-	-	-	-	-	-
Aldrin	mg/kg	0.05				<0.05	-	-	<0.05	-	<0.2	-	-	-	-	<0.05	-	-	-	-	-	-	-	-
Aldrin + Dieldrin	mg/kg	0.05		**10$^{\#12}$**	45$^{\#23}$	<0.05	-	-	<0.05	-	<0.2	-	-	-	-	<0.05	-	-	-	-	-	-	-	-
Chlordane	mg/kg	0.05		**70$^{\#12}$**	530$^{\#23}$	<0.1	-	-	<0.1	-	<0.2	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
DDT	mg/kg	0.05	180$^{\#11}$			<0.05	-	-	<0.05	-	<0.2	-	-	-	-	<0.05	-	-	-	-	-	-	-	-
4,4-DDE	mg/kg	0.05				<0.05	-	-	<0.05	-	<0.2	-	-	-	-	<0.05	-	-	-	-	-	-	-	-
DDD	mg/kg	0.05				<0.05	-	-	<0.05	-	<0.2	-	-	-	-	<0.05	-	-	-	-	-	-	-	-
DDT+DDE+DDD	mg/kg	0.05		**400$^{\#12}$**	3,600$^{\#23}$	<0.05	-	-	<0.05	-	<0.2	-	-	-	-	<0.05	-	-	-	-	-	-	-	-
Endosulfan I	mg/kg	0.05				<0.05	-	-	<0.05	-	<0.2	-	-	-	-	<0.05	-	-	-	-	-	-	-	-
Endosulfan II	mg/kg	0.05				<0.05	-	-	<0.05	-	<0.2	-	-	-	-	<0.05	-	-	-	-	-	-	-	-
Endosulfan sulfate	mg/kg	0.05		**380$^{\#14}$**	4,900$^{\#25}$	<0.05	-	-	<0.05	-	<0.2	-	-	-	-	<0.05	-	-	-	-	-	-	-	-
Endrin	mg/kg	0.05		**20$^{\#12}$**	100$^{\#23}$	<0.05	-	-	<0.05	-	<0.2	-	-	-	-	<0.05	-	-	-	-	-	-	-	-
Chlordane (cis)	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlordane (trans)	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin aldehyde	mg/kg	0.05				<0.05	-	-	<0.05	-	<0.2	-	-	-	-	<0.05	-	-	-	-	-	-	-	-
Endrin ketone	mg/kg	0.05				<0.05	-	-	<0.05	-	<0.2	-	-	-	-	<0.05	-	-	-	-	-	-	-	-
Heptachlor	mg/kg	0.05		**10$^{\#12}$**	50$^{\#23}$	<0.05	-	-	<0.05	-	<0.2	-	-	-	-	<0.05	-	-	-	-	-	-	-	-
Heptachlor epoxide	mg/kg	0.05		**0.07$^{\#14}$**	0.33$^{\#25}$	<0.05	-	-	<0.05	-	<0.2	-	-	-	-	<0.05	-	-	-	-	-	-	-	-
Methoxychlor	mg/kg	0.05		**400$^{\#12}$**	2,500$^{\#23}$	<0.05	-	-	<0.05	-	<0.2	-	-	-	-	<0.05	-	-	-	-	-	-	-	-
Endosulfan	mg/kg	0.05		**340$^{\#12}$**	2,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxychlordane	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toxaphene	mg/kg	0.1		**30$^{\#12}$**	160$^{\#23}$	<0.1	-	-	<0.1	-	<0.2	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
Organochlorine Pesticides (EPAVic)	mg/kg	0.1				<0.1	-	-	<0.1	-	<0.2	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
Other Organochlorine Pesticides (EPAVic)	mg/kg	0.1				<0.1	-	-	<0.1	-	<0.2	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
Organophosphorus Pesticides																								
Chlorpyrifos	mg/kg	0.2		**250$^{\#12}$**	2,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pesticides																								
Bifenthrin	mg/kg	0.05		**730$^{\#12}$**	4,500$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mirex	mg/kg			**20$^{\#12}$**	100$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Herbicides																								
Dinoseb	mg/kg	10		**63$^{\#14}$**	820$^{\#25}$	<20	-	-	<20	-	<20	-	-	-	-	<20	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenoxy Acetic Acid	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-TP (Silvex)	mg/kg	0.5		**510$^{\#14}$**	6,600$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hedonal	mg/kg	0.5		**1,300$^{\#12}$**	9,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorprop	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	mg/kg	0.5		**1,900$^{\#14}$**	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Actril (Ioxynil)	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Atrazine	mg/kg	0.2		**400$^{\#12}$**	2,500$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dicamba	mg/kg	0.5		**1,900$^{\#14}$**	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4-chlorophenoxyacetic Acid	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4-Chlorophenoxy Butanoic Acid	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mecoprop	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Picloram	mg/kg			**5,700$^{\#12}$**	35,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fungicides																								
Hexachlorobenzene	mg/kg	0.05		**10$^{\#12}$**	80$^{\#23}$	<0.05	-	-	<0.05	-	<0.2	-	-	-	-	<0.05	-	-	-	-	-	-	-	-
Polychlorinated Biphenyls																								
Aroclor 1016	mg/kg	0.1				<0.1	-	-	<0.1	-	<0.2	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
Aroclor 1221	mg/kg	0.1				<0.1	-	-	<0.1	-	<0.2	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
Aroclor 1232	mg/kg	0.1				<0.1	-	-	<0.1	-	<0.2	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
Aroclor 1242	mg/kg	0.1				<0.1	-	-	<0.1	-	<0.2	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
Aroclor 1248	mg/kg	0.1				<0.1	-	-	<0.1	-	<0.2	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
Aroclor 1254	mg/kg	0.1				<0.1	-	-	<0.1	-	<0.2	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
Aroclor 1260	mg/kg	0.1				<0.1	-	-	<0.1	-	<0.2	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
PCBs (Sum of total)	mg/kg	0.1		**1$^{\#22}$**	7$^{\#30}$	<0.1	-	-	<0.1	-	<0.2	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
Solvents																								
Methyl Ethyl Ketone (MEK)	mg/kg	0.5		**27,000$^{\#14}$**	190,000$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone	mg/kg	0.5		**33,000$^{\#14}$**	140,000$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Acetone	mg/kg	0.5		**61,000$^{\#14}$**	670,000$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Allyl chloride	mg/kg	0.5		**0.72$^{\#14}$**	3.2$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-
Carbon disulfide	mg/kg	0.5		**770$^{\#14}$**	3,500$^{\#25}$	<0.5	-	-	<0.5	-	<0.5	-	-	-	-	<0.5	-	-	-	-	-	-	-	-

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria
Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**
					Location Code	SB23	SB23	SB23	SB24	SB24	SB24	SB25	SB26	SB27	SB27	SB28	SB28	SB29	SB30	SB30	SB31	SB31	SB31	SB32
					Field ID	SB23_0.1-0.2	SB23_0.35-0.45	SB23_1.4-1.5	SB24_0.1-0.2	SB24_0.9-1.0	SB24_0.9_1.0	SB25_0.1-0.2	SB26_0.1-0.2	SB27_0.1-0.2	SB27_0.3-0.4	SB28_0.1-0.2	SB28_0.6-0.7	SB29_0.05-0.15	SB30_0.1-0.2	SB30_0.3-0.4	SB31_0.1-0.2	QC05	QC06	SB32_0.05-0.15
					Date	12/01/2021	12/01/2021	5/03/2021	12/01/2021	12/01/2021	12/02/2021	12/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021	12/01/2021	12/01/2021	12/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021
					Depth	0.1 - 0.2	0.35 - 0.45	1.4 - 1.5	0.1 - 0.2	0.9 - 1	0.9 - 1	0.1 - 0.2	0.1 - 0.2	0.1 - 0.2	0.3 - 0.4	0.1 - 0.2	0.6 - 0.7	0.05 - 0.15	0.1 - 0.2	0.3 - 0.4	0.1 - 0.2	0.1 - 0.2	0.1 - 0.2	0.05 - 0.15
					Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Field_D	Interlab_D	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
					Lab Report No.	767787	767787	778664	767787	767787	773807	767787	767787	767787	767787	767787	767787	767787	767787	767787	767787	767787	EM2100608	767787
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial																			
Halogenated Phenols																								
2,4,5-Trichlorophenol	mg/kg	0.5		**6,300$^{\#14}$**	82,000$^{\#25}$	-	<1	-	-	-	-	<1	<1	-	-	-	<1	-	-	-	-	-	-	<1
2,4,6-Trichlorophenol	mg/kg	0.5		**49$^{\#14}$**	210$^{\#25}$	-	<1	-	-	-	-	<1	<1	-	-	-	<1	-	-	-	-	-	-	<1
2,4-Dichlorophenol	mg/kg	0.5		**190$^{\#14}$**	2,500$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
2,6-Dichlorophenol	mg/kg	0.5				-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
2-Chlorophenol	mg/kg	0.5		**390$^{\#14}$**	5,800$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Pentachlorophenol	mg/kg	0.5		**120$^{\#12}$**	660$^{\#23}$	-	<1	-	-	-	-	<1	<1	-	-	-	<1	-	-	-	-	-	-	<1
2,3,4,6-Tetrachlorophenol	mg/kg	0.5		**1,900$^{\#14}$**	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,3,5,6-Tetrachlorophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,3,4,5-Tetrachlorophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachlorophenols	mg/kg	10				-	<10	-	-	-	-	<10	<10	-	-	-	<10	-	-	-	-	-	-	<10
Phenols (Halogenated)	mg/kg	0.5				-	<1	-	-	-	-	<1	<1	-	-	-	<1	-	-	-	-	-	-	<1
Organochlorine Pesticides																								
a-BHC	mg/kg	0.05		**0.086$^{\#14}$**	0.36$^{\#25}$	-	<0.05	-	-	-	-	<0.05	<0.05	-	-	-	<0.05	-	-	-	-	-	-	<0.05
b-BHC	mg/kg	0.05		**0.3$^{\#14}$**	1.3$^{\#25}$	-	<0.05	-	-	-	-	<0.05	<0.05	-	-	-	<0.05	-	-	-	-	-	-	<0.05
d-BHC	mg/kg	0.05				-	<0.05	-	-	-	-	<0.05	<0.05	-	-	-	<0.05	-	-	-	-	-	-	<0.05
Dieldrin	mg/kg	0.05				-	<0.05	-	-	-	-	<0.05	<0.05	-	-	-	<0.05	-	-	-	-	-	-	<0.05
g-BHC (Lindane)	mg/kg	0.05		**0.57$^{\#14}$**	2.5$^{\#25}$	-	<0.05	-	-	-	-	<0.05	<0.05	-	-	-	<0.05	-	-	-	-	-	-	<0.05
Aldrin	mg/kg	0.05				-	<0.05	-	-	-	-	<0.05	<0.05	-	-	-	<0.05	-	-	-	-	-	-	<0.05
Aldrin + Dieldrin	mg/kg	0.05		**10$^{\#12}$**	45$^{\#23}$	-	<0.05	-	-	-	-	<0.05	<0.05	-	-	-	<0.05	-	-	-	-	-	-	<0.05
Chlordane	mg/kg	0.05		**70$^{\#12}$**	530$^{\#23}$	-	<0.1	-	-	-	-	<0.1	<0.1	-	-	-	<0.1	-	-	-	-	-	-	<0.1
DDT	mg/kg	0.05	180$^{\#11}$			-	<0.05	-	-	-	-	<0.05	<0.05	-	-	-	<0.05	-	-	-	-	-	-	<0.05
4,4-DDE	mg/kg	0.05				-	<0.05	-	-	-	-	<0.05	<0.05	-	-	-	<0.05	-	-	-	-	-	-	<0.05
DDD	mg/kg	0.05				-	<0.05	-	-	-	-	<0.05	<0.05	-	-	-	<0.05	-	-	-	-	-	-	<0.05
DDT+DDE+DDD	mg/kg	0.05		**400$^{\#12}$**	3,600$^{\#23}$	-	<0.05	-	-	-	-	<0.05	<0.05	-	-	-	<0.05	-	-	-	-	-	-	<0.05
Endosulfan I	mg/kg	0.05				-	<0.05	-	-	-	-	<0.05	<0.05	-	-	-	<0.05	-	-	-	-	-	-	<0.05
Endosulfan II	mg/kg	0.05				-	<0.05	-	-	-	-	<0.05	<0.05	-	-	-	<0.05	-	-	-	-	-	-	<0.05
Endosulfan sulfate	mg/kg	0.05		**380$^{\#14}$**	4,900$^{\#25}$	-	<0.05	-	-	-	-	<0.05	<0.05	-	-	-	<0.05	-	-	-	-	-	-	<0.05
Endrin	mg/kg	0.05		**20$^{\#12}$**	100$^{\#23}$	-	<0.05	-	-	-	-	<0.05	<0.05	-	-	-	<0.05	-	-	-	-	-	-	<0.05
Chlordane (cis)	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chlordane (trans)	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin aldehyde	mg/kg	0.05				-	<0.05	-	-	-	-	<0.05	<0.05	-	-	-	<0.05	-	-	-	-	-	-	<0.05
Endrin ketone	mg/kg	0.05				-	<0.05	-	-	-	-	<0.05	<0.05	-	-	-	<0.05	-	-	-	-	-	-	<0.05
Heptachlor	mg/kg	0.05		**10$^{\#12}$**	50$^{\#23}$	-	<0.05	-	-	-	-	<0.05	<0.05	-	-	-	<0.05	-	-	-	-	-	-	<0.05
Heptachlor epoxide	mg/kg	0.05		**0.07$^{\#14}$**	0.33$^{\#25}$	-	<0.05	-	-	-	-	<0.05	<0.05	-	-	-	<0.05	-	-	-	-	-	-	<0.05
Methoxychlor	mg/kg	0.05		**400$^{\#12}$**	2,500$^{\#23}$	-	<0.05	-	-	-	-	<0.05	<0.05	-	-	-	<0.05	-	-	-	-	-	-	<0.05
Endosulfan	mg/kg	0.05		**340$^{\#12}$**	2,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxychlordane	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Toxaphene	mg/kg	0.1		**30$^{\#12}$**	160$^{\#23}$	-	<0.1	-	-	-	-	<0.1	<0.1	-	-	-	<0.1	-	-	-	-	-	-	<0.1
Organochlorine Pesticides (EPAVic)	mg/kg	0.1				-	<0.1	-	-	-	-	<0.1	<0.1	-	-	-	<0.1	-	-	-	-	-	-	<0.1
Other Organochlorine Pesticides (EPAVic)	mg/kg	0.1				-	<0.1	-	-	-	-	<0.1	<0.1	-	-	-	<0.1	-	-	-	-	-	-	<0.1
Organophosphorus Pesticides																								
Chlorpyrifos	mg/kg	0.2		**250$^{\#12}$**	2,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pesticides																								
Bifenthrin	mg/kg	0.05		**730$^{\#12}$**	4,500$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mirex	mg/kg			**20$^{\#12}$**	100$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Herbicides																								
Dinoseb	mg/kg	10		**63$^{\#14}$**	820$^{\#25}$	-	<20	-	-	-	-	<20	<20	-	-	-	<20	-	-	-	-	-	-	<20
2,4,5-Trichlorophenoxy Acetic Acid	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-TP (Silvex)	mg/kg	0.5		**510$^{\#14}$**	6,600$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hedonal	mg/kg	0.5		**1,300$^{\#12}$**	9,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorprop	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	mg/kg	0.5		**1,900$^{\#14}$**	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Actril (loxynil)	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Atrazine	mg/kg	0.2		**400$^{\#12}$**	2,500$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dicamba	mg/kg	0.5		**1,900$^{\#14}$**	25,000$^{\#25}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4-chlorophenoxyacetic Acid	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4-Chlorophenoxy Butanoic Acid	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mecoprop	mg/kg	0.5		**800$^{\#12}$**	5,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Picloram	mg/kg			**5,700$^{\#12}$**	35,000$^{\#23}$	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fungicides																								
Hexachlorobenzene	mg/kg	0.05		**10$^{\#12}$**	80$^{\#23}$	-	<0.05	-	-	-	-	<0.05	<0.05	-	-	-	<0.05	-	-	-	-	-	-	<0.05
Polychlorinated Biphenyls																								
Aroclor 1016	mg/kg	0.1				-	<0.2	-	-	-	-	<0.1	<0.1	-	-	-	<0.1	-	-	-	-	-	-	<0.1
Aroclor 1221	mg/kg	0.1				-	<0.2	-	-	-	-	<0.1	<0.1	-	-	-	<0.1	-	-	-	-	-	-	<0.1
Aroclor 1232	mg/kg	0.1				-	<0.2	-	-	-	-	<0.1	<0.1	-	-	-	<0.1	-	-	-	-	-	-	<0.1
Aroclor 1242	mg/kg	0.1				-	<0.2	-	-	-	-	<0.1	<0.1	-	-	-	<0.1	-	-	-	-	-	-	<0.1
Aroclor 1248	mg/kg	0.1				-	<0.2	-	-	-	-	<0.1	<0.1	-	-	-	<0.1	-	-	-	-	-	-	<0.1
Aroclor 1254	mg/kg	0.1				-	<0.2	-	-	-	-	<0.1	<0.1	-	-	-	<0.1	-	-	-	-	-	-	<0.1
Aroclor 1260	mg/kg	0.1				-	<0.2	-	-	-	-	<0.1	<0.1	-	-	-	<0.1	-	-	-	-	-	-	<0.1
PCBs (Sum of total)	mg/kg	0.1		**1$^{\#22}$**	7$^{\#30}$	-	<0.2	-	-	-	-	<0.1	<0.1	-	-	-	<0.1	-	-	-	-	-	-	<0.1
Solvents																								
Methyl Ethyl Ketone (MEK)	mg/kg	0.5		**27,000$^{\#14}$**	190,000$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
4-Methyl-2-pentanone	mg/kg	0.5		**33,000$^{\#14}$**	140,000$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Acetone	mg/kg	0.5		**61,000$^{\#14}$**	670,000$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Allyl chloride	mg/kg	0.5		**0.72$^{\#14}$**	3.2$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5
Carbon disulfide	mg/kg	0.5		**770$^{\#14}$**	3,500$^{\#25}$	-	<0.5	-	-	-	-	<0.5	<0.5	-	-	-	<0.5	-	-	-	-	-	-	<0.5

Table 1 - Soil Results vs. Relevant Beneficial Use Criteria
Detailed Site Investigation
Elwood Foreshore, Elwood
City of Port Phillip
M18310

					Report	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**
					Location Code	SB32	SB33	SB34	SB34	SB35	SB35	SB35	SB36	SB36	SB37	SB37	SB37	SB38
					Field ID	SB32_0.9-1.0	SB33_0.1-0.2	SB34_0.1-0.2	SB34_0.4-0.5	SB35_0.1-0.2	QC01	QC02	SB36_0.1-0.2	SB36_0.4-0.5	SB37_0.1-0.2	SB37_0.5-0.6	SB37_1.4-1.5	SB38_0.1-0.2
					Date	5/03/2021	12/01/2021	13/01/2021	13/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	5/03/2021	12/01/2021
					Depth	0.9 - 1.0	0.1 - 0.2	0.1 - 0.2	0.4 - 0.5	0.1 - 0.2	0.1 - 0.2	0.1 - 0.2	0.1 - 0.2	0.4 - 0.5	0.1 - 0.2	0.5 - 0.6	1.4 - 1.5	0.1 - 0.2
					Sample Type	Normal	Normal	Normal	Normal	Normal	Field_D	Interlab_D	Normal	Normal	Normal	Normal	Normal	Normal
					Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
					Lab Report No.	778664	767787	767787	767787	767787	767787	EM2100608	767787	767787	767787	767787	778664	767787
	Unit	EQL	NEPC 2013 - Maintenance of Ecosystems - Urban Residential / Public Open Space	**NEPC 2013 - Human Health Setting 'C' - Public Open Space**	NEPC 2013 - Human Health Setting 'D' - Commercial / Industrial													
Halogenated Phenols																		
2,4,5-Trichlorophenol	mg/kg	0.5		**6,300**[#14]	82,000[#25]	-	-	-	<1	<1	-	-	-	-	-	-	-	<1
2,4,6-Trichlorophenol	mg/kg	0.5		**49**[#14]	210[#25]	-	-	-	<1	<1	-	-	-	-	-	-	-	<1
2,4-Dichlorophenol	mg/kg	0.5		**190**[#14]	2,500[#25]	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
2,6-Dichlorophenol	mg/kg	0.5				-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
2-Chlorophenol	mg/kg	0.5		**390**[#14]	5,800[#25]	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Pentachlorophenol	mg/kg	0.5		**120**[#12]	660[#23]	-	-	-	<1	<1	-	-	-	-	-	-	-	<1
2,3,4,6-Tetrachlorophenol	mg/kg	0.5		**1,900**[#14]	25,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-
2,3,5,6-Tetrachlorophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-
2,3,4,5-Tetrachlorophenol	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-
Tetrachlorophenols	mg/kg	10				-	-	-	<10	<10	-	-	-	-	-	-	-	<10
Phenols (Halogenated)	mg/kg	0.5				-	-	-	<1	<1	-	-	-	-	-	-	-	<1
Organochlorine Pesticides																		
a-BHC	mg/kg	0.05		**0.086**[#14]	0.36[#25]	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	<0.05
b-BHC	mg/kg	0.05		**0.3**[#14]	1.3[#25]	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	<0.05
d-BHC	mg/kg	0.05				-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	<0.05
Dieldrin	mg/kg	0.05				-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	<0.05
g-BHC (Lindane)	mg/kg	0.05		**0.57**[#14]	2.5[#25]	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	<0.05
Aldrin	mg/kg	0.05				-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	<0.05
Aldrin + Dieldrin	mg/kg	0.05		**10**[#12]	45[#23]	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	<0.05
Chlordane	mg/kg	0.05		**70**[#12]	530[#23]	-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	<0.1
DDT	mg/kg	0.05	180[#11]			-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	<0.05
4,4-DDE	mg/kg	0.05				-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	<0.05
DDD	mg/kg	0.05				-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	<0.05
DDT+DDE+DDD	mg/kg	0.05		**400**[#12]	3,600[#23]	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	<0.05
Endosulfan I	mg/kg	0.05				-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	<0.05
Endosulfan II	mg/kg	0.05				-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	<0.05
Endosulfan sulfate	mg/kg	0.05		**380**[#14]	4,900[#25]	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	<0.05
Endrin	mg/kg	0.05		**20**[#12]	100[#23]	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	<0.05
Chlordane (cis)	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-
Chlordane (trans)	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-
Endrin aldehyde	mg/kg	0.05				-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	<0.05
Endrin ketone	mg/kg	0.05				-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	<0.05
Heptachlor	mg/kg	0.05		**10**[#12]	50[#23]	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	<0.05
Heptachlor epoxide	mg/kg	0.05		**0.07**[#14]	0.33[#25]	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	<0.05
Methoxychlor	mg/kg	0.05		**400**[#12]	2,500[#23]	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	<0.05
Endosulfan	mg/kg	0.05		**340**[#12]	2,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxychlordane	mg/kg	0.05				-	-	-	-	-	-	-	-	-	-	-	-	-
Toxaphene	mg/kg	0.1		**30**[#12]	160[#23]	-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	<0.1
Organochlorine Pesticides (EPAVic)	mg/kg	0.1				-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	<0.1
Other Organochlorine Pesticides (EPAVic)	mg/kg	0.1				-	-	-	<0.1	<0.1	-	-	-	-	-	-	-	<0.1
Organophosphorus Pesticides																		
Chlorpyrifos	mg/kg	0.2		**250**[#12]	2,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-
Pesticides																		
Bifenthrin	mg/kg	0.05		**730**[#12]	4,500[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-
Mirex	mg/kg			**20**[#12]	100[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-
Herbicides																		
Dinoseb	mg/kg	10		**63**[#14]	820[#25]	-	-	-	<20	<20	-	-	-	-	-	-	-	<20
2,4,5-Trichlorophenoxy Acetic Acid	mg/kg	0.5		**800**[#12]	5,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-TP (Silvex)	mg/kg	0.5		**510**[#14]	6,600[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-
Hedonal	mg/kg	0.5		**1,300**[#12]	9,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorprop	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-
4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	mg/kg	0.5		**1,900**[#14]	25,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-
Actril (Ioxynil)	mg/kg	0.5				-	-	-	-	-	-	-	-	-	-	-	-	-
Atrazine	mg/kg	0.2		**400**[#12]	2,500[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-
Dicamba	mg/kg	0.5		**1,900**[#14]	25,000[#25]	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4-chlorophenoxyacetic Acid	mg/kg	0.5		**800**[#12]	5,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methyl-4-Chlorophenoxy Butanoic Acid	mg/kg	0.5		**800**[#12]	5,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-
Mecoprop	mg/kg	0.5		**800**[#12]	5,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-
Picloram	mg/kg			**5,700**[#12]	35,000[#23]	-	-	-	-	-	-	-	-	-	-	-	-	-
Fungicides																		
Hexachlorobenzene	mg/kg	0.05		**10**[#12]	80[#23]	-	-	-	<0.05	<0.05	-	-	-	-	-	-	-	<0.05
Polychlorinated Biphenyls																		
Aroclor 1016	mg/kg	0.1				-	-	-	<0.2	<0.2	-	-	-	-	-	-	-	<0.1
Aroclor 1221	mg/kg	0.1				-	-	-	<0.2	<0.2	-	-	-	-	-	-	-	<0.1
Aroclor 1232	mg/kg	0.1				-	-	-	<0.2	<0.2	-	-	-	-	-	-	-	<0.1
Aroclor 1242	mg/kg	0.1				-	-	-	<0.2	<0.2	-	-	-	-	-	-	-	<0.1
Aroclor 1248	mg/kg	0.1				-	-	-	<0.2	<0.2	-	-	-	-	-	-	-	<0.1
Aroclor 1254	mg/kg	0.1				-	-	-	<0.2	<0.2	-	-	-	-	-	-	-	<0.1
Aroclor 1260	mg/kg	0.1				-	-	-	<0.2	<0.2	-	-	-	-	-	-	-	<0.1
PCBs (Sum of total)	mg/kg	0.1		**1**[#22]	7[#30]	-	-	-	<0.2	<0.2	-	-	-	-	-	-	-	<0.1
Solvents																		
Methyl Ethyl Ketone (MEK)	mg/kg	0.5		**27,000**[#14]	190,000[#25]	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
4-Methyl-2-pentanone	mg/kg	0.5		**33,000**[#14]	140,000[#25]	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Acetone	mg/kg	0.5		**61,000**[#14]	670,000[#25]	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Allyl chloride	mg/kg	0.5		**0.72**[#14]	3.2[#25]	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5
Carbon disulfide	mg/kg	0.5		**770**[#14]	3,500[#25]	-	-	-	<0.5	<0.5	-	-	-	-	-	-	-	<0.5

Comments
#1 NEPC (2013) EIL - Commercial and Industrial. Value applies to aged arsenic (contamination present in soil for at least two years). For fresh contamination refer Schedule B7 of the NEPM.
#2 NEPC (2013) EIL - Commercial and Industrial. Value is for chromium III. Initial screening value applicable to all aged soils (see text). Derive site-specific value if contamination is fresh (<2 years) or if EILs are exceeded.
#3 NEPC (2013) EIL - Commercial and Industrial. Initial screening value applicable to all aged soils (see text). Derive site-specific value if contamination is fresh (<2 years) or if EILs are exceeded.
#4 NEPC (2013) EIL - Commercial and Industrial. Initial screening value applicable to all aged soils (see text). Derive site-specific value if contamination is fresh (<2 years) or if EILs are exceeded. Assumes ABC of 30 mg/kg
#5 NEPC (2013) ESL - Commercial and Industrial. Coarse soil value adopted for initial screening.
#6 NEPC (2013) ESL - Commercial and Industrial. Fine soil value (most conservative) adopted for initial screening.
#7 ESL for TRH F1 adopted for this historical fraction. Where F1 data are available, screening based on this fraction is not required.
#8 ESL for TRH >C10-C16 adopted for this historical fraction. Where >C10-C16 data are available, screening based on this fraction is not required.
#9 ESL for coarse soil adopted for initial screening.
#10 NEPC (2013) ESL - Commercial and Industrial. Value applies to both coarse and fine soil.
#11 NEPC (2013) EIL - Commercial and Industrial. Value applies to both fresh and aged contamination.
#12 Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability maybe important and should be considered where appropriate (refer Shedule B7).
#13 Lead: HILs A,B,C based on blood lead models (IEUBK & HIL D on adult lead model for where 50% bioavailability considered. Site-specific bioavailability should be considered where appropriate.
#14 Elemental mercury: HIL does not address elemental mercury. a site specific assessment should be considered if elemental mercury is present, or suspected to be present.
#15 Carcinogenic PAHs: HIL based on 8 carc. PAHs & their TEFs (rel to BaP ref Schedule 7) BaP TEQ calc by multiplying the conc of each carc. PAH in sample by its BaP TEF (ref Table 1A(1)) & summing
#16 Total PAHs: Based on sum of 16 most common reported (WHO 98). HIL application should consider presence of carcinogenic PAHs (should meet BaP TEQ HIL) & napthalene (should meet relevant HSL)
#17 PCBs: HIL refers to non-dioxin like PCBs only. Where PCB source is known, or suspected at a site, a site-specific assessment of exposure to all PCBs (inc dioxin like PCBs) should be undertaken

Appendix A: Human Health Risk Assessment

Senversa Pty Ltd
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9 April 2021

Anthony Savenkov
Head of Property Projects, Property and Assets
City of Port Phillip
99a Carlisle Street
St Kilda, VIC 3182

Dear Anthony,

Re: Human Health Risk Assessment

Elwood Foreshore (Stage 1 and Stage 2)

1. Introduction

Senversa Pty Ltd (Senversa) was engaged by City of Port Phillip (CoPP) to undertake a Human Health Risk Assessment (HHRA) for the Elwood Foreshore, Elwood (the site). The site includes both the northwest and southeast development portions (Stage 1 and Stage 2) of the Elwood Foreshore. The site location and layout are provided in **Figure 1**.

In 2020, Atma Pty Ltd (Atma) completed a Preliminary Site Investigation (PSI) and Detailed Site Investigation (DSI) for the northwest portion of the site (known as the Stage 1 area), where various building and infrastructure upgrade works are proposed. These investigation works identified elevated concentrations of polycyclic aromatic hydrocarbon (PAH) concentrations that were determined to have the potential to extend into the southeast portion of the Elwood Foreshore (known as the Stage 2 area).

A DSI was requested for the Stage 2 area to gain an understanding of the soil contamination status and further inform Council's business feasibility study and Master Development Plan for the broader Elwood Foreshore. A site-specific human health risk assessment (HHRA) was also requested to further assess the potential health risk to site users from the identified PAH impacts across both the Stage 1 and Stage 2 areas (the site).

The HHRA documented herein includes the results of the HHRA completed for the Stage 1 area (previously issued as draft) and the Stage 2 area. Additional sampling information has also been incorporated from a soil assessment completed by Landserv at the Wattie Watson Oval (Landserv, 2020) and from a small Greencap assessment at the site of proposed new exercise equipment at the waterfront area of the site (Greencap, 2020). This HHRA should be read in conjunction with these reports which include additional summary tables and figures.

2. Issue Identification

Summary of Consolidated Soil Investigation Works

A DSI was undertaken by Atma in July/August 2020 in the Stage 1 area, which included 37 grid-based borehole locations, two targeted locations and the installation of three groundwater bores. Fill soils were found at most borehole locations with a thickness ranging between 0.1 and 1.1 m below ground level (bgl). A number of analytes were identified by in shallow soil at concentrations exceeding HILs. Concentrations of total PAHs, carcinogenic PAHs (as Benzo(a)pyrene toxic equivalents or B(a)P TEQ) and TRH >C16-C34 exceeded recreational/public open space criteria, which is the current land use across the majority of the site. High concentrations (exceeding the criterion for commercial/industrial uses) of B(a)P TEQ were found at two locations near the former rifle range (MW03/0.1 and T2/0.5).

A DSI was undertaken by Senversa in April 2021 in the Stage 2 area, which included 32 grid-based and targeted soil bore locations to provide broad coverage over the site and to target areas of interest identified after review of the previous environmental reports and historical aerials. Additionally, an environmental investigation had been completed by Atma in September 2020 at the Wattie Watson Oval as part of proposed redevelopment works, which included 26 grid-based borehole locations. A small soil investigation (5 boreholes) was also completed by Greencap in October 2020 at the location of the proposed Elwood Fitness Station.

Consistent with the Stage 1 area DSI, the Stage 2 area DSI (Senversa, 2021) and environmental investigation at Wattie Watson Oval (Landserv, 2020) found high concentrations (exceeding the criterion for commercial/industrial uses) of B(a)P TEQ at nine locations near the former rifle range and current Wattie Watson Oval.

With regards to human health risk, the results showed that with the exception of B(a)P TEQ, chemical concentrations exceeding the HIL were relatively marginal (less than 2.5 times the HIL) and not widespread (reported in only one or two samples). The 95% $\text{UCL}_{\text{average}}$ concentrations were below screening levels, further indicating that risks are likely to be low and acceptable when the overall concentrations to which site users are likely to be exposed are considered.

On the basis of these completed investigations, a HHRA was recommended to further assess potential risks to human health associated with identified exceedances of HILs (particularly B(a)P TEQ) within soil at the site.

The HHRA considers a pathway of direct contact (i.e. incidental ingestion and dermal contact) with the impacts in shallow soil, and a pathway of dust inhalation, which are the key pathways by which future site users may be exposed. Potential receptors associated with the future use of the site include construction workers (associated with potential future site development works), future site maintenance workers (e.g. gardeners), and future recreational users of the site. These receptors are discussed further in **Section 6**.

3. HHRA Methodology

The HHRA was undertaken in general accordance with relevant Australian guidance documents, primarily:

- *Environmental Health Risk Assessment, Guidelines for Assessing Human Health Risks from Environmental Hazards* (enHealth, 2012a)
- *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013), Schedule B4, Guideline on Site-specific Human Health Risk Assessment Methodology* (NEPC, 2013).

In accordance with the above documents, the general scope of work undertaken to complete the HHRA comprised the following five elements:

- **Issue Identification:** This included identification of the objectives of the risk assessment, the problems that the risk assessment needs to address, and the risk management decisions that need to be made based on the HHRA. A key component of this stage is development of conceptual model describing the sources, receptors and exposure pathways that will be evaluated. This element of the HHRA is presented above (in **Section 2**).

- **Data Collection and Evaluation:** This included review of available data and information, and identification of the contaminants or chemicals of potential concern (CoPCs) requiring detailed quantitative consideration in the risk assessment.
- **Toxicity Assessment:** This entailed evaluation of both qualitative and quantitative information about the toxicity of identified CoPCs, in order to describe the nature and incidence of adverse health effects which could occur in humans at different exposure levels.
- **Exposure Assessment:** This involved the identification of exposed human populations (receptors) and the pathways via which receptors may be exposed to CoPCs. Environmental monitoring data were combined with estimates of the frequency, extent and duration of receptor exposure to derive quantitative estimates of human exposure to contaminants.
- **Risk Characterisation:** This involved comparison of estimated exposure levels to relevant toxicity (dose-response) criteria to estimate the potential incidence and nature of adverse health effects to human receptors. The risk characterisation stage also includes interpretation of risk estimates in the context of the uncertainties and assumptions of the risk assessment process.

4. Data Evaluation

The recent soil analytical results obtained from Stage 2 area and targeted soils bores to collect samples for bio-accessibility analysis (Senversa, 2021) were compiled with the previous investigation results from the Stage 1 area DSI (Atma, 2020), the soil assessment completed by Landserv at the Wattie Watson Oval (Landserv, 2020) and from the small Greencap assessment at the site of proposed new exercise equipment at the waterfront area of the site (Greencap, 2020).

4.1 Identified impacts in fill or shallow natural soils at concentrations above screening levels

Chemicals reported above health-based investigation/screening levels for public open space land use (i.e. NEPC (2013) HIL or HSL ‘C’ values) in fill or shallow natural soils were lead, B(a)P TEQ, total PAH, and TRH C16-C34 as summarised in **Table 4-1**.

Table 4-1. Soil Analytical Data Summary (chemicals exceeding HIL/HSL C only) [1]

Chemical	HIL-C/ HSL C	Samples Analysed	Number of HIL/HSL Exceedances	Concentration Range	Arithmetic Mean	Standard Deviation	95% $UCL_{average}$ [2]
Lead	600	168	5	<5 – **1200**	133.5	175.3	160.4
TRH C16-C34	5300	160	5	<100 - **9500**	853.0	1413	766.2
B(a)P TEQ[3]	3	183	84	<0.5 - <u>**410**</u>	**20.5**	<u>42.1</u>	34.7
Total PAH	300	183	9	<0.5 – <u>**2237.4**</u>	128.1	<u>289.2</u>	882.8

NOTES:

All concentrations in mg/kg.

BOLDED values exceed adopted HIL or HSL

<u>Underlined</u> values indicate exceedance of statistical comparison measures in NEPC (2013), i.e. maximum concentration greater than 250% of HIL/HSL or standard deviation greater than 50% of HIL/HSL.

[1] Refer to Table 1 for full soil analytical data summary tables.

[2] 95% $UCL_{average}$ = 95% Upper Confidence Limit on average concentration. Calculated using ProUCL (Version 5.0). Value is that recommended by ProUCL based on distribution testing. Details of calculations are provided in **Attachment D**.

[3] B(a)P TEQ = Benzo(a)pyrene toxic equivalent concentration. This value is calculated from the concentrations of B(a)P and other carcinogenic PAHs based on toxic equivalency factors, and reflects the cumulative toxic effect of these compounds. See further information within NEPC (2013).

B(a)P TEQ

Reported B(a)P TEQ concentrations on average exceed the HIL C value by a factor of up to approximately 5 and the 95% $UCL_{average}$ concentration (based on all site data) is approximately 15 times above the screening level. The maximum B(a)P TEQ concentration at the site (410 mg/kg) is approximately 100 times the HIL C (3 mg/kg) and also approximately 10 times the HIL D criteria (40 mg/kg) for commercial / industrial use. The following was also noted:

- There was a clear spatial pattern to the distribution of the highest concentrations, suggesting contamination is associated with fill soils at the location of the former rifle range and Wattie Watson Oval. The highest concentrations were typically observed at depth (> 0.2 m bgl). Natural soils were encountered and sampled beneath the former rifle range and Wattie Watson Oval which did not contain any detectable B(a)P TEQ

  There were, however, exceedances of the HIL C value in shallow fill and natural soils throughout the site area indicating that contamination (at lower concentrations) is also associated with heterogeneous fill. Select natural soil samples were obtained across the entire site area except for the east side of the Stage 2 area (where there was equipment refusal). B(a)P TEQ impacts did not extend into the natural soils. Where natural soil samples were unable to be obtained in the western side of the Stage 2 area, deeper fill soil samples were obtained up to 2.0 m bgl.
- B(a)P TEQ bioaccessibility testing indicated that only a very small percentage (0.3 – 2.0%) could potentially be transferred dermally through the skin and approximately 11% could be solubilised in the gastrointestinal tract. The implications of these results to the HHRA are further discussed below.

The analytical results for PAHs including B(a)P TEQ for all soil samples are summarised in **Table 1**.

4.2 Selection of CoPC for HHRA

Chemicals of potential concern (CoPC) are considered to be those chemicals which are known or suspected to be present at concentrations which may pose a risk to human health. In general, a chemical is selected as a CoPC if it is reported above relevant screening criteria which have been derived based on protection of human health.

As discussed above, chemicals reported above relevant health-based investigation levels for the current open space / recreational land use setting are lead, B(a)P TEQ, total PAH, and TRH C16-C34.

B(a)P TEQ is identified as a key CoPC for HHRA, based on the large number of identified exceedances across the site, together with the fact that the maximum, mean, and 95%UCL concentrations all exceed the NEPM HIL-C; the maximum concentration is more than 250% of the HIL-C, and the standard deviation is more than 50% of the HIL-C.

For total PAH, the maximum concentration is more than 250% of the HIL-C, the standard deviation is more than 50% of the HIL-C, and the 95%UCL concentration is above the HIL-C. However, the mean concentration is below the HIL-C. Further consideration has been given to the need to assess PAH beyond B(a)P TEQ. As further detailed in **Attachment A**, individual PAHs can be broadly categorised into those considered to be genotoxic carcinogens, and those not considered to be associated with carcinogenic effects. The NEPC (2013) HILs for B(a)P TEQ account for the potentially carcinogenic PAHs (benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene and indeno(1,2,3-c,d)pyrene), while the other PAHs (acenaphthene, acenaphthylene, anthracene, fluoranthene, fluorene, naphthalene, phenanthrene and pyrene) are typically of much less concern and are considered unlikely to contribute to unacceptable health risks at the site. This is further demonstrated by comparison of the reported concentrations of these individual PAHs to screening levels derived by the USEPA (2015) for residential use of land, as shown in **Table 4-2** below.

Table 4-2: Comparison of Individual Non-Carcinogenic PAH Concentrations to Screening Levels

PAH	Maximum Site Concentration (mg/kg)	USEPA (2015) Regional Screening Level (RSL) for Residential Land Use (mg/kg)	CoPC?
Acenaphthene	11	3,600	No
Acenaphthylene	28.1	1,800*	No
Anthracene	67	18,000	No
Fluoranthene	360	2,400	No
Fluorene	12	2,400	No
Naphthalene	5.5	1,900**	No
Phenanthrene	310	1,800*	No
Pyrene	360	1,800	No

* No screening level available; the lowest value for other non-carcinogenic PAHs has been adopted as a surrogate.
** Value is the HSL 'C' derived by Friebel and Nadebaum (2011) (lower of values derived for inhalation or direct contact exposure)

As all of the non-carcinogenic PAH are below the identified screening levels, further assessment of these non-carcinogenic PAH is not required, the risks associated with total PAH are considered to be adequately assessed through the assessment of carcinogenic PAH (i.e. adopting B(a)P TEQ as a COPC).

For TRH C16-C34, the maximum concentration exceeds the HIL-C, however it is less than 250% of the HIL-C and the standard deviation is less than 50% of the HIL-C. The mean and 95% UCL concentrations are also below the HIL-C. Additionally, the exceedances are limited to five locations (T2 – Atma, BH02, BH03, SB16 – Landserv, and SB23 – Senversa) and are at depths of 0.35 m or greater, with shallower soils in the same location being below the HIL-C. These two factors reduce the potential exposure of sensitive receptors to the maximum concentration. Overall, the risks associated with TRH C16-C34 are assessed to be low, and further assessment as part of the HHRA is not considered warranted.

For lead, the maximum concentration exceeds the HIL-C, however it is less than 250% of the HIL-C and the standard deviation is less than 50% of the HIL-C. The mean and 95% UCL concentrations are also below the HIL-C. Additionally, the exceedences are limited to three locations (BH01, BH05 – Landserv, and SB18 – Senversa) and are at depths of 0.4 m or greater, with shallower soils in the same location being below the HIL-C. These two factors reduce the potential exposure of sensitive receptors to the maximum concentration. Overall, the risks associated with lead are assessed to be low, and further assessment as part of the HHRA is not considered warranted.

Based on the above, only carcinogenic PAHs (represented by B(a)P TEQ), have been identified as CoPC at the site. A summary of all the soil analytical results (PAHs) available for the site is provided as **Table 1**.

5. Toxicity Assessment

The toxicity assessment stage of a risk assessment is separated into two components; hazard identification and dose-response assessment. The hazard identification stage is a qualitative description of the capacity of a contaminant or agent to cause harm. The dose-response assessment includes the identification and selection of appropriate toxicity criteria published by sources considered by NEPC (2013) and/ or enHealth (2012a) to be compliant with Australian requirements for setting public health standards.

5.1 Hazard Identification

The hazard identification process requires a review of existing toxicological information from a variety of appropriate sources to describe the capacity of a specific agent to produce adverse health effects.

Toxicological hazards associated with the specific CoPC assessed in this HHRA (i.e. carcinogenic PAHs as represented by B(a)P TEQ) are summarised in the toxicological profile provided in **Attachment A**.

5.2 Dose-Response Assessment

The objective of the dose-response assessment is to identify the quantitative toxicity values for each CoPC which will be used for the quantification of human health risk. The numerical values derived from toxicity dose-response studies are referred to collectively as toxicity values. The toxicity values adopted are based on two different approaches to the characterisation of dose-response (NHMRC, 1999 and USEPA, 2005):

- For chemicals that have the potential to result in carcinogenic effects with a genotoxic mechanism, any level of exposure is assumed to result in some incremental lifetime risk. These chemicals are therefore assessed on the basis of a non-threshold dose-response relationship. The values available are essentially the slope of the cancer dose-response curve for the chemical (based on relevant studies and approaches to extrapolate effects from high doses to low doses) and are termed either a cancer slope factor (CSF) or an inhalation unit risk (IUR). The CSF (expressed as (mg/kg/day)$^{-1}$) or IUR (expressed as (µg/m3)$^{-1}$) is used to estimate the probability of an individual developing cancer at some point in a lifetime as a result of a specific exposure.
- For other chemicals that may be associated with non-carcinogenic effects or other carcinogenic effects that are not genotoxic, a threshold is considered relevant. The threshold levels are typically termed an acceptable or tolerable daily intake (ADI or TDI) or reference dose (RfD), or in the case of inhalation exposures a tolerable concentration in air (TC) or reference concentration (RfC). These levels reflect intakes or exposure levels below which it is considered unlikely that adverse effects would occur in human populations, including sensitive sub-groups (e.g., the very young or elderly).

The CoPC requiring assessment in this HHRA are considered to be genotoxic carcinogens and have therefore been assessed using non-threshold dose-response values.

The adopted non-threshold toxicity values for carcinogenic PAH, assessed based on a TEQ relative to B(a)P, are discussed in **Attachment A**, and are as follows:

- Cancer Slope Factor (for assessment of oral and dermal exposure): 2.1 (mg/kg/day)$^{-1}$, derived by NZ MfE (2011).
- Inhalation Unit Risk (for assessment of inhalation exposure): 0.00059 (µg/m3)$^{-1}$, based on the adopted oral reference value in the absence of a relevant toxicity reference value for the inhalation pathway.

It is also noted that B(a)P and other carcinogenic PAHs are considered to be mutagens, such that additional safety factors should be applied to toxicological reference values where early life exposure may occur (USEPA, 2005 and 2009; NEPC, 2013; enHealth, 2012a). These safety factors are termed age-dependent adjustment factors (ADAFs) and are applied to address differential potency associated with exposure during early life (less than 16 years of age). Default ADAFs recommended by USEPA (2005) and enHealth (2012a) have therefore been applied to the above cancer slope factors and inhalation unit risk factors as follows:

- A 10-fold adjustment for children ages 0 to <2 years.
- A 3-fold adjustment for children aged 2-<16 years.
- No adjustment for individuals aged 16 years and older.

6. Exposure Assessment

6.1 Receptors and Exposure Pathways

Based on the current and likely future use of the site for open public space and recreation, as well as uncovering of soil during construction, human receptors with the highest potential for exposure to soil contaminants are the following:

- Construction Workers (adults) associated with potential future redevelopment of the site, who may directly or indirectly contact soil during a future construction period via the following pathways:
  - Incidental ingestion of surface soil and dust (e.g. via hand to mouth contact).
  - Dermal contact with surface soil and dust (e.g. following adherence of soil or soil-derived dust to the skin).
  - Inhalation of soil-derived airborne dust/particulates.
- Recreation and open space area users (adults and children) who may directly or indirectly contact soil via the following pathways:
  - Incidental ingestion of surface soil and dust (e.g. via hand to mouth contact).
  - Dermal contact with surface soil and dust (e.g. following adherence of soil or soil-derived dust to the skin).
  - Inhalation of soil-derived airborne dust/particulates.

Other potential receptors (e.g. gardeners or intrusive maintenance workers) may also be present, however:

- These receptors would be less frequently exposed to site soils, e.g. gardening works would be less frequent than construction workers (for which exposure every working day is assumed), and intrusive maintenance works are expected to occur only occasionally on an as needed basis.
- These receptors are less sensitive than park users, which could include sensitive subpopulations such as children and the elderly.

Assessment of potential risks to regular park users (including adults and children) and construction workers is therefore considered protective of other potential human receptors.

6.2 Adopted Exposure Parameters

Definitions of the adopted exposure parameter values are also detailed in **Attachment B**. In summary, the adopted exposure parameter values are generally consistent with those adopted in the derivation of the NEPM HIL-C (for future recreational users), and in the development of the CRC Care HSLs for intrusive maintenance workers (for the assessment of risks to construction workers). The following site-specific refinements have been made:

Construction workers:

- **Exposure frequency and duration:** it is assumed that future construction works associated with site redevelopment could continue for a full year. An exposure frequency of 240 working days/year (8 hour days), and an exposure duration of 1 year has therefore been assumed for construction workers. This is considered to be a highly conservative estimate of the duration and frequency over which direct soil exposure could occur for construction workers.
- **Soil adherence:** a soil adherence factor of 0.3 mg/cm^2 has been selected based on information provided in the enHealth Australian Exposure Factors Guide. (enHealth, 2012). This is the 95th percentile value for construction workers utilised by the USEPA.

6.3 Adopted Source Concentration

Based on the sampling completed at the site to date, there is considered to be a historical source of contamination at the area of the site associated with both the former rifle range and the current Wattie Watson Oval. Elevated concentrations of B(a)P TEQ were consistently identified in this area at depths of greater than 0.2 m bgl, which are representative of a distinct source area likely related to contaminants within fill soils imported into the site during historical land reclamation. This area is shown as the "Management Area" on **Figure 1** and **Figure 2**.

6.3.1 *Deeper soils within the former rifle range and Wattie Watson Oval area (>0.2 m depth)*

To account for the defined source area, the assessment has considered concentrations within the area of the former rifle range and Wattie Watson Oval at depth. The B(a)P TEQ 95%UCL$_{\text{average}}$[1] for this defined area was calculated to be 153 mg/kg. This approach will allow separate assessment of the requirement for management measures to reduce exposures, both for the defined area of the rifle range and Wattie Watson Oval where the highest concentrations have been identified in deeper soils, and also for shallower soils in this area and in other areas of the site (see **Section 6.3.2**).

As discussed above, it should be noted that the impacts are not currently present at the surface, but rather at depths of >0.2 m bgl, which reduces the exposure potential. The assessment of this maximum concentration will primarily inform any management requirements if the site layout or surface were to undergo any future changes.

6.3.2 *Shallow soils (<0.2 m bgl) and deeper soils outside the former rifle range and Wattie Watson Oval area (>0.2 m bgl)*

In addition to assessing the maximum concentrations at depth (>0.2 m bgl) in the area of the former rifle range and Wattie Watson Oval (in order to assess the requirement for management, as discussed in **Section 6.3.1**), consideration has also been given to the following:

- Average deeper (>0.2 m bgl) soil concentrations at areas outside of the former rifle range and Wattie Watson Oval area.
    - This will help to assess the requirement for management of soils at depth outside of the former rifle range and Wattie Watson Oval area.
- Average shallow (<0.2 m bgl) soil concentrations across the entire site area including the former rifle range and Wattie Watson Oval.
    - Provided there is adequate management of soils at depth in the area of the former rifle range and Wattie Watson Oval, this will be more representative of the overall concentration to which future site users would be exposed.

In order to provide a conservative estimate of the overall exposure concentration in recreation areas across the site (excluding deeper soils within the area of the former rifle range and Wattie Watson Oval), the following B(a)P TEQ 95%UCL$_{\text{average}}$ were calculated:

- 9.4 mg/kg for deeper soils (>0.2 m bgl) for areas outside the area of the former rifle range and Wattie Watson Oval.
- 6.0 mg/kg for shallow soils (<0.2 m bgl) across the entire site area.

6.4 Estimation of Chemical Intakes

The equations used to estimate intakes of CoPC were those recommended by enHealth (2012a) and NEPC (2013), primarily based on USEPA (1989, 2004) guidance, and are presented in **Attachment B** Definitions of the equation parameters and adopted exposure parameter values are also detailed in **Attachment B**.

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[1] The 95%UCL$_{\text{average}}$ is the 95% upper confidence limit of the arithmetic mean estimated for a dataset; there is estimate to be a 95% probability that the mean is lower than this value; it is therefore a conservative estimate of the overall concentration to which site users are likely to be exposed.

Relative oral bioavailability and the dermal absorption factor for the CoPC assessed are further discussed below.

Relative Oral Bioaccessibility and Dermal Absorption Factor:

Relative oral bioavailability is defined as the bioavailability of a contaminant from a particular medium following ingestion, normalised to the bioavailability from the medium administered in the toxicity study (or studies) from which toxicological reference values were derived. The bioavailability from any medium is dependent on two processes: bioaccessibility, which is the amount of contaminant which can be released or solubilised from the medium; and absorption, which is the part of the bioaccessible fraction which is transported across the intestinal epithelium and into systemic circulation. The relative bioaccessibility between the contaminated medium (e.g. soil) and the medium utilised in toxicity studies can therefore be used as an estimate of relative oral bioavailability.

As part of the investigation works, three selected soil samples were submitted to the University of South Australia Centre for Environmental Risk Assessment and Remediation (CERAR) for PAH bioaccessibility testing. Samples were selected to assess a range of concentrations from areas where elevated impacts had previously been identified. The sampling involved targeting a range of locations where PAH impacts had previously been identified. These soils were then analysed for PAHs, and the three samples in which the highest concentrations were identified were submitted for both oral and dermal PAH bioaccessibility testing. The CERAR bioaccessibility report is provided in **Attachment E**, including details of the methodology and basis for the testing.

The oral bioaccessibility testing is designed to assess the fraction of each PAH which can be solubilised in the gastrointestinal tract, and therefore which is bioaccessible. In contrast, the adopted oral toxicity reference value (CSF) was derived from toxicity studies which included administration of solubilised PAHs by gel or by gavage, in which the administered dose is already solubilised (or in the case of gel easily solubilised) and therefore likely to be 100% bioaccessible. The ratio of the bioaccessible B(a)P TEQ fraction in soil to the solubilised fraction in the relevant toxicity studies (assumed to be approximately 100%) therefore provides an estimate of the relative oral bioavailability applicable to site soils.

The dermal bioaccessibility testing is designed to provide data to assist in refining the dermal absorption factor (which in turn in the risk assessment provides a conservative estimate of dermal bioaccessibility). In the test, saturated soil (moistened with artificial perspiration) is applied directly to silicone sheeting which acts as a passive sampler; the sheeting facilitates the molecular diffusion of PAHs from the soil. As PAHs partition into the silicone, a gradient is created within soil-solution for further diffusive mobilisation of PAHs from the soil matrix.

The assessment is considered conservative for the following reasons:

- the high moisture content of the applied soil (i.e. the use of saturated soils);
- the high capacity of the silicone sheeting to sorb PAHs; and
- and the extended timeframe (8 hours) of the assay.

Additional conservatism is built into the assay as it only assesses the transfer of PAH from the soil into the ‘surrogate skin’ but not the penetration of PAHs through the skin (i.e. stratum corneum) for further diffusive mobilisation of PAHs from the soil matrix.

The site-specific bioaccessibility testing results are summarised in **Table 6-1** below, and indicate low oral bioaccessibility (7–10%) and dermal bioaccessibility (0.3–0.5%) of B(a)P TEQ in site soils. The maximum quantified bioaccessibility values have been rounded to 10% (oral) and 0.5% (dermal) for adoption in the HHRA.

Table 6-1: B(a)P TEQ Bioaccessibility Results

Sample	B(a)P TEQ Concentration (mg/kg)	Bioaccessible Concentration (mg/kg)		Bioaccessibility (%)	
		Oral	Dermal	Oral	Dermal
SB01_0.45	37	6.68	0.31	10.2	0.5
SB02_0.4	93 (QC01: 75, QC02:161)	16.7	0.55	9.7	0.3
SB05_0.5	13	1.29	0.06	7.1	0.3
SB16_0.45-0.55	63.5	6.41	0.07	10.4	0.2
SB30_0.15-0.25	22.5	2.29	<0.04	10.9	0.2

7. Risk Characterisation

Risk characterisation is the final step in the quantitative risk assessment process. In this step, information gathered and derived from the toxicity assessment and exposure assessment is used to derive quantitative estimates of risk to human health. The risk calculations undertaken in the HHRA are detailed in **Attachment C** and are summarised below.

The CoPC identified in this HHRA are classed as genotoxic carcinogens, and risks to human health were therefore estimated as the incremental probability of an individual developing cancer over a lifetime as a result of chemical exposure. The numerical estimate of incremental lifetime carcinogenic risk was calculated using the following relationship:

$$ILCR = CDI_{nt} * SF$$

or

$$ILCR = EC_{inh} * IUR * 10^{3} \frac{\mu g}{mg}$$

Where:

ILCR	=	Incremental Lifetime Cancer Risk (unitless)
CDI_{nt}	=	Chronic Daily Intake (based on non-threshold averaging time) (mg/kg/day)
SF	=	Cancer Slope Factor $(mg/kg/day)^{-1}$
EC_{inh}	=	Exposure adjusted air concentration (mg/m^3)
IUR	=	Inhalation Unit Risk $(\mu g/m^3)^{-1}$

To assess the overall potential for effects posed by simultaneous exposure to more than one chemical that is associated with non-threshold carcinogenic effects, the risk for each chemical and pathway relevant to a receptor, and for adults and children (as relevant), were summed. The resulting sum is referred to as the cumulative incremental lifetime carcinogenic risk and is estimated as follows:

$$ILCR_{cum} = \sum_{i=1,j=1}^{n} ILCR_{i,j}$$

Where:

$ILCR_{cum}$	=	Cumulative ILCR for a given receptor (unitless)
$ILCR_{i,j}$	=	ILCR for chemical i and pathway j
n	=	Number of chemicals and/or pathways relevant to land use scenario.

This approach assumes that exposure to multiple carcinogens over a lifetime results in a cumulative effect, and therefore, exposures are summed over all intake routes.

The incremental lifetime cancer risk estimates for each receptor have been compared to an adopted acceptable carcinogenic risk level of 1 in 100,000 (1×10^{-5}). This value is recommended by the NEPM (NEPC, 2013) and enHealth (2012a) as an acceptable (negligible) incremental lifetime risk of developing cancer due to single or multiple carcinogens.

Where the estimated cumulative cancer risk is greater than 1×10^{-5}, a more detailed and critical evaluation of the risk may be conducted, or appropriate risk management measures may be recommended.

The risk calculations for the recreational open space and construction worker scenarios are shown in **Attachment C** for the following:

- 95% $UCL_{average}$ concentrations for soils at depth (>0.2 m bgl) within the former rifle range and Wattie Watson Oval area (153 mg/kg BaP TEQ).
- 95% $UCL_{average}$ concentrations for soils at depth (>0.2 m bgl) outside the former rifle range and Wattie Watson Oval area (9.4 mg/kg BaP TEQ).
- 95% $UCL_{average}$ concentrations for shallow soils (<0.2 m bgl) across the entire site (6 mg/kg BaP TEQ).

The results of the assessment are summarised in **Table 7-1**, **Table 7-2** and **Table 7-3**.

Table 7-1: Summary of Risk Estimate, 95% UCL concentration of soils at depth (>0.2 m bgl) within former rifle range and current Wattie Watson Oval area

Exposure Pathway	**Increased Lifetime Cancer Risk**	
	Recreational open space (sensitive use including child exposure)	**Construction workers (scenario is conservative for other site workers (e.g. gardeners)**
Incidental Soil Ingestion	2.7×10^{-6}	7.0×10^{-8}
Dermal Contact with Soil	$\underline{9.6 \times 10^{-5}}$	4.0×10^{-7}
Inhalation of Soil-derived Dust	3.4×10^{-7}	1.1×10^{-8}
TOTAL	$\underline{\mathbf{1 \times 10^{-4}}}$	$\mathbf{5 \times 10^{-7}}$
Acceptable risk level	***1×10^{-5}***	***1×10^{-5}***

Table 7-2. Summary of Risk Estimate, 95%UCL concentration of soils at depth outside former rifle range and current Wattie Watson Oval area

Exposure Pathway	**Increased Lifetime Cancer Risk**	
	Recreational open space (sensitive use including child exposure)	**Construction workers (scenario is conservative for other site workers (e.g. gardeners)**
Incidental Soil Ingestion	1.7 x 10^{-7}	4.3 x 10^{-9}
Dermal Contact with Soil	5.9 x 10^{-6}	2.5 x 10^{-8}
Inhalation of Soil-derived Dust	2.1 x 10^{-8}	6.7 x 10^{-10}
TOTAL	**6 x 10^{-6}**	**3 x 10^{-8}**
Acceptable risk level	***1 x 10^{-5}***	***1 x 10^{-5}***

Table 7-3. Summary of Risk Estimate, 95%UCL concentration of shallow soils across entire site area

Exposure Pathway	**Increased Lifetime Cancer Risk**	
	Recreational open space (sensitive use including child exposure)	**Construction workers (scenario is conservative for other site workers (e.g. gardeners)**
Incidental Soil Ingestion	1.1 x 10^{-7}	2.8 x 10^{-9}
Dermal Contact with Soil	3.8 x 10^{-6}	1.6 x 10^{-8}
Inhalation of Soil-derived Dust	1.3 x 10^{-8}	4.3 x 10^{-10}
TOTAL	**4 x 10^{-6}**	**2 x 10^{-8}**
Acceptable risk level	***1 x 10^{-5}***	***1 x 10^{-5}***

As shown in the above tables, the estimated risks are below the acceptable level (1 x 10^{-5}) for all scenarios with the exception of the sensitive open space scenario with the 95% UCL for soils at depth within the former rifle range and current Wattie Watson Oval area. For all scenarios, the risks are primarily driven by the dermal exposure pathway.

For the soils at depth within the former rifle range and current Wattie Watson Oval area, risks are around 10 times above the acceptable level for sensitive users associated with the recreational open space, but around 20 times below the acceptable level for construction workers.

This indicates that exposure for recreational users should be managed in this area (noting that the soils are currently at depth), but no special management measures are required to manage risks to future construction workers (or other workers such as gardeners or intrusive workers, for whom the exposure potential will be lower than for construction workers). The maximum concentrations in this area are at depth (>0.2 m bgl) and are managed currently by either clean topsoil or asphalt in the current site layout. However, it should be noted that this coverage will need to be maintained or reinstated if the current layout were to change.

For the broader site (all shallow soils (<0.2 m bgl), and deeper soils (>0.2 m bgl) outside of the former rifle range and current Wattie Watson Oval area), risks are around 2 times below the acceptable level for sensitive users associated with the recreational open space and around 500 times below the acceptable level for construction workers. This indicates that risks are low and acceptable for recreational users and future construction workers (or other workers such as gardeners or intrusive workers, for whom the exposure potential will be lower than for construction workers).

8. Conservatism in the assessment

The majority of the exposure scenarios used in the risk estimates are generic factors consistent with the development of the HILs and HSLs in the NEPM (2013), or conservative assumptions. The assessment is likely to be conservative, as it is based on a number of conservative assumptions adopted. Areas of conservatism are summarised below:

Toxicity

- The assessment has adopted a more stringent toxicity value than in the NEPM. This is a conservative approach, with the adopted value (derived by MfE (2011)) approximately 4 times more stringent than the NEPM value on which the HILs are based.

Exposure parameters: recreational users

- The exposure parameters are developed assuming direct contact with bare soil. The presence of topsoil cover (grass and/or tanbark) across the site will reduce exposure and associated health risk relative to that assumed in this assessment. Additionally, the soils with the highest concentrations are currently located at depth (>0.2 m bgl) within the former rifle range and current Wattie Watson Oval area.
- The assumption that park/open space users will regularly frequent the site (7 days/week year round) for 35 years is conservative. It is considered more likely that receptors may regularly visit the park during some periods but will also not visit the park and/or only be present for short periods during other periods of their life, such that average exposure will be much less than that assumed in this assessment.
- **Dermal absorption:** The Exposure Factors Handbook (enHealth 2012) provides various adherence factors for different activities and age brackets and recommends that a value suitable to the site-specific scenario is selected. The open space soil adherence factor adopted in the HHRA (0.5 mg/cm2) is the default NEPM value and is experimentally derived and based on the amount of dirt that accumulates on adhesive tape placed on children's hands during play. This default value is considered likely to be conservative for the site. By way of comparison, the Exposure Factors Handbook also documents soil adherence value for children in day-care of 0.04 mg/cm2 (50th percentile) and 0.3 mg/cm2 (95th percentile), this range in soil adherence is 2 to 10 times lower than the adopted value.

Exposure parameters: construction workers

- The assessment assumes that workers will be exposed to the reported chemical concentrations for the 8-hour duration of their working day for an entire year. It is more likely that any exposure will be limited to a short period of excavation works and likely not for the full day over an extended period.
- As previously discussed, this assessment will be conservative for other workers potentially associated with the site (e.g. gardeners, intrusive workers) for whom exposures will be less frequent.

Given the areas of conservatism detailed above, a high degree of confidence is retained in the conclusion that risks to sensitive site users across the broader site (excluding soils at depth within the former rifle range and current Wattie Watson Oval area) are low and acceptable. It is also concluded that risks to workers construction workers and other workers (e.g. intrusive workers and gardeners) across the whole site (including soils at depth within the former rifle range and current Wattie Watson Oval area) are low and acceptable.

9. Conclusions

On the basis of the available data and the assumptions presented in this HHRA, the following conclusions and recommendations are provided:

- Elevated B(a)P TEQ concentrations (up to a maximum of 410 mg/kg) were measured across the site, with the highest concentrations observed at depth (>0.2 m bgl) within the former rifle range and current Wattie Watson Oval, designated here as the “Soil Management Area”. Although impacts are found across the site, the highest concentrations are limited to the Soil Management Area and are not present at the ground surface.
- There is the potential for unacceptable risks to recreational users of the site if they are exposed to soils at depth within the Soil Management Area. While exposure by these users is unlikely to occur in this area given the soils are located at depth (>0.2 m bgl), it is recommended that future exposure to soils in this area be managed with the preparation of a Soil Contamination Management Plan (SCMP) to ensure access to exposed soils by recreational users is limited.
- Health risks to recreational users of the site area (including sensitive users such as children) are assessed to be low and acceptable given the risk assessment of shallow soils (<0.2 m bgl).
- Health risks to construction workers during the development of the site are estimated to be low and acceptable, even when an individual receptor spends an extended period of time (8 hours/day, 5 days/week, for a full year) directly exposed to site soils, including deep soils (<0.2 m bgl) within the Management Area.
- Health risks to other receptors who may be exposed to soil contamination at the site (e.g. gardeners, intrusive maintenance workers) are also considered to be low and acceptable, as exposure frequency for these receptors is expected to be lower than the assessed construction worker receptors.

10. Recommendations

There is the potential for unacceptable risks to recreational users of the site if they are exposed to deeper soils within the Soil Management Area. While exposure by these users is unlikely to occur as the affected soils are deeper than 0.2 m bgl, it is recommended that potential exposure to soils in this area by recreational users be managed as a precautionary measure. Excavations within the Soil Management Area should be avoided where possible to minimise exhumation of deeper impacted soils.

A SCMP be prepared to document the nature and extent of soil impacts across the site and outline control measures to manage excavated soils and minimise exposure to site users during proposed infrastructure upgrade works, primarily focusing on the designated Soil Management Area. The SCMP should include, but not limited to:

- Specific responsibilities and obligations of relevant parties in administering the SCMP.
- Information on the nature and extent of the benzo(a)pyrene impacted soils, plus disclosure of site-specific HHRA.
- Management and monitoring requirements for maintaining the existing grass cover and 200mm cover of shallower fill soils that pose a low and acceptable risk to the site users.
- Management requirements that general handling of excavated soils, including use of PPE, dust suppression, stockpile management, and personal hygiene requirements.
- Management of unexpected contamination, including odorous soil or asbestos debris.
- Waste management requirements for surplus soils with consideration to the separate In-situ Soil Hazard Assessment report prepared for the site (Senversa, 2021). This includes segregation of fill soils from natural soils to minimise off-site disposal costs and optimise reuse potential.

Proposed upgrade works within the designated Soil Management Area should look to raise site levels, so a more permanent cover system can be achieved that requires less ongoing maintenance (i.e. 0.5m cover system of hard standing surface). Soil excavated from depth (>0.2m) within the designated Soil Management Area are not considered suitable for reuse within the site, unless reused beneath permanent hardstanding surfaces or 0.5m of clean fill soils with a demarcation layer.

While risks associated with soils (>0.2m depth) outside the Soil Management Area are assessed to be low and acceptable, it is recommended that if these soils are excavated and reused a suitable topsoil planting medium (e.g. 200mm) and grass be established over these soils. The reused soils should also be free of odours and inert waste.

If you have any comments or questions, please do not hesitate to contact the undersigned at katierichardson@senversa.com.au or via mobile on 0403 993 727.

Yours sincerely,

KRichardson

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Senior Environmental Geologist

Katie Richardson
National Risk Assessment Practice Leader

Enclosures: Table 1: Analytical Results
Figure 1: Site Layout and Sample Locations
Figure 2: Benzo(a)pyrene TEQ Historical and Recent Results
Figure 3: Benzo(a)pyrene TEQ
Attachment A: Toxicological Profile for PAHs
Attachment B: Exposure Equations and Parameter Assumptions
Attachment C: Risk Assessment Models
Attachment D: 95% UCL Statistics
Attachment E: Laboratory Reports

Limitations

Senversa has prepared this document for use only by its client for the specific purpose described in its proposal, which is subject to limitations. Matters of possible interest to third parties may not have been specifically addressed for the purposes of preparing this document and Senversa's use of professional judgement for the purposes of the work means that matters may have existed that would have been assessed differently on behalf of third parties.

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.

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.

Table 1: Analytical Results

Table 1 - Soil Analytical Results
Human Health Risk Assessment
Elwood Foreshore (Stage 1 and Stage 2), Elwood, Victoria
City of Port Phillip
M18310

				Report	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**
				Location Code	**BH01**	**BH02**		**BH03**		**BH04**	**BH05**			**BH06**				**BH07**		**BH08**		**BH09**	
				Field ID	BH1/0.1	BH2/0.1	BH2/0.5	BH3/0.1	BH3/0.5	BH4/0.1	BH5/0.1	BH5/0.5	BH5/1.0	BH6/0.1	DUP-140720B	SPLIT140720B	BH6/0.5	BH7/0.1	BH7/0.5	BH8/0.1	BH8/0.5	BH9/0.1	BH9/0.5
				Date	14/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020	14/07/2020	15/07/2020	15/07/2020	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020
				Depth	0.1	0.1	0.5	0.1	0.5	0.1	0.1	0.5	1	0.1	0.1	0.1	0.5	0.1	0.5	0.1	0.5	0.1	0.5
				Fill/Natural	Natural	Fill	Natural	Fill	Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Natural	Fill	Fill	Fill	Fill
				Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Field_D	Interlab_D	Normal	Normal	Normal	Normal	Normal	Normal	Normal
				Lab Report No.	732366	732366	733886	732366	733886	732366	732366	733886	734380	732366	732366	EM2012544	733886	732366	733886	732366	733886	732366	733886
	Unit	EQL	**NEPM 2013 Table 1A(1) HILs Rec C Soil**	NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil																			
PAHs																							
Acenaphthene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3	<0.5	<0.5	<0.5	0.6	<0.5	0.8	<0.5	<0.5	2.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.1			<0.5	0.6	<0.5	0.6	<0.5	<0.5	0.6	7.5	0.6	1.6	2.4	2.3	<0.5	4.5	<0.5	1.3	4.4	0.8	<0.5
2-Chloronaphthalene	mg/kg	0.1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1			<0.5	1	<0.5	1	<0.5	0.6	0.9	8.4	0.7	1.8	1.7	2.5	0.7	6	<0.5	1.7	3.9	1.1	0.7
Benzo(b)fluoranthene	mg/kg	0.1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoranthene	mg/kg	0.5			<0.5	0.8	<0.5	0.7	<0.5	<0.5	0.7	6.1	0.6	1.3	1.1	2.8	0.6	4.6	<0.5	1.3	2.9	0.7	<0.5
Benzo(g,h,i)perylene	mg/kg	0.1			<0.5	<0.5	<0.5	0.6	<0.5	<0.5	0.5	5	<0.5	1	<0.5	1.6	0.6	2.6	<0.5	0.8	2.7	0.6	<0.5
Benzo(b+j+k)fluoranthene	mg/kg	0.2			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1			<0.5	0.8	<0.5	1	<0.5	0.5	0.9	6.4	0.7	1.8	1.8	0.8	0.6	5.8	<0.5	1.6	3.9	0.9	0.6
Chrysene	mg/kg	0.1			<0.5	0.9	<0.5	0.9	<0.5	<0.5	0.8	6.8	0.7	1.8	2.5	1.9	0.6	4.8	<0.5	1.5	4.6	1	0.5
Dibenz(a,h)anthracene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.9	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	0.8	<0.5	<0.5
Fluoranthene	mg/kg	0.1			0.9	1.6	<0.5	0.9	0.6	0.9	1.2	16	1.7	2.6	3.1	4.6	0.8	10	<0.5	2.7	9.4	1.9	0.9
Fluorene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1			<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	4.5	<0.5	0.9	<0.5	1.3	<0.5	2.5	<0.5	0.7	2.5	<0.5	<0.5
Naphthalene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	13	0.8	1.9	0.7	2	<0.5	2.9	<0.5	0.6	8.5	<0.5	<0.5
Pyrene	mg/kg	0.1			1	1.8	0.5	1	0.6	1	1.5	16	1.8	2.7	2.8	4.5	0.9	11	<0.5	3.2	9.9	2.1	1
Benzo(a)pyrene TEQ (Zero)	mg/kg	0.1	**3**[#1]	40[#1]	<0.5	1.2	<0.5	1.3	<0.5	0.7	1.1	**13**	0.9	2.4	2.3	**3.2**	0.8	**8.7**	<0.5	2.2	**6.1**	1.4	0.8
Sum of Polycyclic aromatic hydrocarbons (PAH)	mg/kg	0.1	**300**[#2]	4,000[#2]	1.9	7.5	0.5	7.3	1.2	3	7.1	96.8	7.6	17.4	16.1	24.9	4.8	56.4	<0.5	15.4	56	9.1	3.7

Table 1 - Soil Analytical Results

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M18310

				Report	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**
				Location Code	**BH10**	**BH11**	**BH12**	**BH13**	**BH14**	**BH15**	**BH16**	**BH17**	**BH18**		**BH19**			**BH20**	**BH21**	**BH22**		**BH23**	**BH24**
				Field ID	BH10/0.1	BH11/0.1	BH12/0.1	BH13/0.1	BH14/0.1	BH15/0.1	BH16/0.1	BH17/0.1	BH18/0.1	BH18/0.5	BH19/0.1	BH19/0.5	BH19/1.0	BH20/0.1	BH21/0.1	BH22/0.1	BH22/0.5	BH23/0.1	BH24/0.1
				Date	14/07/2020	14/07/2020	15/07/2020	14/07/2020	14/07/2020	14/07/2020	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	15/07/2020	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	14/07/2020
				Depth	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.1	0.5	1	0.1	0.1	0.1	0.5	0.1	0.1
				Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
				Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
				Lab Report No.	732366	732366	733886	732366	732366	732366	732366	732366	732366	733886	732366	733886	734380	732366	732366	732366	733886	732366	732366
	Unit	EQL	**NEPM 2013 Table 1A(1) HILs Rec C Soil**	NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil																			
PAHs																							
Acenaphthene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.1			<0.5	0.6	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	0.8	<0.5	0.6	4	1.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-Chloronaphthalene	mg/kg	0.1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1			<0.5	0.7	0.7	<0.5	<0.5	<0.5	0.9	0.5	1.4	<0.5	0.8	5.8	2.7	<0.5	<0.5	0.8	<0.5	0.5	0.6
Benzo(b)fluoranthene	mg/kg	0.1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	1	<0.5	0.6	3.8	1.8	<0.5	<0.5	0.8	<0.5	<0.5	<0.5
Benzo(g,h,i)perylene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	0.6	4	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j+k)fluoranthene	mg/kg	0.2			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1			<0.5	0.6	0.7	<0.5	<0.5	<0.5	0.7	<0.5	1.3	<0.5	0.8	4.2	2.4	<0.5	<0.5	0.8	<0.5	<0.5	<0.5
Chrysene	mg/kg	0.1			<0.5	0.6	<0.5	<0.5	<0.5	<0.5	0.7	0.5	1.1	<0.5	0.7	5	1.9	<0.5	<0.5	0.6	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.1			0.9	1.4	0.7	<0.5	<0.5	<0.5	1.3	1.1	1	<0.5	0.9	13	3.6	<0.5	<0.5	1.3	0.5	<0.5	1
Fluorene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	0.5	2.9	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.8	1.6	<0.5	<0.5	<0.5	<0.5	<0.5	0.8
Pyrene	mg/kg	0.1			1	1.6	0.8	<0.5	<0.5	<0.5	1.5	1.3	1.3	<0.5	1	9	3.9	<0.5	<0.5	1.4	0.6	0.5	1.1
Benzo(a)pyrene TEQ (Zero)	mg/kg	0.1	**3**$^{\#1}$	40$^{\#1}$	<0.5	0.8	0.8	<0.5	<0.5	<0.5	1.1	0.5	1.8	<0.5	1.1	**7.4**	**3.9**	<0.5	<0.5	1	<0.5	0.5	0.6
Sum of Polycyclic aromatic hydrocarbons (PAH)	mg/kg	0.1	**300**$^{\#2}$	4,000$^{\#2}$	1.9	5.5	2.9	<0.5	<0.5	<0.5	6.3	3.4	9.5	<0.5	6.5	55.5	22.8	<0.5	<0.5	5.7	1.1	1	3.5

Table 1 - Soil Analytical Results

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M18310

				Report	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**
				Location Code	**BH25**		**BH26**				**BH27**	**BH28**		**BH29**			**BH30**	**BH31**	**BH32**	**BH33**			**BH34**
				Field ID	BH25/0.1	BH25/0.5	BH26/0.1	DUP-140720C	SPLIT140720C	BH26/0.5	BH27/0.1	BH28/0.1	BH28/0.5	BH29/0.1	BH29/0.5	BH29/1.0	BH30/0.1	BH31/0.1	BH32/0.1	BH33/0.1	DUP-140720D	BH33/0.5	BH34/0.1
				Date	14/07/2020	15/07/2020	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020	15/07/2020	15/07/2020	14/07/2020	14/07/2020	14/07/2020	14/07/2020	14/07/2020	15/07/2020	14/07/2020
				Depth	0.1	0.5	0.1	0.1	0.1	0.5	0.1	0.1	0.5	0.1	0.5	1	0.1	0.1	0.1	0.1	0.1	0.5	0.1
				Fill/Natural	Fill	Fill	Fill	Fill	Fill	Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
				Sample Type	Normal	Normal	Normal	Field_D	Interlab_D	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Field_D	Normal	Normal
				Lab Report No.	732366	733886	732366	732366	EM2012544	733886	732366	732366	733886	732366	733886	733886	732366	732366	732366	732366	732366	733886	732366
	Unit	EQL	**NEPM 2013 Table 1A(1) HILs Rec C Soil**	NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil																			
PAHs																							
Acenaphthene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	3.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.1			1	1	<0.5	<0.5	<0.5	<0.5	<0.5	4.7	<0.5	15	0.5	1.4	<0.5	<0.5	<0.5	0.9	1.1	<0.5	<0.5
2-Chloronaphthalene	mg/kg	0.1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1			<0.5	1.5	<0.5	<0.5	<0.5	<0.5	<0.5	5.8	0.9	16	0.8	1.9	<0.5	<0.5	<0.5	0.8	1.2	<0.5	<0.5
Benzo(b)fluoranthene	mg/kg	0.1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoranthene	mg/kg	0.5			<0.5	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	4	0.6	10	0.6	1.2	<0.5	<0.5	0.5	0.9	1.1	<0.5	<0.5
Benzo(g,h,i)perylene	mg/kg	0.1			<0.5	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	3.2	0.7	8.6	0.6	1.2	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5
Benzo(b+j+k)fluoranthene	mg/kg	0.2			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1			0.6	1.3	<0.5	<0.5	<0.5	<0.5	<0.5	4.5	0.8	13	0.8	1.7	<0.5	<0.5	<0.5	1	1	<0.5	<0.5
Chrysene	mg/kg	0.1			1.2	1	<0.5	<0.5	<0.5	<0.5	<0.5	6.2	0.6	13	0.7	1.5	<0.5	<0.5	<0.5	1	1.5	<0.5	<0.5
Dibenz(a,h)anthracene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	1.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.1			1.2	1.9	<0.5	<0.5	<0.5	<0.5	<0.5	6.8	0.9	24	0.9	2.5	<0.5	<0.5	0.9	1.3	1.9	<0.5	<0.5
Fluorene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1			<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	2.5	0.5	7.1	<0.5	1	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5
Naphthalene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	mg/kg	0.1			<0.5	1.1	<0.5	<0.5	<0.5	<0.5	<0.5	2	<0.5	8.9	<0.5	1.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5
Pyrene	mg/kg	0.1			1.1	2.1	<0.5	<0.5	<0.5	<0.5	<0.5	7.8	1	26	1	2.8	<0.5	<0.5	0.9	1.2	2	<0.5	<0.5
Benzo(a)pyrene TEQ (Zero)	mg/kg	0.1	**3**[#1]	40[#1]	<0.5	1.9	<0.5	<0.5	<0.5	<0.5	<0.5	**8.4**	1.1	**22**	1	2.5	<0.5	<0.5	<0.5	1.1	1.6	<0.5	<0.5
Sum of Polycyclic aromatic hydrocarbons (PAH)	mg/kg	0.1	**300**[#2]	4,000[#2]	5.1	12.5	<0.5	<0.5	<0.5	<0.5	<0.5	48.9	6	147.4	5.9	16.7	<0.5	<0.5	2.3	7.1	11.9	<0.5	<0.5

Table 1 - Soil Analytical Results
Human Health Risk Assessment
Elwood Foreshore (Stage 1 and Stage 2), Elwood, Victoria
City of Port Phillip
M18310

senversa

Report					**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Atma, 2020**	**Greencap, 2020**	**Greencap, 2020**	**Greencap, 2020**	**Greencap, 2020**	**Greencap, 2020**	**Greencap, 2020**
Location Code					**BH35**	**BH36**	**BH37**	**MW03**		**T1**	**T2**		**BH01**		**BH02**	**BH03**	**BH04**	**BH05**
Field ID					BH35/0.1	BH36/0.1	BH37/0.1	MW03/0.1	MW03/0.5	T1/0.1	T2/0.1	T2/0.5	BH01_0.1	BH01_1.0	BH02_0.1	BH03_0.1	BH04_0.1	BH05_0.1
Date					14/07/2020	14/07/2020	14/07/2020	15/07/2020	15/07/2020	14/07/2020	14/07/2020	15/07/2020	18/09/2020	18/09/2020	18/09/2020	18/09/2020	18/09/2020	18/09/2020
Depth					0.1	0.1	0.1	0.1	0.5	0.1	0.1	0.5	0.1	1	0.1	0.1	0.1	0.1
Fill/Natural					Fill	Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
Sample Type					Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Lab Report No.					732366	732366	732366	732271	732271	732366	732366	733886	745197	745197	746860	745197	746860	746860
	Unit	EQL	**NEPM 2013 Table 1A(1) HILs Rec C Soil**	NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil														
PAHs																		
Acenaphthene	mg/kg	0.1			<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	11	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.1			<0.5	<0.5	<0.5	4.2	<0.5	<0.5	<0.5	6.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	mg/kg	0.1			<0.5	<0.5	<0.5	11	<0.5	<0.5	<0.5	56	<0.5	<0.5	0.7	<0.5	<0.5	0.5
Benz(a)anthracene	mg/kg	0.1			<0.5	<0.5	<0.5	33	0.8	<0.5	<0.5	99	<0.5	<0.5	2	<0.5	<0.5	1.2
2-Chloronaphthalene	mg/kg	0.1			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1			<0.5	<0.5	<0.5	34	1	<0.5	<0.5	99	<0.5	<0.5	2.2	<0.5	<0.5	1.6
Benzo(b)fluoranthene	mg/kg	0.1			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoranthene	mg/kg	0.5			<0.5	<0.5	<0.5	26	0.7	<0.5	<0.5	68	<0.5	<0.5	1.8	<0.5	<0.5	1.1
Benzo(g,h,i)perylene	mg/kg	0.1			<0.5	<0.5	<0.5	19	0.5	<0.5	<0.5	57	<0.5	<0.5	1	<0.5	<0.5	1.2
Benzo(b+j+k)fluoranthene	mg/kg	0.2			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1			<0.5	<0.5	<0.5	29	0.9	<0.5	<0.5	74	<0.5	<0.5	1.7	<0.5	<0.5	1
Chrysene	mg/kg	0.1			<0.5	<0.5	<0.5	28	1	<0.5	<0.5	87	<0.5	<0.5	2.1	<0.5	<0.5	1.4
Dibenz(a,h)anthracene	mg/kg	0.1			<0.5	<0.5	<0.5	4.2	<0.5	<0.5	<0.5	21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.1			<0.5	<0.5	<0.5	60	2	<0.5	<0.5	230	<0.5	<0.5	5.8	<0.5	<0.5	3.3
Fluorene	mg/kg	0.1			<0.5	<0.5	<0.5	2.9	<0.5	<0.5	<0.5	9.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1			<0.5	<0.5	<0.5	16	<0.5	<0.5	<0.5	53	<0.5	<0.5	0.9	<0.5	<0.5	0.8
Naphthalene	mg/kg	0.1			<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	3.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	mg/kg	0.1			<0.5	<0.5	<0.5	42	<0.5	<0.5	<0.5	210	<0.5	<0.5	2.8	<0.5	<0.5	1.8
Pyrene	mg/kg	0.1			<0.5	<0.5	<0.5	62	2.2	<0.5	<0.5	240	<0.5	<0.5	5.2	<0.5	0.5	3.1
Benzo(a)pyrene TEQ (Zero)	mg/kg	0.1	**3**[#1]	40[#1]	<0.5	<0.5	<0.5	**49**	1.3	<0.5	<0.5	**150**	<0.5	<0.5	2.9	<0.5	<0.5	2
Sum of Polycyclic aromatic hydrocarbons (PAH)	mg/kg	0.1	**300**[#2]	4,000[#2]	<0.5	<0.5	<0.5	**372.6**	9.1	<0.5	<0.5	**1,323.9**	<0.5	<0.5	26.2	<0.5	0.5	17

Table 1 - Soil Analytical Results

Human Health Risk Assessment
Elwood Foreshore (Stage 1 and Stage 2), Elwood, Victoria
City of Port Phillip
M18310

				Report	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**
				Location Code	**BH01**				**BH02**			**BH03**		**BH04**	**BH05**			**BH06**	
				Field ID	BH01/0-0.05	BH01/0.4-0.5	BH01/0.6-0.7	BH01/1.4-1.5	BH02/0.15-0.25	BH02/0.9-1.0	BH02/1.4-1.5	BH03/0-0.05	BH03/0.6-0.7	BH04/0.15-0.25	BH05/0-0.05	BH05/0.15-0.25	BH05/0.4-0.5	BH06/0.15-0.25	BH06/0.4-0.5
				Date	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020
				Depth	0 - 0.05	0.4 - 0.5	0.6 - 0.7	1.4 - 1.5	0.15 - 0.25	0.9 - 1	1.4 - 1.5	0 - 0.05	0.6 - 0.7	0.15 - 0.25	0 - 0.05	0.15 - 0.25	0.4 - 0.5	0.15 - 0.25	0.4 - 0.5
				Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
				Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
				Lab Report No.	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358
	Unit	EQL	**NEPM 2013 Table 1A(1) HILs Rec C Soil**	NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil															
PAHs																			
Acenaphthene	mg/kg	0.1			<0.1	<0.3	<0.6	2.6	<0.6	<0.1	<0.1	<0.1	<2	<0.2	<0.1	<0.1	<0.6	<0.1	<0.3
Acenaphthylene	mg/kg	0.1			<0.1	0.5	<0.6	24	0.8	<0.1	<0.1	0.2	<2	0.5	<0.1	<0.1	0.6	0.2	2.2
Anthracene	mg/kg	0.1			<0.1	0.8	0.8	57	1.2	0.2	<0.1	0.3	2.3	0.9	<0.1	<0.1	2	0.3	2.9
Benz(a)anthracene	mg/kg	0.1			0.1	3.4	2.9	130	6.2	0.8	<0.1	1.6	21	4.5	0.3	0.4	5.2	1.7	16
2-Chloronaphthalene	mg/kg	0.1			-	-	-	<0.6	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1			0.2	4.4	5.4	130	14	1.5	<0.1	2.3	37	6	0.5	0.6	8.7	2.2	20
Benzo(b)fluoranthene	mg/kg	0.1			0.2	3.9	4.1	100	11	1.2	<0.1	2.4	36	5.3	0.4	0.5	6.5	1.9	18
Benzo(b+j)fluoranthene	mg/kg	0.5			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	0.1			0.2	4.2	4.1	74	10	1	<0.1	2	31	5.2	0.4	0.5	4.7	1.8	16
Benzo(b+j+k)fluoranthene	mg/kg	0.2			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1			0.1	3.4	4.1	98	11	1.2	<0.1	1.4	26	4.2	0.4	0.4	6.2	1.5	14
Chrysene	mg/kg	0.1			0.1	3.5	4.2	120	11	1.2	<0.1	1.8	24	4.8	0.4	0.5	7.4	1.8	17
Dibenz(a,h)anthracene	mg/kg	0.1			<0.1	0.9	<0.6	16	2.1	0.2	<0.1	0.5	7.6	1.2	<0.1	0.1	1.1	0.5	3.9
Fluoranthene	mg/kg	0.1			0.2	5.9	6.7	360	18	2.3	<0.1	3	28	9	0.6	0.7	15	3	30
Fluorene	mg/kg	0.1			<0.1	<0.3	<0.6	12	<0.6	<0.1	<0.1	<0.1	<2	<0.2	<0.1	<0.1	<0.6	<0.1	0.6
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1			0.2	3.9	3.4	84	8.6	0.8	<0.1	2	32	5.2	0.4	0.5	4.5	1.9	16
Naphthalene	mg/kg	0.1			<0.1	<0.3	<0.6	5.5	<0.6	<0.1	<0.1	<0.1	<2	<0.2	<0.1	<0.1	<0.6	<0.1	0.3
Phenanthrene	mg/kg	0.1			<0.1	2.3	2.6	310	6.6	1.2	<0.1	1	4.7	3.4	0.2	0.2	9.6	0.9	13
Pyrene	mg/kg	0.1			0.3	6	6.9	310	18	2.2	<0.1	3.1	32	9	0.6	0.8	15	3.1	31
Benzo(a)pyrene TEQ (Zero)	mg/kg	0.1	**$3^{\#1}$**	$40^{\#1}$	0.3	**6.8**	**6.9**	**190**	**20**	2.1	<0.1	**3.6**	**57**	**9.2**	0.7	0.9	**12**	**3.4**	**31**
Sum of Polycyclic aromatic hydrocarbons (PAH)	mg/kg	0.1	**$300^{\#2}$**	$4,000^{\#2}$	1.6	43	45	**1,800**	120	14	<0.1	22	280	59	4.2	5.2	86	21	200

Table 1 - Soil Analytical Results

Human Health Risk Assessment
Elwood Foreshore (Stage 1 and Stage 2), Elwood, Victoria
City of Port Phillip
M18310

Report					**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**
Location Code					**BH07**	**BH08**		**BH09**		**BH10**	**BH11**	**BH12**		**BH13**		**BH14**		**BH15**
Field ID					BH07/0.4-0.5	BH08/0-0.05	BH08/0.6-0.7	BH09/0-0.05	BH09/0.6-0.7	BH10/0.15-0.25	BH11/0.4-0.5	BH12/0.15-0.25	BH12/0.4-0.5	BH13/0-0.05	BH13/0.6-0.7	BH14/0-0.05	BH14/0.4-0.5	BH15/0.15-0.25
Date					24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020
Depth					0.4 - 0.5	0 - 0.05	0.6 - 0.7	0 - 0.05	0.6 - 0.7	0.15 - 0.25	0.4 - 0.5	0.15 - 0.25	0.4 - 0.5	0 - 0.05	0.6 - 0.7	0 - 0.05	0.4 - 0.5	0.15 - 0.25
Fill/Natural					Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
Sample Type					Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Lab Report No.					20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358
	Unit	EQL	**NEPM 2013 Table 1A(1) HILs Rec C Soil**	NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil														
PAHs																		
Acenaphthene	mg/kg	0.1			<0.6	<0.2	<0.6	<0.2	<0.2	<0.2	<0.6	<0.6	<0.6	<0.1	<0.6	<0.2	<0.6	<0.1
Acenaphthylene	mg/kg	0.1			1.6	0.3	1.5	0.3	0.8	0.3	1.3	<0.6	1.4	<0.1	0.7	<0.2	2	0.1
Anthracene	mg/kg	0.1			2.4	0.5	2.1	0.4	1.1	0.4	2.1	1.4	1.7	0.1	0.9	0.7	3.1	0.2
Benz(a)anthracene	mg/kg	0.1			13	3	10	2.3	6.3	2.2	11	5.3	8.2	0.5	5	1.5	17	1
2-Chloronaphthalene	mg/kg	0.1			-	<0.2	-	-	-	<0.2	-	-	-	-	<0.6	-	-	-
Benzo(a)pyrene	mg/kg	0.1			27	4.2	24	3.2	8.6	3.1	24	11	19	1.1	8.2	2.3	36	2.2
Benzo(b)fluoranthene	mg/kg	0.1			21	3.5	19	2.8	8.8	2.6	18	8.1	15	0.8	7.3	1.6	27	1.7
Benzo(b+j)fluoranthene	mg/kg	0.5			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	0.1			22	3.6	16	2.8	7.2	2.6	14	6.8	17	0.8	7.6	1.5	25	1.6
Benzo(b+j+k)fluoranthene	mg/kg	0.2			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1			21	3	19	2.6	4.9	2.5	18	8	15	0.9	6.4	1.4	27	1.7
Chrysene	mg/kg	0.1			21	3.2	19	2.5	7.1	2.5	18	8.7	15	0.9	7.1	1.8	25	1.7
Dibenz(a,h)anthracene	mg/kg	0.1			4.1	0.7	3.3	0.7	1.7	0.6	3.5	1.3	2.8	0.2	1.1	0.2	4.9	0.3
Fluoranthene	mg/kg	0.1			35	5.5	30	3.9	12	4.1	30	15	23	1.4	11	4.3	43	2.5
Fluorene	mg/kg	0.1			0.7	<0.2	<0.6	<0.2	0.2	<0.2	<0.6	<0.6	<0.6	<0.1	<0.6	<0.2	0.7	<0.1
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1			16	3.5	15	2.8	7.2	2.6	14	6.3	12	0.6	7.6	1.6	21	1.4
Naphthalene	mg/kg	0.1			<0.6	<0.2	<0.6	<0.2	<0.2	<0.2	<0.6	<0.6	<0.6	<0.1	<0.5	<0.2	<0.6	<0.1
Phenanthrene	mg/kg	0.1			13	1.9	11	1.1	4.5	1.4	11	7.6	8.2	0.5	3.9	2.9	15	0.8
Pyrene	mg/kg	0.1			36	5.8	31	4.3	13	4.3	31	16	24	1.6	12	3.9	45	2.7
Benzo(a)pyrene TEQ (Zero)	mg/kg	0.1	**$3^{\#1}$**	$40^{\#1}$	**39**	**6.3**	**34**	**5**	**13**	**4.7**	**34**	**15**	**27**	1.6	**12**	**3.1**	**51**	**3.1**
Sum of Polycyclic aromatic hydrocarbons (PAH)	mg/kg	0.1	**$300^{\#2}$**	$4,000^{\#2}$	230	39	200	30	83	29	200	96	160	9.4	79	24	290	18

Table 1 - Soil Analytical Results

Human Health Risk Assessment
Elwood Foreshore (Stage 1 and Stage 2), Elwood, Victoria
City of Port Phillip
M18310

				Report	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**
				Location Code	**BH16**		**BH17**		**BH18**			**BH19**		**BH20**	**BH21**	**BH22**	**BH23**		**BH24**
				Field ID	BH16/0.15-0.25	BH16/0.4-0.5	BH17/0.4-0.5	BH17/0.6-0.7	BH18/0.0-0.05	BH18/0.4-0.5	BH18/0.6-0.7	BH19/0.0-0.05	BH19/0.6-0.7	BH20/0.15-0.25	BH21/0.15-0.25	BH22/0.4-0.5	BH23/0.0-0.05	BH23/0.6-0.7	BH24/0.4-0.5
				Date	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020	24/08/2020
				Depth	0.15 - 0.25	0.4 - 0.5	0.4 - 0.5	0.6 - 0.7	0 - 0.05	0.4 - 0.5	0.6 - 0.7	0 - 0.05	0.6 - 0.7	0.15 - 0.25	0.15 - 0.25	0.4 - 0.5	0 - 0.05	0.6 - 0.7	0.4 - 0.5
				Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
				Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
				Lab Report No.	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358	20-40358
	Unit	EQL	**NEPM 2013 Table 1A(1) HILs Rec C Soil**	NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil															
PAHs																			
Acenaphthene	mg/kg	0.1			<0.3	<0.6	<0.6	<0.6	<0.7	<0.5	<0.6	<0.1	<0.6	<0.3	<0.6	<0.6	<0.7	<0.6	<0.6
Acenaphthylene	mg/kg	0.1			0.3	1.4	<0.6	0.6	<0.7	0.8	1.3	<0.1	0.8	<0.3	<0.6	1.7	<0.7	1.1	0.9
Anthracene	mg/kg	0.1			0.5	2	2.9	0.7	0.8	1	3.4	<0.1	1.1	<0.3	0.7	2.6	<0.7	2.1	1.4
Benz(a)anthracene	mg/kg	0.1			2.7	12	9.4	3.7	4.4	9.1	26	0.5	5.9	1.2	3.7	13	2.5	13	6.6
2-Chloronaphthalene	mg/kg	0.1			-	-	-	<0.6	-	<0.5	-	-	-	-	<0.6	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1			6.2	21	18	6.2	9.9	16	43	0.7	12	2.9	6.1	23	5.8	24	11
Benzo(b)fluoranthene	mg/kg	0.1			4.9	15	13	5.2	7.5	11	28	0.6	9.3	2.3	5	17	4.6	17	8.3
Benzo(b+j)fluoranthene	mg/kg	0.5			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	0.1			4.7	15	10	5.1	6	11	27	0.7	7	2	4.8	16	3.8	19	8.3
Benzo(b+j+k)fluoranthene	mg/kg	0.2			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1			4.9	13	13	4.5	7.6	9.8	26	0.6	9.1	2.3	4.4	15	4.5	16	7.3
Chrysene	mg/kg	0.1			4.8	16	14	5.3	7.7	11	27	0.7	10	2.2	5.1	17	4.6	16	9
Dibenz(a,h)anthracene	mg/kg	0.1			0.9	2.3	2.5	0.7	1.5	1.9	4.9	0.1	1.7	0.4	0.7	2.8	0.8	2.8	1.1
Fluoranthene	mg/kg	0.1			7.3	24	27	8	12	14	38	0.9	17	3.2	7	27	6.5	21	14
Fluorene	mg/kg	0.1			<0.3	<0.6	<0.6	<0.6	<0.7	<0.5	<0.6	<0.1	<0.6	<0.3	<0.6	<0.6	<0.7	<0.6	<0.6
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1			3.7	16	9.3	5.1	5.8	12	30	0.7	6.6	1.7	5	17	3.6	19	8.8
Naphthalene	mg/kg	0.1			<0.3	<0.6	<0.6	<0.5	<0.7	<0.5	<0.6	<0.1	<0.6	<0.3	<0.5	<0.6	<0.7	<0.6	<0.6
Phenanthrene	mg/kg	0.1			2.4	8	13	2.8	4.3	3.3	9.4	0.3	6.3	1.2	2.3	9	2	5.9	5.2
Pyrene	mg/kg	0.1			7.8	26	25	8.4	12	15	44	1	18	3.5	7.5	28	7.2	23	15
Benzo(a)pyrene TEQ (Zero)	mg/kg	0.1	**3**$^{\#1}$	40$^{\#1}$	**8.8**	**29**	**25**	**8.9**	**14**	**22**	**59**	1.1	**17**	**4.1**	**8.7**	**32**	**8.2**	**34**	**15**
Sum of Polycyclic aromatic hydrocarbons (PAH)	mg/kg	0.1	**300**$^{\#2}$	4,000$^{\#2}$	51	170	160	56	80	120	**310**	6.8	100	23	52	190	46	180	97

Table 1 - Soil Analytical Results

Human Health Risk Assessment
Elwood Foreshore (Stage 1 and Stage 2), Elwood, Victoria
City of Port Phillip
M18310

				Report	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Landserv, 2020**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**
				Location Code	**BH25**			**BH26**	**SB01**	**SB02**			**SB03**		**SB04**		**SB05**		**SB06**
				Field ID	BH25/0.0-0.05	BH25/0.4-0.5	BH25/0.6-0.7	BH26/0.4-0.5	SB01_0.45	SB02_0.4	QC01	QC02	SB03_0.1	SB03_0.4	SB04_0.1	SB04_0.4	SB05_0.1	SB05_0.5	SB06_0.48
				Date	24/08/2020	24/08/2020	24/08/2020	24/08/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020	8/12/2020
				Depth	0 - 0.05	0.4 - 0.5	0.6 - 0.7	0.4 - 0.5	0.45	0.4	0.4	0.4	0.1	0.4	0.1	0.4	0.1	0.5	0.48
				Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
				Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Field_D	Interlab_D	Normal	Normal	Normal	Normal	Normal	Normal	Normal
				Lab Report No.	20-40358	20-40358	20-40358	20-40358	762416	762416	762416	EM2021988	762416	762416	762416	762416	762416	762416	762416
	Unit	EQL	**NEPM 2013 Table 1A(1) HILs Rec C Soil**	NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil															
PAHs																			
Acenaphthene	mg/kg	0.1			<0.7	<0.6	<0.6	<0.7	0.5	0.9	1.4	2.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.1			<0.7	1.5	<0.6	<0.7	4.8	21	12	28.1	<0.5	1.5	<0.5	<0.5	<0.5	<0.5	0.6
Anthracene	mg/kg	0.1			<0.7	2.2	0.7	0.9	8.6	29	20	39.4	<0.5	2.6	1.0	<0.5	0.7	0.9	1.8
Benz(a)anthracene	mg/kg	0.1			2.3	12	4.1	4.5	22	63	53	91.6	<0.5	7.6	5.1	1.7	2.5	5.6	7.3
2-Chloronaphthalene	mg/kg	0.1			<0.7	-	-	<0.7	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1			3.9	20	9.9	7.9	26	62	52	115	<0.5	8.7	6.2	2.1	2.9	9.8	8.3
Benzo(b)fluoranthene	mg/kg	0.1			3.5	14	7.4	6.3	-	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoranthene	mg/kg	0.5			-	-	-	-	17	39	34	116	<0.5	6.0	4.7	1.7	1.9	8.1	6.2
Benzo(g,h,i)perylene	mg/kg	0.1			3.5	15	6.3	6.2	18	37	22	68.7	<0.5	5.6	4.5	1.1	2.0	2.3	5.4
Benzo(b+j+k)fluoranthene	mg/kg	0.2			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1			3.1	13	7.2	5.5	18	35	42	38.0	<0.5	6.6	5.0	1.5	1.7	8.0	6.2
Chrysene	mg/kg	0.1			3.4	15	7.6	6.1	21	56	55	73.0	<0.5	7.0	5.6	2.2	2.6	5.6	7.7
Dibenz(a,h)anthracene	mg/kg	0.1			<0.7	2.3	1.3	1	3.2	12	7.2	15.1	<0.5	1.2	1.0	<0.5	<0.5	1.1	1.2
Fluoranthene	mg/kg	0.1			4.4	24	11	8.3	35	57	100	194	0.7	13	9.5	3.3	4.5	9.7	12
Fluorene	mg/kg	0.1			<0.7	<0.6	<0.6	<0.7	1.7	4.4	3.0	4.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1			3.6	15	5.7	6.2	18	42	23	54.0	<0.5	6.2	4.5	1.0	2.2	2.8	6.3
Naphthalene	mg/kg	0.1			<0.5	<0.6	<0.6	<0.5	0.8	2.4	2.0	3.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	mg/kg	0.1			1.4	8.3	3.6	2.5	27	67	98	162	<0.5	6.4	3.7	1.1	2.1	4.1	5.8
Pyrene	mg/kg	0.1			4.9	25	12	8.7	36	63	100	176	0.7	15	10	3.5	4.9	11	13
Benzo(a)pyrene TEQ (Zero)	mg/kg	0.1	**$3^{\#1}$**	$40^{\#1}$	**5.2**	**28**	**14**	**11**	**37**	**93**	**75**	**161**	<0.5	**13**	**9.2**	2.7	**3.8**	**13**	**12**
Sum of Polycyclic aromatic hydrocarbons (PAH)	mg/kg	0.1	**$300^{\#2}$**	$4,000^{\#2}$	34	170	77	64	257.6	**590.7**	**624.6**	**1,180**	1.4	87.4	60.8	19.2	28	69	81.8

Table 1 - Soil Analytical Results

Human Health Risk Assessment
Elwood Foreshore (Stage 1 and Stage 2), Elwood, Victoria
City of Port Phillip
M18310

				Report	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**
				Location Code	**SB07**		**SB08**	**SB09**		**SB10**		**SB11**		**SB12**	**SB13**		**SB14**		**SB15**
				Field ID	SB07_0.1-0.2	SB07_0.7-0.8	SB08_0.1-0.2	SB09_0.1-0.2	SB09_0.4-0.5	SB10_0.1-0.2	SB10_0.7-0.8	SB11_0.1-0.2	SB11_0.8-0.9	SB12_0.1-0.2	SB13_0.1-0.2	SB13_0.8_0.9	SB14_0.1-0.2	SB14_0.8-0.9	SB15_0.1-0.2
				Date	12/01/2021	12/01/2021	12/01/2021	8/12/2020	8/12/2020	12/01/2021	12/01/2021	8/12/2020	8/12/2020	8/12/2020	12/01/2021	12/02/2021	12/01/2021	12/02/2021	12/01/2021
				Depth	0.1 - 0.2	0.7 - 0.8	0.1 - 0.2	0.1 - 0.2	0.4 - 0.5	0.1 - 0.2	0.7 - 0.8	0.1 - 0.2	0.8 - 0.9	0.1 - 0.2	0.1 - 0.2	0.8 - 0.9	0.1 - 0.2	0.8 - 0.9	0.1 - 0.2
				Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
				Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
				Lab Report No.	767787	767787	767787	767787	767787	767787	767787	767787	767787	767787	767787	773807	767787	773807	767787
	Unit	EQL	**NEPM 2013 Table 1A(1) HILs Rec C Soil**	NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil															
PAHs																			
Acenaphthene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.9	<0.5	4.9	<0.5
Acenaphthylene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	6.6	<0.5	5.3	<0.5
Anthracene	mg/kg	0.1			0.6	1.0	1.2	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	6.1	<0.5	11	<0.5
Benz(a)anthracene	mg/kg	0.1			7.4	6.3	7.3	0.9	1.0	1.0	5.4	<0.5	3.2	2.1	4.0	68	2.7	120	<0.5
2-Chloronaphthalene	mg/kg	0.1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1			8.1	7.2	9.5	1.8	1.7	2.0	6.3	0.7	5.1	4.8	4.8	72	5.3	120	<0.5
Benzo(b)fluoranthene	mg/kg	0.1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoranthene	mg/kg	0.5			6.8	7.6	9.5	0.9	1.4	1.2	5.2	<0.5	3.3	4.0	4.5	65	3.8	120	<0.5
Benzo(g,h,i)perylene	mg/kg	0.1			5.6	4.9	4.7	0.8	0.8	1.1	2.9	0.5	3.5	2.9	3.0	41	2.7	100	<0.5
Benzo(b+j+k)fluoranthene	mg/kg	0.2			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1			4.8	4.1	7.3	0.9	1.0	1.1	4.1	0.6	4.5	2.9	2.6	61	4.0	100	<0.5
Chrysene	mg/kg	0.1			5.3	5.9	8.0	1.9	1.7	2.5	5.5	0.5	3.7	2.1	3.4	97	3.7	120	<0.5
Dibenz(a,h)anthracene	mg/kg	0.1			2.2	1.3	1.1	<0.5	<0.5	<0.5	0.7	<0.5	0.8	0.9	0.9	14	<0.5	26	<0.5
Fluoranthene	mg/kg	0.1			14	13	11	3.2	3.5	4.4	9.9	0.9	6.2	4.7	6.6	210	4.4	300	<0.5
Fluorene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.9	<0.5	2.3	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1			5.5	4.0	4.3	0.6	<0.5	0.8	3.3	<0.5	2.9	2.4	4.1	57	2.5	78	<0.5
Naphthalene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	4.7	<0.5	3.1	<0.5
Phenanthrene	mg/kg	0.1			3.9	6.1	4.9	0.9	0.8	1.1	3.7	<0.5	2.0	1.8	1.9	61	1.8	62	<0.5
Pyrene	mg/kg	0.1			13	13	12	3.9	3.7	5.1	10	1.0	6.8	5.1	6.8	210	6.0	350	<0.5
Benzo(a)pyrene TEQ (Zero)	mg/kg	0.1	**$3^{\#1}$**	$40^{\#1}$	**13**	**11**	**14**	2.2	2.1	2.4	**8.9**	0.8	**7.4**	**6.9**	**7.3**	**110**	**6.7**	**190**	<0.5
Sum of Polycyclic aromatic hydrocarbons (PAH)	mg/kg	0.1	**$300^{\#2}$**	$4,000^{\#2}$	77.2	74.4	80.8	15.8	15.6	20.3	57.9	4.2	42	33.7	42.6	**980.2**	36.9	**1,522.6**	<0.5

Table 1 - Soil Analytical Results

Human Health Risk Assessment
Elwood Foreshore (Stage 1 and Stage 2), Elwood, Victoria
City of Port Phillip
M18310

				Report	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**
				Location Code	**SB16**				**SB17**	**SB18**		**SB19**		**SB20**			**SB21**	**SB22**
				Field ID	SB16_0.05-0.15	SB16_0.45-0.55	QC03	QC04	SB17_0.05-0.15	SB18_0.1-0.2	SB18_0.4-0.5	SB19_0.1-0.2	SB19_0.35-0.45	SB20_0.1-0.2	SB20_0.5-0.6	SB20_2.4-2.5	SB21_0.1-0.2	SB22_0.1-0.2
				Date	13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021	2/02/2021	2/02/2021	2/02/2021	2/02/2021	5/03/2021	13/01/2021	13/01/2021
				Depth	0.05 - 0.15	0.45 - 0.55	0.45 - 0.55	0.45 - 0.55	0.05 - 0.15	0.1 - 0.2	0.4 - 0.5	0.1 - 0.2	0.35 - 0.45	0.1 - 0.2	0.5 - 0.6	2.4 - 2.5	0.1 - 0.2	0.1 - 0.2
				Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
				Sample Type	Normal	Normal	Field_D	Interlab_D	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
				Lab Report No.	767787	767787	767787	EM2100608	767787	767787	767787	771075	771075	771075	771075	778664	767787	767787
	Unit	EQL	**NEPM 2013 Table 1A(1) HILs Rec C Soil**	NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil														
PAHs																		
Acenaphthene	mg/kg	0.1			<0.5	1.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.1			<0.5	10	<0.5	0.6	0.8	<0.5	<0.5	<0.5	0.7	<0.5	0.7	< 0.5	<0.5	<0.5
Anthracene	mg/kg	0.1			<0.5	67	0.6	0.9	2.2	<0.5	<0.5	<0.5	2.5	<0.5	0.6	< 0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.1			4.4	180	7.2	4.1	4.7	1.1	0.8	<0.5	13	<0.5	7.9	< 0.5	0.7	1.9
2-Chloronaphthalene	mg/kg	0.1			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1			6.6	300	8.1	7.1	3.0	2.2	1.2	<0.5	13	<0.5	7.8	< 0.5	1.1	2.1
Benzo(b)fluoranthene	mg/kg	0.1			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoranthene	mg/kg	0.5			5.3	200	7.6	8.0	2.4	1.3	0.8	<0.5	14	<0.5	7.2	< 0.5	1.0	1.3
Benzo(g,h,i)perylene	mg/kg	0.1			4.7	100	6.7	5.7	1.7	1.4	0.7	<0.5	7.3	<0.5	4.1	< 0.5	1.0	1.4
Benzo(b+j+k)fluoranthene	mg/kg	0.2			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1			5.9	190	7.8	2.5	3.2	1.4	0.9	<0.5	13	<0.5	7.1	< 0.5	0.7	1.3
Chrysene	mg/kg	0.1			4.7	240	7.0	4.2	3.1	0.9	0.9	<0.5	10	<0.5	6.2	< 0.5	0.6	1.6
Dibenz(a,h)anthracene	mg/kg	0.1			1.8	38	3.0	1.0	0.6	<0.5	<0.5	<0.5	3.1	<0.5	1.4	< 0.5	0.5	<0.5
Fluoranthene	mg/kg	0.1			8.0	300	11	7.6	12	2.0	1.3	<0.5	20	<0.5	10	0.6	1.3	3.5
Fluorene	mg/kg	0.1			<0.5	2.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1			4.7	140	7.4	4.2	1.8	1.3	0.6	<0.5	8.2	<0.5	3.4	< 0.5	0.7	1.5
Naphthalene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5
Phenanthrene	mg/kg	0.1			2.1	100	3.3	2.6	10	0.7	<0.5	<0.5	10	<0.5	3.4	< 0.5	<0.5	1.3
Pyrene	mg/kg	0.1			8.5	360	13	7.9	9.7	2.1	1.4	<0.5	20	<0.5	11	0.6	1.4	3.4
Benzo(a)pyrene TEQ (Zero)	mg/kg	0.1	**3**[#1]	40[#1]	**11**	**410**	**14**	**10.1**	**4.9**	2.7	1.5	<0.5	**21**	<0.5	**12**	< 0.5	1.9	2.7
Sum of Polycyclic aromatic hydrocarbons (PAH)	mg/kg	0.1	**300**[#2]	4,000[#2]	56.7	**2,237.4**	82.7	56.4	55.2	14.4	8.6	<0.5	134.8	<0.5	70.8	1.2	9	19.3

Table 1 - Soil Analytical Results
Human Health Risk Assessment
Elwood Foreshore (Stage 1 and Stage 2), Elwood, Victoria
City of Port Phillip
M18310

				Report	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**
				Location Code	**SB23**		**SB24**			**SB25**	**SB26**	**SB27**		**SB28**		**SB29**	**SB30**		
				Field ID	SB23_0.1-0.2	SB23_0.35-0.45	SB24_0.1-0.2	SB24_0.9-1.0	SB24_0.9_1.0	SB25_0.1-0.2	SB26_0.1-0.2	SB27_0.1-0.2	SB27_0.3-0.4	SB28_0.1-0.2	SB28_0.6-0.7	SB29_0.05-0.15	SB30_0.1-0.2	SB30_0.3-0.4	SB31_0.1-0.2
				Date	12/01/2021	12/01/2021	12/01/2021	12/01/2021	12/02/2021	12/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021	13/01/2021	12/01/2021	12/01/2021	12/01/2021	13/01/2021
				Depth	0.1 - 0.2	0.35 - 0.45	0.1 - 0.2	0.9 - 1	0.9 - 1	0.1 - 0.2	0.1 - 0.2	0.1 - 0.2	0.3 - 0.4	0.1 - 0.2	0.6 - 0.7	0.05 - 0.15	0.1 - 0.2	0.3 - 0.4	0.1 - 0.2
				Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
				Sample Type	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
				Lab Report No.	767787	767787	767787	767787	773807	767787	767787	767787	767787	767787	767787	767787	767787	767787	767787
	Unit	EQL	**NEPM 2013 Table 1A(1) HILs Rec C Soil**	NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil															
PAHs																			
Acenaphthene	mg/kg	0.1			<0.5	1.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	mg/kg	0.1			3.5	1.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.1	<0.5	<0.5	<0.5
Anthracene	mg/kg	0.1			5.2	33	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	0.5	2.6	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	0.1			15	67	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	3.9	<0.5	3.3	6.2	<0.5	0.6	1.3
2-Chloronaphthalene	mg/kg	0.1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1			18	110	0.6	0.6	<0.5	1.0	<0.5	<0.5	11	<0.5	7.5	13	<0.5	0.6	2.3
Benzo(b)fluoranthene	mg/kg	0.1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoranthene	mg/kg	0.5			17	83	0.5	0.5	<0.5	1.0	<0.5	<0.5	9.8	<0.5	6.1	11	<0.5	0.5	1.7
Benzo(g,h,i)perylene	mg/kg	0.1			8.1	24	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	4.4	<0.5	5.4	7.5	<0.5	<0.5	1.6
Benzo(b+j+k)fluoranthene	mg/kg	0.2			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1			15	81	0.5	0.6	<0.5	0.9	<0.5	<0.5	7.7	<0.5	4.4	7.9	<0.5	0.6	2.0
Chrysene	mg/kg	0.1			22	63	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	8.2	<0.5	3.3	6.2	<0.5	0.5	1.7
Dibenz(a,h)anthracene	mg/kg	0.1			4.2	11	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.1	<0.5	<0.5	2.2	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.1			39	130	0.6	0.7	0.8	1.0	0.5	<0.5	10	<0.5	6.2	17	<0.5	0.7	3.0
Fluorene	mg/kg	0.1			2.5	3.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1			11	36	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	7.8	<0.5	4.3	6.4	<0.5	<0.5	1.3
Naphthalene	mg/kg	0.1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	mg/kg	0.1			37	72	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.8	<0.5	2.1	11	<0.5	<0.5	1.1
Pyrene	mg/kg	0.1			41	140	0.6	0.8	0.9	1.2	0.5	<0.5	11	<0.5	6.8	17	<0.5	0.8	3.2
Benzo(a)pyrene TEQ (Zero)	mg/kg	0.1	**3**[#1]	40[#1]	**28**	**150**	0.7	0.7	<0.5	1.3	<0.5	<0.5	**16**	<0.5	**9.4**	**18**	<0.5	0.8	3.0
Sum of Polycyclic aromatic hydrocarbons (PAH)	mg/kg	0.1	**300**[#2]	4,000[#2]	238.5	**861.8**	2.8	3.2	1.7	7.8	1	<0.5	79.3	<0.5	49.9	109.9	<0.5	4.3	19.2

Table 1 - Soil Analytical Results
Human Health Risk Assessment
Elwood Foreshore (Stage 1 and Stage 2), Elwood, Victoria
City of Port Phillip
M18310

				Report	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**	**Senversa, 2021**
				Location Code	**SB31**		**SB32**		**SB33**	**SB34**		**SB35**			**SB36**		**SB37**			**SB38**
				Field ID	QC05	QC06	SB32_0.05-0.15	SB32_0.9-1.0	SB33_0.1-0.2	SB34_0.1-0.2	SB34_0.4-0.5	SB35_0.1-0.2	QC01	QC02	SB36_0.1-0.2	SB36_0.4-0.5	SB37_0.1-0.2	SB37_0.5-0.6	SB37_1.4-1.5	SB38_0.1-0.2
				Date	13/01/2021	13/01/2021	13/01/2021	5/03/2021	12/01/2021	13/01/2021	13/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	12/01/2021	5/03/2021	12/01/2021
				Depth	0.1 - 0.2	0.1 - 0.2	0.05 - 0.15	0.9 - 1.0	0.1 - 0.2	0.1 - 0.2	0.4 - 0.5	0.1 - 0.2	0.1 - 0.2	0.1 - 0.2	0.1 - 0.2	0.4 - 0.5	0.1 - 0.2	0.5 - 0.6	1.4 - 1.5	0.1 - 0.2
				Fill/Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill
				Sample Type	Field_D	Interlab_D	Normal	Normal	Normal	Normal	Normal	Normal	Field_D	Interlab_D	Normal	Normal	Normal	Normal	Normal	Normal
				Lab Report No.	767787	EM2100608	767787	778664	767787	767787	767787	767787	767787	EM2100608	767787	767787	767787	767787	778664	767787
	Unit	EQL	**NEPM 2013 Table 1A(1) HILs Rec C Soil**	NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil																
PAHs																				
Acenaphthene	mg/kg	0.1			<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5
Acenaphthylene	mg/kg	0.1			<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	0.6	< 0.5	1.8
Anthracene	mg/kg	0.1			<0.5	<0.5	0.6	< 0.5	<0.5	<0.5	5.8	<0.5	<0.5	0.7	0.8	0.6	<0.5	0.8	< 0.5	2.3
Benz(a)anthracene	mg/kg	0.1			3.2	1.0	2.2	< 0.5	1.3	<0.5	8.2	3.1	0.9	2.7	2.6	4.4	2.7	5.8	< 0.5	10
2-Chloronaphthalene	mg/kg	0.1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.1			2.9	1.2	4.8	< 0.5	1.9	<0.5	14	5.9	1.5	3.6	7.3	7.5	6.7	11	< 0.5	21
Benzo(b)fluoranthene	mg/kg	0.1			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b+j)fluoranthene	mg/kg	0.5			2.8	1.4	3.5	< 0.5	1.3	<0.5	10	4.1	1.2	4.1	5.7	5.0	5.8	8.4	< 0.5	14
Benzo(g,h,i)perylene	mg/kg	0.1			2.3	0.8	3.4	< 0.5	1.3	<0.5	6.8	2.4	0.7	2.5	4.1	4.0	5.0	6.3	< 0.5	15
Benzo(b+j+k)fluoranthene	mg/kg	0.2			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.1			3.0	<0.5	3.7	< 0.5	1.6	<0.5	9.6	4.0	1.3	1.3	4.2	3.7	4.2	7.5	< 0.5	18
Chrysene	mg/kg	0.1			2.9	0.9	3.4	< 0.5	1.4	<0.5	16	6.1	1.1	2.5	2.6	6.0	2.7	8.8	< 0.5	14
Dibenz(a,h)anthracene	mg/kg	0.1			1.1	<0.5	<0.5	< 0.5	<0.5	<0.5	1.2	<0.5	<0.5	<0.5	<0.5	1.3	1.3	1.0	< 0.5	2.9
Fluoranthene	mg/kg	0.1			5.9	1.7	5.5	< 0.5	2.6	0.6	21	4.9	1.7	5.2	8.3	11	4.6	15	< 0.5	22
Fluorene	mg/kg	0.1			<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	< 0.5	<0.5
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1			2.1	0.6	3.0	< 0.5	1.0	<0.5	6.6	1.4	0.6	1.9	3.6	2.8	4.0	3.0	< 0.5	12
Naphthalene	mg/kg	0.1			<0.5	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	< 0.5	<0.5
Phenanthrene	mg/kg	0.1			1.8	0.5	2.2	< 0.5	1.1	<0.5	16	2.5	0.6	2.3	3.3	2.7	1.1	4.6	< 0.5	8.1
Pyrene	mg/kg	0.1			5.9	1.9	6.1	< 0.5	2.8	0.5	24	6.1	1.8	5.4	8.8	12	5.4	16	< 0.5	24
Benzo(a)pyrene TEQ (Zero)	mg/kg	0.1	**$3^{\#1}$**	$40^{\#1}$	**5.2**	1.5	**6.1**	< 0.5	2.4	<0.5	**19**	**7.2**	1.9	**4.6**	**9.0**	**10**	**9.7**	**15**	< 0.5	**30**
Sum of Polycyclic aromatic hydrocarbons (PAH)	mg/kg	0.1	**$300^{\#2}$**	$4,000^{\#2}$	33.9	10.0	38.4	< 0.5	16.3	1.1	142.3	40.5	11.4	32.2	51.3	61.6	43.5	89.4	< 0.5	165.7

Comments

#1 Carcinogenic PAHs: HIL based on 8 carc. PAHs & their TEFs (rel to BaP ref Schedule 7) BaP TEQ calc by multiplying the conc of each carc. PAH in sample by its BaP TEF (ref Table 1A(1)) & summing
#2 Total PAHs: Based on sum of 16 most common reported (WHO 98). HIL application should consider presence of carcinogenic PAHs (should meet BaP TEQ HIL) & napthalene (should meet relevant HSL)

Figures:

Figure 1: Site and Sample Locations

Figure 2: Benzo(a)Pyrene TEQ Results

Figure 3: Benzo(a)Pyrene TEQ Results within Management Area

Path: S:\01_Jobs\3.VIC_Jobs\M18310_CoPP_ELWOOD FORESHORE_HRRA\MXDs\1. Working MXDs\M18310_005_F001_Site_Layout_Samples.mxd

senversa

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

Legend

- ● Soil Bore (Senversa, 2021)
- ● Soil Bore (Atma, 2020)
- ● Soil Bore (Greencap, 2020)
- ● Soil Bore (Landserv, 2020)
- ● Groundwater Monitoring Well (Atma, 2020)
- ☐ Current Site Feature
- ⬚ Former Site Feature
- 🟦 Stage 1 Area
- 🟩 Stage 2 Area
- 🟥 Site Boundary
- ☐ Property Boundary

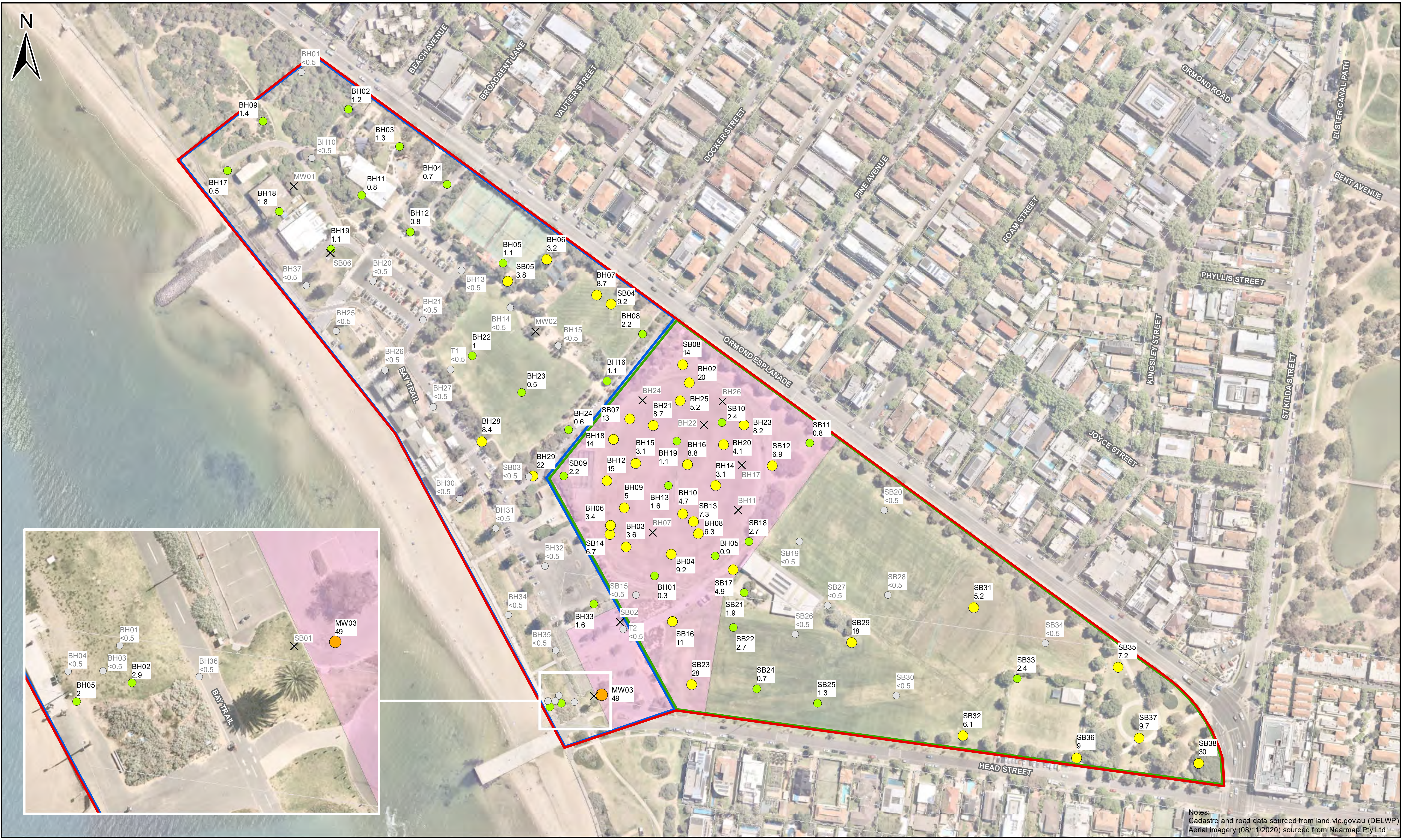
Notes:
Cadastre and road data sourced from land.vic.gov.au (DELWP)
Aerial imagery (08/11/2020) sourced from Nearmap Pty Ltd

Designed:	I. Graves	Date:	9/04/2021
Drawn:	M. Sari	Revision:	0
Checked:	R. Griffin	Scale:	1:2,500 (A3)
File:	M18310_005_F001_Site_Layout_Samples		

0 25 50 100 150 200 Metres

Datum GDA 1994, Projection MGA Zone 55

Figure No:	**1**
Title:	**Site Layout and Sample Locations**
Project:	Human Health Risk Assessment
Location:	Elwood Foreshore, Elwood, Victoria
Client:	City of Port Phillip



Notes:
Cadastre and road data sourced from land.vic.gov.au (DELWP)
Aerial imagery (08/11/2020) sourced from Nearmap Pty Ltd

Path: S:\01_Jobs\3.VIC_Jobs\M18310_CoPP_ELWOOD FORESHORE_HRRA\MXDs\1. Working MXDs\M18310_005_F002_BaP_Results_Below.mxd

senversa

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

Legend

Benzo(a)pyrene TEQ (Zero) (mg/kg)

- × No Sample
- ● <EQL
- ● >EQL - 3
- ● >3 - 40
- ● >40 - 400
- ● >400

Sample ID
Benzo(a)pyrene TEQ (Zero) (mg/kg)
Below EQL or No Sample
Where multiple samples were available for the given depth interval, the highest results was adopted.

- ▭ Stage 1 Area
- ▭ Stage 2 Area
- ▭ Site Boundary
- ▭ Soil Management Area
- ▭ Property Boundary

Designed: I. Graves
Drawn: F. Gurnett
Checked: R. Griffin
File: M18310_005_F002_BaP_Results_Below

Date: 9/04/2021
Revision: 0
Scale: 1:2,500 (A3)

0 25 50 100 150 200 Metres
Datum GDA 1994, Projection MGA Zone 55

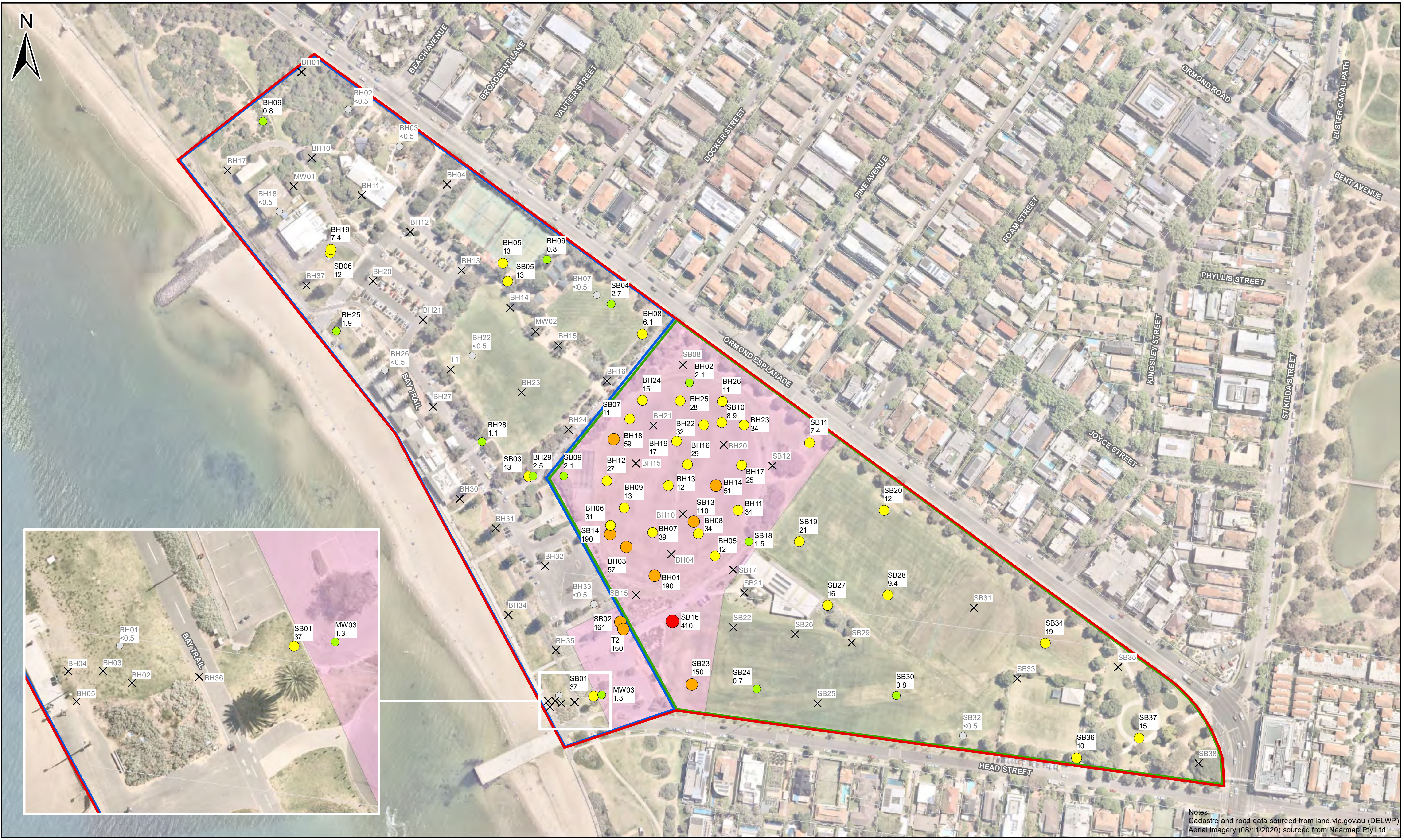
Figure No: 2

Title: **Benzo(a)pyrene TEQ Results – Shallow Soils (<0.2 m bgl)**

Project: Human Health Risk Assessment

Location: Elwood Foreshore, Elwood, Victoria

Client: City of Port Phillip



Notes:
Cadastre and road data sourced from land.vic.gov.au (DELWP)
Aerial imagery (08/11/2020) sourced from Nearmap Pty Ltd

Path: S:\01_Jobs\3.VIC_Jobs\M18310_CoPP_ELWOOD FORESHORE_HRRA\MXDs\1. Working MXDS\M18310_005_F003_BaP_Results_Above.mxd

senversa

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

Legend

Benzo(a)pyrene TEQ (Zero) (mg/kg)

- ✕ No Sample
- ○ <EQL
- ● >EQL - 3
- ● >3 - 40
- ● >40 - 400
- ● >400

Sample ID
Benzo(a)pyrene TEQ (Zero) (mg/kg)
Below EQL or No Sample
Where multiple samples were available for the given depth interval, the highest results was adopted.

- 🟦 Stage 1 Area
- 🟩 Stage 2 Area
- 🟥 Site Boundary
- ▨ Soil Management Area
- ☐ Property Boundary

Designed:	I. Graves	Date:	9/04/2021
Drawn:	F. Gurnett	Revision:	0
Checked:	R. Griffin	Scale:	1:2,500 (A3)
File:	M18310_005_F003_BaP_Results_Above		

0 25 50 100 150 200 Metres
Datum GDA 1994, Projection MGA Zone 55

Figure No:	**3**
Title:	**Benzo(a)pyrene TEQ Results – Deeper Soils (>0.2 m bgl)**
Project:	Human Health Risk Assessment
Location:	Elwood Foreshore, Elwood, Victoria
Client:	City of Port Phillip

Attachment A: Toxicological Profile for PAHs

Toxicological Profile for Polycyclic Aromatic Hydrocarbons (PAHs)

The following health effects information has been primarily extracted and modified from ATSDR (1995) and CCME (2008), unless otherwise noted.

General

Polycyclic aromatic hydrocarbons (PAHs) occur ubiquitously in the environment from both synthetic and natural sources. They are a group of hydrocarbons characterised by two or more fused benzenoid (aromatic) rings, and are typically associated with combustion processes, fossil fuels or other petroleum products, or natural plant or bacterial products. Widespread PAH contamination is present in the environment due primarily to the combustion of fuels and coals as an energy source. The combustion of wood or other organic materials (e.g. incinerators) also produces PAHs, and they are found in foods, particularly charbroiled, broiled, or pickled food items, and refined fats and oils.

The most commonly studied PAHs are the unsubstituted PAHs, i.e. those lacking substituents such as alkyl groups, halogens, hydroxyl-, dihydroxy- or dihydrodiol groups, arene oxides, methylsulfones, or other groups, while the environmental and toxicological significance of substituted PAHs is largely unknown.

Within Australia and overseas, the following 16 unsubstituted PAHs are typically analysed for and considered as a group in contaminated site assessment work:

- acenaphthene
- acenaphthylene
- anthracene
- benz[a]anthracene
- benzo[a]pyrene
- benzo[b]fluoranthene
- benzo[g,h,i]perylene
- benzo[k]fluoranthene
- chrysene
- dibenz[a,h]anthracene
- fluoranthene
- fluorene
- naphthalene
- indeno[1,2,3-c,d]pyrene
- phenanthrene
- pyrene

These PAHs are the most commonly assessed based on the following considerations:

- More information is available on them than other PAHs.
- They are suspected to be more harmful than other PAHs, and they exhibit harmful effects that are representative of the PAHs.
- There is considered to be a greater chance of exposure to these PAHs than to the others.

The above PAHs with the exception of naphthalene are considered in this toxicity profile. The toxicity of naphthalene (if considered in this risk assessment) is discussed separately.

Health Effects Other than Cancer

Noncancer adverse health effects associated with PAH exposure have been observed in animals but generally not in humans (with the exception of adverse hematological and dermal effects). Animal studies demonstrate that PAHs tend to affect proliferating tissues such as bone marrow, lymphoid organs, gonads, and intestinal epithelium.

Reproductive and developmental effects in animals associated with acute oral exposure to PAHs have been reported. Noncancer effects noted in longer term oral toxicity studies in animals include increased liver weight (generally not considered to be adverse) and aplastic anemia (a serious effect).

Carcinogenicity

Evidence exists to indicate that mixtures of PAHs are carcinogenic in humans. The evidence in humans comes primarily from occupational studies of workers exposed to mixtures containing PAHs as a result of their involvement in such processes as coke production, roofing, oil refining, or coal gasification (e.g., coal tar, roofing tar, soot, coke oven emissions, soot, crude oil) (Hammond et al. 1976; Lloyd 1971; Maclure and MacMahon 1980; Mazumdar et al. 1975; Redmond et al. 1976; Wynder and Hoffmann 1967). PAHs, however, have not been clearly identified as the causative agent. Cancer associated with exposure to PAH-containing mixtures in humans occurs predominantly in the lung and skin following inhalation and dermal exposure, respectively. Some ingestion of PAHs is likely because of swallowing of particles containing PAHs subsequent to mucocilliary clearance of these particulates from the lung.

Certain PAHs are carcinogenic to animals by the oral route (e.g., benz[a]anthracene, benzo[a]pyrene, and dibenz[a,h]anthracene). The results of dermal studies indicate that benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[j]fluoranthene, benzo[k]fluoranthene, chrysene, dibenz[a,h]anthracene, and indeno[l,2,3-c,d]pyrene are tumorigenic in mice following dermal exposure. The sensitivity of mouse skin to PAH tumorigenesis forms the basis for the extensive studies performed using dermal administration. This tumorigenicity can be enhanced or modified with concomitant exposure to more than one PAH, long straight-chain hydrocarbons (i.e., dodecane), or similar organic compounds commonly found at hazardous waste sites. Thus, humans exposed to PAHs in combination with these substances could be at risk for developing skin cancer.

For many of the carcinogenic PAHs, it appears that the site of tumor induction is influenced by the route of administration and site of absorption, i.e., forestomach tumors are observed following ingestion, lung tumors following inhalation, and skin tumors following dermal exposure. However, the observations that (1) mammary tumors are induced following intravenous injection in Sprague-Dawley rats, (2) the susceptibility to tumor development on the skin after dermal application is not similar in rats and mice, and (3) oral cavity tumors are not observed when benzo[a]pyrene is administered in the diet, suggest that the point of first contact may not always be the site of PAH-induced tumors.

Of the 16 priority PAHs, the International Agency for Research on Cancer (IARC) has classified benz(a) anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, naphthalene and indeno(1,2,3-cd)pyrene as Group 2a (probably carcinogenic to humans) or Group 2b (possibly carcinogenic to humans) carcinogens.

The remaining PAHs considered in this profile are either not classified by IARC, or classified within Group 3 (not classifiable as to carcinogenic potential).

More recently, CCME (2008) has provisionally defined the carcinogenic PAHs of interest to comprise the following:

- Benz(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene

- Benzo(k)fluoranthene
- Chrysene
- Dibenzo(a,h)anthracene
- Indeno(1,2,3-cd)pyrene

It is noted that, while benzo(g,h,i)perylene is not classified with respect to carcinogenicity, it has been considered as a carcinogen due to positive findings in genotoxicity studies, however there are insufficient data available to determine carcinogenicity.

The remainder of the 16 priority PAHs (acenaphthene, acenaphthylene, anthracene, fluoranthene, fluorene, naphthalene, phenanthrene and pyrene) are not considered to be genotoxic carcinogens (CCME, 2008).

Genotoxicity

Benzo(a)pyrene has been thoroughly studied in genetic toxicology test systems, and has been found to induce genetic damage in prokaryotes, eukaryotes, and mammalian cells in vitro, and to produce a wide range of genotoxic effects (gene mutations in somatic cells, chromosome damage in germinal and somatic cells, DNA adduct formation, UDS, sister chromatid exchange, and neoplastic cell transformation). In cultured human cells, benzo[a]pyrene binds to DNA and causes gene mutations, chromosome aberrations, sister chromatid exchange, and UDS.

The results of in vivo studies indicate that many of the same types of adverse effects observed in vitro were seen in mice, rats, and hamsters exposed to benzo(a)pyrene via the oral, dermal, or intraperitoneal routes. The available data also indicate that benzo(a)pyrene is genotoxic in both somatic and germinal cells of intact animals. The only study that was found regarding genotoxic effects in humans following exposure to benzo(a)pyrene reported no correlation between aluminium plant workers' exposure to PAHs, including benzo(a)pyrene, and sister chromatid exchange frequency. However, the findings from assays using human cells as the target, in conjunction with the data from whole animal experiments, suggest that benzo(a)pyrene would probably have similar deleterious effects on human genetic material.

Because the genotoxic activity of benzo(a)pyrene is well established, it is frequently used as a positive control to demonstrate the sensitivity of various test systems to detect the genotoxic action of unknown compounds. It also serves as the model compound for PAHs, and the available information on the formation of metabolites and structure of benzo(a)pyrene can theoretically be used to predict potential genotoxicity/carcinogenicity of other PAHs that have not been as extensively studied.

Epoxidation is thought to be the major pathway for benzo(a)pyrene metabolism pertinent to macromolecular interaction. This process results in conversion of the benzo(a)pyrene molecule into an epoxide, which is is acted upon by epoxide hydrolase to form a dihydrodiol, which then gives rise to the ultimate mutagenic/carcinogenic epoxide form: benzo[a]pyrene 7,8-diol-9,10-epoxide. One of the unique structural features of the diol epoxide is that it appears to form in the area of the PAH molecule referred to as the bay region (i.e., a deep-pocketed area formed when a single benzo ring is joined to the remainder of the multiple ring system to form a phenanthrene nucleus).

Analysis of the bay region diol epoxides and their contribution to the DNA binding, genotoxicity, and carcinogenicity of various PAHs has provided the basis for the bay region hypothesis. For example, DNA adducts formed with non-bay region diol epoxides of benzo[a]pyrene have low mutagenic potential. The hypothesis further predicts that structures with more reactive bay regions would probably be more genotoxic and more carcinogenic. The body of evidence on the mutagenic and tumorigenic activity of the PAHs that form bay region diol epoxides (benzo[a]pyrene, benz[a]anthracene, chrysene, dibenz[a,h]anthracene; benzo[b]fluoranthene, benzo[j]fluoranthene, benzo[k]fluoranthene, and indeno[1,2,3-c,d]pyrene) supports this hypothesis.

In summary, several general conclusions can be reached for the unsubstituted PAHs evaluated in this profile. The formation of diol epoxides that covalently bind to DNA appears to be the primary mechanism of action for both genotoxicity and carcinogenicity of several of the unsubstituted PAHs that are genotoxins (benzo[a]pyrene, benz[a]anthracene, dibenz[a,h]anthracene, chrysene, benzo[b]fluoranthene, benzo[j]fluoranthene). There was insufficient evidence to draw meaningful conclusions regarding the genotoxic potential of benzo[g,h,i]perylene, although some evidence does exist.

With regard to the unsubstituted PAHs that either lack a bay region configuration (acenaphthene, acenaphthylene, anthracene, fluorene, and pyrene) or appear to have a weakly reactive bay region (phenanthrene), there is no compelling evidence to suggest that they interact with or damage DNA.

The five PAHs that appear to be exceptions to the bay region diol epoxide hypothesis are fluoranthene, benzo[k]fluoranthene, benzo[j]fluoranthene, and indeno[1,2,3-cd]pyrene (no bay region), and benzo[e]pyrene (two bay regions). The evidence does suggest, however, that fluoranthene possesses genotoxic properties while benzo[e]pyrene is either weakly mutagenic or nonmutagenic.

Published Dose-Response Values

Available chronic dose-response values published and adopted by sources recognised and endorsed by NEPC (2013) and enHealth (2012) are summarised in the following table.

Published Dose-Response Values for PAHs

PAH	Exposure Route	Effect Type	Value	Source
Benzo(a)pyrene	Oral	Non-threshold	0.43 (mg/kg/day)$^{-1}$	NHMRC, NMMRC (2011)* WHO (2011) (based on evaluation by WHO, 2003). Derivation used simple body weight scaling to convert from animal to human dose.
	Oral	Non-threshold	2.1 (mg/kg/day)$^{-1}$	MfE (2011). Derivation used allometric body weight scaling (body weight to the ¾) to convert from animal to human dose. Value is geometric mean of values derived using allometric body weight scaling
	Oral	Non-threshold	7.3 (mg/kg/day)$^{-1}$	IRIS (last updated November 1994) Derivation used allometric body weight scaling (see above).
	Oral	Non-threshold	2.3 (mg/kg/day)$^{-1}$	Health Canada (2004) and CCME (2008) Derivation used allometric body weight scaling (see above).
	Inhalation	Non-threshold	0.087 (µg/m^3)$^{-1}$	WHO (2000)
Acenaphthene	Oral	Threshold	0.06 mg/kg/day	IRIS (last updated April 1994)
Anthracene	Oral	Threshold	0.3 mg/kg/day	IRIS (last updated July 1993)
Fluoranthene	Oral	Threshold	0.04 mg/kg/day	IRIS (last updated July 1993)
Fluorene	Oral	Threshold	0.04 mg/kg/day	IRIS (last updated November 1990)
Pyrene	Oral	Threshold	0.03 mg/kg/day	IRIS (last updated July 1993)

NOTES:

IRIS = Integrated Risk Information System (epa.gov/iris)
* Based on drinking water unit risk of 1 x 10^{-5} per 0.0007 mg/L derived by WHO (2003), which has been adopted by NHMRC, NMMRC (2011) and WHO (2011) in derivation of drinking water guideline values. Value was converted to an oral slope factor assuming that a 60 kg adult ingests 2 litres of water per day. Body weight of 60 kg was used for consistency with approach used by WHO (2003) for derivation of drinking water guideline values.

Adopted Dose-Response Values

Threshold

Oral

Dose-response values for assessment of threshold health effects associated with PAHs have not been published by Australian regulatory agencies or by the World Health Organization (WHO). Senversa has therefore adopted Reference Doses published by IRIS for acenaphthene, anthracene, fluoranthene, fluorene and pyrene to assess potential threshold health effects associated with oral exposure to these compounds.

In the absence of published oral dose-response criteria for acenaphthylene and phenanthrene, a surrogate approach has been adopted; it has been assumed that the oral toxicity of these compounds is comparable to the toxicity of the other unsubstituted PAHs with either no or weakly reactive bay region (acenaphthene, anthracene, fluoranthene, fluorene, pyrene). The geometric mean of oral RfDs reported for these compounds (0.06 mg/kg/day) has been adopted for both acenaphthylene and phenanthrene.

Other PAHs have been assessed based on non-threshold dose-response values (see below).

Dermal

In the absence of specific dermal toxicity values for threshold health effects, the oral threshold values have been adopted. In accordance with USEPA (2004) guidance, these values have been corrected to convert from an ingested dose (as used in oral toxicity studies) to an absorbed dose, based on published gastrointestinal absorption factors available from the Risk Assessment Information System (RAIS; http://rais.ornl.gov). However, as GA factors published by RAIS for PAHs are equal to one, no absorption correction is applied and the oral values have been adopted directly.

Inhalation

USEPA (2011) and other agencies have not published dose-response values for assessment of threshold health effects associated with inhalation exposure to PAHs. Senversa have therefore adopted a route-to-route (oral to inhalation) extrapolation approach for assessment of inhalation effects of non-carcinogenic PAHs. Oral RfDs were converted to Tolerable Concentrations/Reference Concentrations assuming an adult body weight of 70 kg, and a daily inhalation volume of 20 m^3. The resulting inhalation tolerable/reference concentrations are the following:

- Acenaphthene: 0.21 mg/m^3
- Acenaphthylene: 0.21 mg/m^3
- Anthracene: 1.0 mg/m^3
- Fluorene: 0.14 mg/m^3
- Fluoranthene: 0.14 mg/m^3
- Phenanthrene: 0.21 mg/m^3
- Pyrene: 0.10 mg/m^3

It is noted that there is substantial uncertainty associated with the use of route-to-route extrapolation, due to differences in e.g., absorption, distribution and metabolism of chemicals via the oral versus inhalation exposure routes. However, this approach has been adopted as a conservative measure in the absence of other data.

Non-Threshold

Oral

As shown above, non-threshold dose-response values published by various Australian and international agencies for benzo(a)pyrene vary by more than one order of magnitude. This variation is primarily attributable to differences in models used to estimate cancer potency, and whether allometric (body weight to the ¾ power) scaling was used to convert from animal to human dose estimates. It is noted that the current adopted NHMRC (2011) and WHO (2011) drinking water guideline values were derived from a cancer slope factor derived by the WHO (2003) which was not based on allometric scaling, consistent with NHMRC (1999) guidelines for cancer risk assessment. However, more recent Australian guidance (enHealth, 2012) refers to more recent USEPA (2005) guidance where allometric scaling ($BW^{3/4}$) is recommended. The current Australian policy decision with respect to allometric scaling is therefore unclear.

For the purposes of this HHRA, the more recent cancer slope factor derived by MfE (2011) of 2.1 $(mg/kg/day)^{-1}$ (which was derived with consideration of allometric scaling) has been conservative adopted for initial risk screening.

In order to assess potential oral health effects associated with exposure to potentially carcinogenic PAHs other than benzo(a)pyrene, toxic equivalency factors (TEFs) recommended by NEPC (2013) have been adopted, as shown in the following table.

Toxic Equivalency Factors Adopted for Carcinogenic PAHs (NEPC, 2013)

Compound	Toxic Equivalency Factor (TEF)
Benzo(a)pyrene (index compound)	1.0
Benz(a)anthracene	0.1
Benzo(b)fluoranthene	0.1
Benzo(g,h,i)perylene	0.01
Benzo(k)fluoranthene	0.1
Chrysene	0.01
Dibenzo(a,h)anthracene	1
Indeno(1,2,3-c,d)pyrene	0.1

Dermal

In the absence of specific dermal toxicity values for non-threshold health effects published by Australian or international agencies, the oral values have been adopted. In accordance with USEPA (2004) guidance, these values have been corrected to convert from an ingested dose (as used in oral toxicity studies) to an absorbed dose, based on published gastrointestinal absorption (GA) factors available from the Risk Assessment Information System (RAIS; http://rais.ornl.gov). However, as GA factors published by RAIS for PAHs are equal to one, no absorption correction is applied and the oral values have been adopted directly.

It should be noted that benzo(a)pyrene and other carcinogenic PAHs are considered to be point of contact carcinogens, such that it is considered more appropriate to use a dermal-specific slope factor for risk estimation, rather than the oral slope factor. While some recent literature studies (Knafla, 2006 and 2011) have derived dermal slope factors for benzo(a)pyrene, there are greater uncertainties in the extrapolation of dermal data from animals to humans than for the oral or inhalation route (CCME, 2008), and to date, neither Australian nor other international agencies have adopted or endorsed the use of a dermal slope factor (although it is noted that CCME, 2008 has indicated that one is being developed by Health Canada).

Inhalation

The inhalation unit risk value published by WHO (2000) for benzo(a)pyrene is based on an occupational exposure study of workers exposed to mixtures of PAHs in coke oven emissions, and the data are therefore not considered relevant to inhalation exposures likely to occur at contaminated sites (primarily the inhalation of airborne dust derived from PAH impacted soils). The adopted oral reference value has therefore been adopted for assessment of all routes of exposure, consistent with recent approaches by CCME (2008). The oral slope factor was converted to an inhalation unit risk of 0.0006 $(\mu g/m^3)^{-1}$ assuming a 70 kg adult with an inhalation rate of 20 m^3/day.

In order to assess potential inhalation health effects associated with exposure to potentially carcinogenic PAHs other than benzo(a)pyrene, the TEFs summarised above have been applied to the inhalation unit risk for benzo(a)pyrene.

Age Dependent Adjustments to Non-Threshold Criteria

Where early life exposure to carcinogens for which a mutagenic mode of action has been established (as is the case for benzo(a)pyrene), USEPA (2005 and 2009) and enHealth (2012) recommend an additional safety factor should be applied to toxicological reference values used in health risk assessment. The safety factors are termed age-dependent adjustment factors (ADAFs) and are applied to address differential potency associated with exposure during early life (less than 16 years of age). Their use has been recommended by USEPA (2005) on the basis of animal carcinogenicity bioassays which indicate higher susceptibility to mutagenic carcinogens during early life exposure. Default ADAFs recommended by USEPA (2005) have therefore been applied to the adopted cancer slope factors and inhalation unit risk factors for carcinogenic PAHs as follows:

- A 10-fold adjustment for children ages 0 to <2 years.
- A 3-fold adjustment for children aged 2-<16 years.
- No adjustment for individuals aged 16 years and older.

Background Intakes

As summarised in the table below, estimated chemical intakes from background exposure to PAHs in soil, drinking water and food are less than 5% of the lowest threshold toxicity criteria adopted in this assessment, and correction of adopted RfDs for background exposure was therefore not considered necessary.

Media	Estimated Intake (mg/kg/day)	Basis
Soil Ingestion	4.6 x 10^{-6}	Assumes background soil concentration of 0.6 mg/kg, which was the maximum reported for any individual PAH in urban soils in Brisbane (Yang et al. 1991). Intake has been estimated for a 13 kg toddler assuming 100 mg of soil is ingested daily.
Water Consumption	2 x 10^{-6}	Total PAH exposure via drinking water reported by ATSDR (1995). It has been conservatively assumed that the total PAH intake may apply to any individual PAH (in the absence of compound specific data). The value reported by ATSDR (0.027 ug/day) was converted to a weight normalised intake for a 13 kg toddler. Use of this value is considered conservative given that PAHs have not been reported in Australian drinking water supplies (NHMRC,NMMRC, 2011).
Food Intake	1.2 x 10^{-3}	Maximum reported total PAH intake via food (ATSDR, 1995). It has been conservatively assumed that the total PAH intake may apply to any individual PAH, in the absence of compound specific data. The value reported by ATSDR (16 ug/day) was converted to a weight normalised intake for a 13 kg toddler.
Total	1.2 x 10^{-3}	

Media	Estimated Intake (mg/kg/day)	Basis
Minimum Oral RfD	0.03	Value is minimum RfD of those adopted for PAHs assessed on the basis of threshold dose-response criteria. TDIs ranged from 0.03 mg/kg/day (naphthalene) to 0.3 mg/kg/day (anthracene)
Background Intake as Percentage of RfD	4%	

With respect to background inhalation exposure, Environment Australia (EA, 1999) report background average concentrations of individual PAHs in major Australian cities to be up to 19.8 ng/m^3 (0.00002 mg/m^3). This concentration is negligible in comparison to the minimum adopted reference concentration for individual PAHs (0.14 mg/m^3), and correction of adopted RfCs for background exposure is therefore not considered necessary.

It is noted that the above analysis has not explicitly considered background exposure to PAHs by smokers. However, ATSDR (1995) report that concentrations of individual PAHs in cigarette smoke range from less than 1 µg per 100 cigarettes to 62 µg per 100 cigarettes. For a 70 kg individual who smokes one pack (20 cigarettes) per day, the maximum expected intake of any individual PAH is therefore estimated to be 0.00018 mg/kg/day. This additional intake due to smoking represents less than 1% of the lowest PAH RfD considered in this assessment (0.03 mg/kg/day).

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Attachment B: Exposure Equations and Parameter Assumptions

Table B1: Equations Used to Estimate Chemical Intake

Exposure Pathway	**Equation**
Incidental Ingestion of Soil	$CDI_{ing,ss} = \frac{C_s * IngR_{ss} * EF * ED * CF * RAF}{365 \frac{days}{year} * AT * BW}$
Dermal Contact with Soil	$CDI_{der,ss} = \frac{C_s * AH * SA * DAF * EF * ED * CF}{365 \frac{days}{year} * AT * BW}$
Inhalation of Soil Derived Particulates	$EC_{inh} = \frac{C_{a\_PM10} * RF * ET * EF * ED}{AT * 365 \frac{days}{year} * 24 \frac{hours}{day}}$

The definitions and adopted values for the parameters presented within these equations are detailed below.

Table B2: Exposure Equation Parameter Definitions and Assumptions

Recreational Users

Parameter	Definition (units)	Adopted Value			Justification
		Child 0-<2 yrs	Child 2-<16 yrs	Adult >16 yrs	
$CDI_{ing,ss}$	Chronic daily intake due to soil ingestion (mg/kg/day)	Calculated			NA (calculated from below parameters)
$CDI_{der,ss}$	Chronic Daily Intake due to dermal contact with soil (mg/kg/day)				
EC_{inh}	Exposure Adjusted Air Concentration (mg/m^3)				
C_s	Chemical concentration in soil (mg/kg)	Chemical specific			Maximum reported concentration at site adopted for initial screening.
$IngR_{ss}$	Soil ingestion rate (mg/day)	40	50	25	0-<2 year old children: Value is average of that recommended by enHealth (2012b) for outside soil ingestion. 2->16 year old children: Value is that recommended by enHeatlh (2012b) for children aged 1-15 years. Adults: Value is that recommended by NEPC (2013) for outdoor soil ingestion during open space/recreation land use. This is equal to one half the enHealth (2012b) recommended value for outdoor soil plus indoor dust, and assumes that one half of the total soil/dust ingested during residential use of land occurs (see NEPC, 2013, Schedule B7).
EF	Exposure frequency (days/year)	130	130	130	Professional judgement; assumes users frequent the site 4 days per week during summer months, and 2 days per week during winter months, on average. This is considered to represent a reasonable maximum exposure scenario, as it is considered very unlikely that the average exposure frequency by an individual over the assumed 35 year exposure duration would exceed this level.
ED	Exposure duration (years)	2	14	19	Assumes receptors reside in vicinity of site and use park for up to 35 years, as recommended for screening risk assessment by enHealth (2012b) and NEPC (2013). It has been conservatively assumed that this period includes childhood years (0-<2 and 2-<16 years of age).
CF	Unit conversion factor (kg/mg)	1 x 10^{-6}			Based on unit definitions
RAF	Relative (oral) absorption factor (chemical specific; unitless)	0.05			Based on site-specific bioaccessibility results for BaP TEQ. See further discussion in **Section 5**.

Parameter	Definition (units)	Adopted Value			Justification
		Child 0-<2 yrs	Child 2-<16 yrs	Adult >16 yrs	
AT	Averaging Time (years)	70 (for non-threshold carcinogens) ED (for chemicals assessed on basis of threshold effects)			As defined by USEPA (1989), enHealth (2012a), NEPC (2013).
BW	Body weight (kg)	15	35	70	Age-weighted average body weights reported for different age groups reported by enHealth (2012b).
AH	Soil adherence factor (mg/cm^2/day)	0.2	0.2	0.2	95th percentile weighted adherence factor for children playing at a day care centre and 50th percentile weighted adherence factor for children playing with wet soil (USEPA, 2004; enHealth, 2012b).
SA	Skin surface available for soil contact (cm^2)	1,450	4,000	6,300	enHealth (2012b) recommended values for potentially exposed skin surface area. Values for children are age weighted averages of those for smaller age groupings (see Tables E1 and E2 within enHealth (2012b).
DAF	Dermal absorption factor (chemical-specific; unitless)	0.02			Based on site-specific bioaccessibility results. See further discussion in **Section 5**.
PEF	Particulate Emission Factor (m^3/kg)	2.6 x 10^7			Assumes average $PM_{2.5}$ concentrations in outdoor air are 39 µg/m^3. This is the 95th percentile value for Australia (enHealth, 2012b). PEF is calculated as the inverse of the assumed air concentration (i.e. 1/21.2 m^3/µg * 10^9 µg/kg = 2.6x10^7 m^3/kg).
RF	Lung Retention Factor (unitless)	1			The dust lung retention factor describes the percentage of respirable dust (typically considered to be the PM_{10} fraction) which is retained in the lungs and is associated with health effects (typically considered to be the $PM_{2.5}$ fraction). However, as the PEF adopted for this HHRA is relevant to $PM_{2.5}$ (rather than PM_{10}), 100% retention has been assumed.
ET	Exposure time (hours/day)	2			NEPC (2013); default for open space / recreation use. Considered conservative for site based on likely usage patterns.

Table B3: Exposure Equation Parameter Definitions and Assumptions

Construction Workers

Parameter	Definition (units)	Adopted Value	Justification
$CDI_{ing,ss}$	Chronic daily intake due to soil ingestion (mg/kg/day)	Calculated	NA (calculated from below parameters)
$CDI_{der,ss}$	Chronic Daily Intake due to dermal contact with soil (mg/kg/day)		
EC_{inh}	Exposure Adjusted Air Concentration (mg/m^3)		
C_s	Chemical concentration in soil (mg/kg)	Chemical specific	Maximum reported concentration at site adopted for initial screening.
$IngR_{ss}$	Soil ingestion rate (mg/day)	330	Default for intrusive workers used in the derivation of the HSLs (CRC CARE, 2011)
EF	Exposure frequency (days/year)	240	Professional judgement; it is assumed that construction works could continue for a full year
ED	Exposure duration (years)	1	
CF	Unit conversion factor (kg/mg)	1 x 10^{-6}	Based on unit definitions
RAF	Relative (oral) absorption factor (chemical specific; unitless)	0.05	Based on site-specific bioaccessibility results for BaP TEQ. See further discussion in **Section 5**.
AT	Averaging Time (years)	70 (for non-threshold carcinogens) ED (for chemicals assessed on basis of threshold effects)	As defined by USEPA (1989), enHealth (2012a), NEPC (2013).
BW	Body weight (kg)	70	Age-weighted average body weights reported for different age groups reported by enHealth (2012b).
AH	Soil adherence factor (mg/cm^2/day)	0.3	Selected based on information provided in the enHealth Australian Exposure Factors Guide. (enHealth, 2012). This is the 95th percentile value for construction workers utilised by the USEPA.
SA	Skin surface available for soil contact (cm^2)	6300	enHealth (2012b) recommended values for potentially exposed skin surface area.
DAF	Dermal absorption factor (chemical-specific; unitless)	0.02	Based on site-specific bioaccessibility results. See further discussion in **Section 5**.

Parameter	Definition (units)	Adopted Value	Justification
PEF	Particulate Emission Factor (m^3/kg)	2.6 x 10^7	Assumes average $PM_{2.5}$ concentrations in outdoor air are 39 µg/m^3. This is the 95th percentile value for Australia (enHealth, 2012b). PEF is calculated as the inverse of the assumed air concentration (i.e. 1/21.2 m^3/µg * 10^9 µg/kg = 2.6x10^7 m^3/kg).
RF	Lung Retention Factor (unitless)	1	The dust lung retention factor describes the percentage of respirable dust (typically considered to be the PM_{10} fraction) which is retained in the lungs and is associated with health effects (typically considered to be the $PM_{2.5}$ fraction). However, as the PEF adopted for this HHRA is relevant to $PM_{2.5}$ (rather than PM_{10}), 100% retention has been assumed.
ET	Exposure time (hours/day)	8	Assume 8 hour working day spent on site

Attachment C: Risk Assessment Models

Soil Ingestion Pathway - Exposure and Risk Estimates

CoPP
M18310
Elwood Foreshore
95% UCL, >0.2m bgl within Management Area
Construction Worker

Exposure Parameter Inputs			
	Adult		
Soil Ingestion Rate (mg/day)	330		
Exposure Frequency (days/year)	240		
Exposure Duration (years)	1		
Relative Oral Absorption Factor	0.1		
Body weight (kg)	70		
Intake/Exposure Factor (non-threshold) (kg/kg/day)	4.43E-09		
Intake/Exposure Factor (threshold) (kg/kg/day)	3.10E-07		

Chemical	Mutagen?	Soil Concentration (mg/kg)	Non-Threshold Exposure and Risk Estimates						Threshold Exposure and Risk Estimates								
			Oral Cancer Slope Factor (mg/kg/day)$^{-1}$	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2-<16 Intake (mg/kg/day)	Lifetime Intake (mg/kg/day)	Incremental Lifetime Excess Cancer Risk*	Oral Reference Dose (mg/kg/day)	Background Intake (mg/kg/day)	RfD (Background Corrected) (mg/kg/day)	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2->16 Intake (mg/kg/day)	Adult Hazard Index (unitless)	Child 0-<2 Hazard Index (unitless)	Child 2-<16 Hazard Index (unitless)
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene TEQ	Y	1.53E+02	2.08E+00	3.39E-08	-	-	3.39E-08	7.05E-08	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL								**7.0E-08**							**0.0E+00**	**0.0E+00**	**0.0E+00**

* Incorporates age-dependent adjustment factors (ADAFs) applied to the oral cancer slope factor for mutagens (ADAF=10 for children 0-<2 years, ADAF=3 for children 2-16 years). See Toxicity Profiles in Report Appendices.

Soil Dermal Contact - Exposure and Risk Estimates

CoPP
M18310
Elwood Foreshore
95% UCL, >0.2m bgl within Management Area
Construction Worker

Exposure Parameter Inputs

	Adult					
Soil to skin adherence factor (mg/cm2)	sodadha	0.3				
Skin surface area available for soil contact (cm2/day)	sodssa	6300				
Exposure Frequency (days/year)	sodefa	240				
Exposure Duration (years)	sodeda	1				
Fraction Soil Derived from Site (unitless)	sodfia	1				
Body weight (kg)	sodbwa	70				
Intake/Exposure Factor (non-threshold) (kg/kg/day)	sodifnta	2.54E-07				
Intake/Exposure Factor (threshold) (kg/kg/day)	sodifta	1.78E-05				

				Non-Threshold Exposure and Risk Estimates						Threshold Exposure and Risk Estimates								
Chemical	Mutagen?	Soil Concentration (mg/kg)	Dermal Absorption Factor (unitless)	Dermal Cancer Slope Factor $(mg/kg/day)^{-1}$	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2-<16 Intake (mg/kg/day)	Lifetime Intake (mg/kg/day)	**Incremental Lifetime Excess Cancer Risk***	Dermal Reference Dose (mg/kg/day)	Background Intake (mg/kg/day)	RfD (Background Corrected) (mg/kg/day)	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2-<16 Intake (mg/kg/day)	**Adult Hazard Index (unitless)**	**Child 0-<2 Hazard Index (unitless)**	**Child 2-<16 Hazard Index (unitless)**
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene TEQ	Y	1.53E+02	5.00E-03	2.08E+00	1.94E-07	-	-	1.94E-07	4.04E-07	--	-	--	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL									**4.0E-07**							**0.0E+00**	**0.0E+00**	**0.0E+00**

* Incorporates age-dependent adjustment factors (ADAFs) applied to the oral cancer slope factor for mutagens (ADAF=10 for children 0-<2 years, ADAF=3 for children 2-16 years). See Toxicity Profiles in Report Appendices.

Inhalation of Outdoor Soil Derived Particulates - Exposure and Risk Estimates

CoPP
M18310
Elwood Foreshore
95% UCL, >0.2m bgl within Management Area
Construction Worker

Exposure Parameter Inputs

	Adult					
Exposure Frequency (days/year)	spoefa	240				
Exposure Duration (years)	spoeda	1				
Exposure Time (hours/day)	spoeta	8				
Fraction Dust Derived from Site (unitless)	spofia	1				
Intake/Exposure Factor (non-threshold) (kg/m^3)	spoifnta	3.13E-03				
Intake/Exposure Factor (threshold) (kg/m^3)	spoifta	2.19E-01				
Particulate Emission Factor (m^3/kg) (all receptors):	2.60E+07					

Chemical	Mutagen?	Soil Concentration (mg/kg)	Predicted Outdoor Air Concentration (mg/m^3)	Non-Threshold Exposure and Risk Estimates						Threshold Exposure and Risk Estimates								
				Inhalation Unit Risk (ug/m3)-1	Adult Exposure Adjusted Air Concentration (mg/m^3)	Child 0-<2 Exposure Adjusted Air Concentration (mg/m^3)	Child 2-<16 Exposure Adjusted Air Concentration (mg/m^3)	Lifetime Exposure Adjusted Air Concentration (mg/m^3)	**Incremental Lifetime Excess Cancer Risk***	Inhalation Reference Concentration (mg/m^3)	Background Air Concentration (mg/m^3)	RfC (Background Corrected) (mg/m^3)	Adult Exposure Adjusted Air Concentration (mg/m^3)	Child 0-<2 Exposure Adjusted Air Concentration (mg/m^3)	Child 2-<16 Exposure Adjusted Air Concentration (mg/m^3)	**Adult Hazard Index (unitless)**	**Child 0-<2 Hazard Index (unitless)**	**Child 2-<16 Hazard Index (unitless)**
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene TEQ	Y	1.53E+02	5.88E-06	5.94E-04	1.84E-08	-	-	1.84E-08	1.09E-08	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL									**1.09E-08**							**0.0E+00**	**0.0E+00**	**0.0E+00**

* Incorporates age-dependent adjustment factors (ADAFs) applied to the oral cancer slope factor for mutagens (ADAF=10 for children 0-<2 years, ADAF=3 for children 2-16 years). See Toxicity Profiles in Report Appendices.

Summary of Risk Estimates

CoPP
M18310
Elwood Foreshore
95% UCL, >0.2m bgl within Management Area
Construction Worker

Exposure Pathway	Non-Threshold Risk Estimates Incremental Excess Lifetime Cancer Risk (unitless)	Threshold Risk Estimates Adult Hazard Index	Threshold Risk Estimates Child Hazard Index
Incidental Soil Ingestion	7.0E-08	0.0E+00	0.0E+00
Dermal Contact with Soil	4.0E-07	0.0E+00	0.0E+00
Inhalation of Soil-Derived Dust in Outdoor Air	1.1E-08	0.0E+00	0.0E+00
Inhalation of Subsurface Soil Derived Vapours in Outdoor Air	-	-	-
TOTAL	**4.8E-07**	**-**	**-**
Adopted Acceptable Risk Level	1.0E-05	1	1
Risks Acceptable?	Yes	NA	NA

Soil Ingestion Pathway - Exposure and Risk Estimates

CoPP
M18310
Elwood Foreshore
95% UCL, >0.2 m bgl within Management Area
Future Open Space / Recreation - Park User (Adult and Child)

Exposure Parameter Inputs			
	Adult	**Child (0-<2 yrs)**	**Child (2-<16 yrs)**
Soil Ingestion Rate (mg/day)	25	40	50
Exposure Frequency (days/year)	365	365	365
Exposure Duration (years)	19	2	14
Relative Oral Absorption Factor	0.1	0.1	0.1
Body weight (kg)	70	15	35
Intake/Exposure Factor (non-threshold) (kg/kg/day)	9.69E-09	7.62E-09	2.86E-08
Intake/Exposure Factor (threshold) (kg/kg/day)	3.57E-08	2.67E-07	1.43E-07

Chemical	Mutagen?	Soil Concentration (mg/kg)	Non-Threshold Exposure and Risk Estimates						Threshold Exposure and Risk Estimates								
			Oral Cancer Slope Factor (mg/kg/day)$^{-1}$	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2-<16 Intake (mg/kg/day)	Lifetime Intake (mg/kg/day)	Incremental Lifetime Excess Cancer Risk*	Oral Reference Dose (mg/kg/day)	Background Intake (mg/kg/day)	RfD (Background Corrected) (mg/kg/day)	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2->16 Intake (mg/kg/day)	Adult Hazard Index (unitless)	Child 0-<2 Hazard Index (unitless)	Child 2-<16 Hazard Index (unitless)
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene TEQ	Y	1.53E+02	2.08E+00	7.42E-08	5.83E-08	2.19E-07	3.51E-07	2.73E-06	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL								**2.7E-06**							**0.0E+00**	**0.0E+00**	**0.0E+00**

* Incorporates age-dependent adjustment factors (ADAFs) applied to the oral cancer slope factor for mutagens (ADAF=10 for children 0-<2 years, ADAF=3 for children 2-16 years). See Toxicity Profiles in Report Appendices.

Soil Dermal Contact - Exposure and Risk Estimates

CoPP
M18310
Elwood Foreshore
95% UCL, >0.2 m bgl within Management Area
Future Open Space / Recreation - Park User (Adult and Child)

Exposure Parameter Inputs

	Adult		**Child (0-<2 yrs)**		**Child (2-<16 yrs)**	
Soil to skin adherence factor (mg/cm2)	sodadha	0.5	sodadhc	0.5	sodadhc2	0.5
Skin surface area available for soil contact (cm2/day)	sodssa	6300	sodssc	1450	sodssc2	4000
Exposure Frequency (days/year)	sodefa	365	sodefsc	365	sodefc2	365
Exposure Duration (years)	sodeda	19	sodedc	2	sodedc2	14
Fraction Soil Derived from Site (unitless)	sodfia	1	sodfic	1	sodfic2	1
Body weight (kg)	sodbwa	70	sodbwc	15	sodbwc2	35
Intake/Exposure Factor (non-threshold) (kg/kg/day)	sodifnta	1.22E-05	sodifntc	1.38E-06	sodifntc2	1.14E-05
Intake/Exposure Factor (threshold) (kg/kg/day)	sodifta	4.50E-05	sodiftc	4.83E-05	sodiftc2	5.71E-05

				Non-Threshold Exposure and Risk Estimates						Threshold Exposure and Risk Estimates								
Chemical	Mutagen?	Soil Concentration (mg/kg)	Dermal Absorption Factor (unitless)	Dermal Cancer Slope Factor $(mg/kg/day)^{-1}$	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2-<16 Intake (mg/kg/day)	Lifetime Intake (mg/kg/day)	**Incremental Lifetime Excess Cancer Risk***	Dermal Reference Dose (mg/kg/day)	Background Intake (mg/kg/day)	RfD (Background Corrected) (mg/kg/day)	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2-<16 Intake (mg/kg/day)	**Adult Hazard Index (unitless)**	**Child 0-<2 Hazard Index (unitless)**	**Child 2-<16 Hazard Index (unitless)**
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene TEQ	Y	1.53E+02	5.00E-03	2.08E+00	9.34E-06	1.06E-06	8.74E-06	1.91E-05	9.60E-05	--	-	--	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL									9.6E-05							**0.0E+00**	**0.0E+00**	**0.0E+00**

* Incorporates age-dependent adjustment factors (ADAFs) applied to the oral cancer slope factor for mutagens (ADAF=10 for children 0-<2 years, ADAF=3 for children 2-16 years). See Toxicity Profiles in Report Appendices.

Inhalation of Outdoor Soil Derived Particulates - Exposure and Risk Estimates

CoPP
M18310
Elwood Foreshore
95% UCL, >0.2 m bgl within Management Area
Future Open Space / Recreation - Park User (Adult and Child)

Exposure Parameter Inputs

	Adult		**Child (0-<2 yrs)**		**Child (2-<16 yrs)**	
Exposure Frequency (days/year)	spoefa	365	spoefc	365	spoefc2	365
Exposure Duration (years)	spoeda	19	spoedc	2	spoedc2	14
Exposure Time (hours/day)	spoeta	2	spoetc	2	spoetc2	2
Fraction Dust Derived from Site (unitless)	spofia	1	spofic	1	spofic2	1
Intake/Exposure Factor (non-threshold) (kg/m^3)	spoifnta	2.26E-02	spoifntc	2.38E-03	spoifntc2	1.67E-02
Intake/Exposure Factor (threshold) (kg/m^3)	spoifta	8.33E-02	spoiftc	8.33E-02	spoiftc2	8.33E-02
Particulate Emission Factor (m^3/kg) (all receptors):	2.60E+07					

Chemical	Mutagen?	Soil Concentration (mg/kg)	Predicted Outdoor Air Concentration (mg/m^3)	Non-Threshold Exposure and Risk Estimates						Threshold Exposure and Risk Estimates								
				Inhalation Unit Risk (ug/m3)-1	Adult Exposure Adjusted Air Concentration (mg/m^3)	Child 0-<2 Exposure Adjusted Air Concentration (mg/m^3)	Child 2-<16 Exposure Adjusted Air Concentration (mg/m^3)	Lifetime Exposure Adjusted Air Concentration (mg/m^3)	**Incremental Lifetime Excess Cancer Risk***	Inhalation Reference Concentration (mg/m^3)	Background Air Concentration (mg/m^3)	RfC (Background Corrected) (mg/m^3)	Adult Exposure Adjusted Air Concentration (mg/m^3)	Child 0-<2 Exposure Adjusted Air Concentration (mg/m^3)	Child 2-<16 Exposure Adjusted Air Concentration (mg/m^3)	**Adult Hazard Index (unitless)**	**Child 0-<2 Hazard Index (unitless)**	**Child 2-<16 Hazard Index (unitless)**
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene TEQ	Y	1.53E+02	5.88E-06	5.94E-04	1.33E-07	1.40E-08	9.81E-08	2.45E-07	3.37E-07	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL									**3.37E-07**							**0.0E+00**	**0.0E+00**	**0.0E+00**

* Incorporates age-dependent adjustment factors (ADAFs) applied to the oral cancer slope factor for mutagens (ADAF=10 for children 0-<2 years, ADAF=3 for children 2-16 years). See Toxicity Profiles in Report Appendices.

Summary of Risk Estimates

CoPP
M18310
Elwood Foreshore
95% UCL, >0.2 m bgl within Management Area
Future Open Space / Recreation - Park User (Adult and Child)

Exposure Pathway	Non-Threshold Risk Estimates	Threshold Risk Estimates	
	Incremental Excess Lifetime Cancer Risk (unitless)	Adult Hazard Index	Child Hazard Index
Incidental Soil Ingestion	2.7E-06	0.0E+00	0.0E+00
Dermal Contact with Soil	9.6E-05	0.0E+00	0.0E+00
Inhalation of Soil-Derived Dust in Outdoor Air	3.4E-07	0.0E+00	0.0E+00
Inhalation of Subsurface Soil Derived Vapours in Outdoor Air	-	-	-
TOTAL	**9.9E-05**	**-**	**-**
Adopted Acceptable Risk Level	1.0E-05	1	1
Risks Acceptable?	No	NA	NA

Soil Ingestion Pathway - Exposure and Risk Estimates

CoPP
M18310
Elwood Foreshore
95% UCL, >0.2 m bgl outside Management Area
Construction Worker

Exposure Parameter Inputs	Adult		
Soil Ingestion Rate (mg/day)	330		
Exposure Frequency (days/year)	240		
Exposure Duration (years)	1		
Relative Oral Absorption Factor	0.1		
Body weight (kg)	70		
Intake/Exposure Factor (non-threshold) (kg/kg/day)	4.43E-09		
Intake/Exposure Factor (threshold) (kg/kg/day)	3.10E-07		

			Non-Threshold Exposure and Risk Estimates						Threshold Exposure and Risk Estimates								
Chemical	Mutagen?	Soil Concentration (mg/kg)	Oral Cancer Slope Factor (mg/kg/day)⁻¹	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2-<16 Intake (mg/kg/day)	Lifetime Intake (mg/kg/day)	Incremental Lifetime Excess Cancer Risk*	Oral Reference Dose (mg/kg/day)	Background Intake (mg/kg/day)	RfD (Background Corrected) (mg/kg/day)	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2->16 Intake (mg/kg/day)	Adult Hazard Index (unitless)	Child 0-<2 Hazard Index (unitless)	Child 2-<16 Hazard Index (unitless)
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene TEQ	Y	9.40E+00	2.08E+00	2.08E-09	-	-	2.08E-09	4.33E-09	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL								**4.3E-09**							**0.0E+00**	**0.0E+00**	**0.0E+00**

* Incorporates age-dependent adjustment factors (ADAFs) applied to the oral cancer slope factor for mutagens (ADAF=10 for children 0-<2 years, ADAF=3 for children 2-16 years). See Toxicity Profiles in Report Appendices.

Soil Dermal Contact - Exposure and Risk Estimates

CoPP
M18310
Elwood Foreshore
95% UCL, >0.2 m bgl outside Management Area
Construction Worker

Exposure Parameter Inputs						
	Adult					
Soil to skin adherence factor (mg/cm2)	sodadha	0.3				
Skin surface area available for soil contact (cm2/day)	sodssa	6300				
Exposure Frequency (days/year)	sodefa	240				
Exposure Duration (years)	sodeda	1				
Fraction Soil Derived from Site (unitless)	sodfia	1				
Body weight (kg)	sodbwa	70				
Intake/Exposure Factor (non-threshold) (kg/kg/day)	sodifnta	2.54E-07				
Intake/Exposure Factor (threshold) (kg/kg/day)	sodifta	1.78E-05				

				Non-Threshold Exposure and Risk Estimates						Threshold Exposure and Risk Estimates								
Chemical	Mutagen?	Soil Concentration (mg/kg)	Dermal Absorption Factor (unitless)	Dermal Cancer Slope Factor $(mg/kg/day)^{-1}$	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2-<16 Intake (mg/kg/day)	Lifetime Intake (mg/kg/day)	**Incremental Lifetime Excess Cancer Risk***	Dermal Reference Dose (mg/kg/day)	Background Intake (mg/kg/day)	RfD (Background Corrected) (mg/kg/day)	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2-<16 Intake (mg/kg/day)	**Adult Hazard Index (unitless)**	**Child 0-<2 Hazard Index (unitless)**	**Child 2-<16 Hazard Index (unitless)**
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene TEQ	Y	9.40E+00	5.00E-03	2.08E+00	1.19E-08	-	-	1.19E-08	2.48E-08	--	-	--	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL									**2.5E-08**							**0.0E+00**	**0.0E+00**	**0.0E+00**

* Incorporates age-dependent adjustment factors (ADAFs) applied to the oral cancer slope factor for mutagens (ADAF=10 for children 0-<2 years, ADAF=3 for children 2-16 years). See Toxicity Profiles in Report Appendices.

Inhalation of Outdoor Soil Derived Particulates - Exposure and Risk Estimates

CoPP
M18310
Elwood Foreshore
95% UCL, >0.2 m bgl outside Management Area
Construction Worker

Exposure Parameter Inputs

	Adult					
Exposure Frequency (days/year)	spoefa	240				
Exposure Duration (years)	spoeda	1				
Exposure Time (hours/day)	spoeta	8				
Fraction Dust Derived from Site (unitless)	spofia	1				
Intake/Exposure Factor (non-threshold) (kg/m^3)	spoifnta	3.13E-03				
Intake/Exposure Factor (threshold) (kg/m^3)	spoifta	2.19E-01				
Particulate Emission Factor (m^3/kg) (all receptors):	2.60E+07					

				Non-Threshold Exposure and Risk Estimates						Threshold Exposure and Risk Estimates								
Chemical	Mutagen?	Soil Concentration (mg/kg)	Predicted Outdoor Air Concentration (mg/m^3)	Inhalation Unit Risk (ug/m3)-1	Adult Exposure Adjusted Air Concentration (mg/m^3)	Child 0-<2 Exposure Adjusted Air Concentration (mg/m^3)	Child 2-<16 Exposure Adjusted Air Concentration (mg/m^3)	Lifetime Exposure Adjusted Air Concentration (mg/m^3)	**Incremental Lifetime Excess Cancer Risk***	Inhalation Reference Concentration (mg/m^3)	Background Air Concentration (mg/m^3)	RfC (Background Corrected) (mg/m^3)	Adult Exposure Adjusted Air Concentration (mg/m^3)	Child 0-<2 Exposure Adjusted Air Concentration (mg/m^3)	Child 2-<16 Exposure Adjusted Air Concentration (mg/m^3)	**Adult Hazard Index (unitless)**	**Child 0-<2 Hazard Index (unitless)**	**Child 2-<16 Hazard Index (unitless)**
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**-**	**-**	**-**
Benzo(a)pyrene TEQ	Y	9.40E+00	3.62E-07	5.94E-04	1.13E-09	-	-	1.13E-09	6.73E-10	-	-	-	-	-	-	**-**	**-**	**-**
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**-**	**-**	**-**
TOTAL									**6.73E-10**							**0.0E+00**	**0.0E+00**	**0.0E+00**

* Incorporates age-dependent adjustment factors (ADAFs) applied to the oral cancer slope factor for mutagens (ADAF=10 for children 0-<2 years, ADAF=3 for children 2-16 years). See Toxicity Profiles in Report Appendices.

Summary of Risk Estimates

CoPP
M18310
Elwood Foreshore
95% UCL, >0.2 m bgl outside Management Area
Construction Worker

	Non-Threshold Risk Estimates	Threshold Risk Estimates	
Exposure Pathway	Incremental Excess Lifetime Cancer Risk (unitless)	Adult Hazard Index	Child Hazard Index
Incidental Soil Ingestion	4.3E-09	0.0E+00	0.0E+00
Dermal Contact with Soil	2.5E-08	0.0E+00	0.0E+00
Inhalation of Soil-Derived Dust in Outdoor Air	6.7E-10	0.0E+00	0.0E+00
Inhalation of Subsurface Soil Derived Vapours in Outdoor Air	-	-	-
TOTAL	**3.0E-08**	**-**	**-**
Adopted Acceptable Risk Level	1.0E-05	1	1
Risks Acceptable?	Yes	NA	NA

Soil Ingestion Pathway - Exposure and Risk Estimates

CoPP
M18310
Elwood Foreshore
95%UCL, >0.2 m bgl outside Management Area
Future Open Space / Recreation - Park User (Adult and Child)

Exposure Parameter Inputs			
	Adult	**Child (0-<2 yrs)**	**Child (2-<16 yrs)**
Soil Ingestion Rate (mg/day)	25	40	50
Exposure Frequency (days/year)	365	365	365
Exposure Duration (years)	19	2	14
Relative Oral Absorption Factor	0.1	0.1	0.1
Body weight (kg)	70	15	35
Intake/Exposure Factor (non-threshold) (kg/kg/day)	9.69E-09	7.62E-09	2.86E-08
Intake/Exposure Factor (threshold) (kg/kg/day)	3.57E-08	2.67E-07	1.43E-07

Chemical	Mutagen?	Soil Concentration (mg/kg)	Non-Threshold Exposure and Risk Estimates						Threshold Exposure and Risk Estimates								
			Oral Cancer Slope Factor (mg/kg/day)-1	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2-<16 Intake (mg/kg/day)	Lifetime Intake (mg/kg/day)	Incremental Lifetime Excess Cancer Risk*	Oral Reference Dose (mg/kg/day)	Background Intake (mg/kg/day)	RfD (Background Corrected) (mg/kg/day)	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2->16 Intake (mg/kg/day)	Adult Hazard Index (unitless)	Child 0-<2 Hazard Index (unitless)	Child 2-<16 Hazard Index (unitless)
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene TEQ	Y	9.40E+00	2.08E+00	4.56E-09	3.58E-09	1.34E-08	2.16E-08	1.68E-07	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL								**1.7E-07**							**0.0E+00**	**0.0E+00**	**0.0E+00**

* Incorporates age-dependent adjustment factors (ADAFs) applied to the oral cancer slope factor for mutagens (ADAF=10 for children 0-<2 years, ADAF=3 for children 2-16 years). See Toxicity Profiles in Report Appendices.

Soil Dermal Contact - Exposure and Risk Estimates

CoPP
M18310
Elwood Foreshore
95%UCL, >0.2 m bgl outside Management Area
Future Open Space / Recreation - Park User (Adult and Child)

Exposure Parameter Inputs

	Adult		**Child (0-<2 yrs)**		**Child (2-<16 yrs)**	
Soil to skin adherence factor (mg/cm2)	sodadha	0.5	sodadhc	0.5	sodadhc2	0.5
Skin surface area available for soil contact (cm2/day)	sodssa	6300	sodssc	1450	sodssc2	4000
Exposure Frequency (days/year)	sodefa	365	sodefsc	365	sodefc2	365
Exposure Duration (years)	sodeda	19	sodedc	2	sodedc2	14
Fraction Soil Derived from Site (unitless)	sodfia	1	sodfic	1	sodfic2	1
Body weight (kg)	sodbwa	70	sodbwc	15	sodbwc2	35
Intake/Exposure Factor (non-threshold) (kg/kg/day)	sodifnta	1.22E-05	sodifntc	1.38E-06	sodifntc2	1.14E-05
Intake/Exposure Factor (threshold) (kg/kg/day)	sodifta	4.50E-05	sodiftc	4.83E-05	sodiftc2	5.71E-05

Chemical	Mutagen?	Soil Concentration (mg/kg)	Dermal Absorption Factor (unitless)	Non-Threshold Exposure and Risk Estimates						Threshold Exposure and Risk Estimates								
				Dermal Cancer Slope Factor $(mg/kg/day)^{-1}$	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2-<16 Intake (mg/kg/day)	Lifetime Intake (mg/kg/day)	**Incremental Lifetime Excess Cancer Risk***	Dermal Reference Dose (mg/kg/day)	Background Intake (mg/kg/day)	RfD (Background Corrected) (mg/kg/day)	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2-<16 Intake (mg/kg/day)	**Adult Hazard Index (unitless)**	**Child 0-<2 Hazard Index (unitless)**	**Child 2-<16 Hazard Index (unitless)**
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene TEQ	Y	9.40E+00	5.00E-03	2.08E+00	5.74E-07	6.49E-08	5.37E-07	1.18E-06	5.90E-06	--	-	--	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL									**5.9E-06**							**0.0E+00**	**0.0E+00**	**0.0E+00**

* Incorporates age-dependent adjustment factors (ADAFs) applied to the oral cancer slope factor for mutagens (ADAF=10 for children 0-<2 years, ADAF=3 for children 2-16 years). See Toxicity Profiles in Report Appendices.

Inhalation of Outdoor Soil Derived Particulates - Exposure and Risk Estimates

CoPP
M18310
Elwood Foreshore
95%UCL, >0.2 m bgl outside Management Area
Future Open Space / Recreation - Park User (Adult and Child)

Exposure Parameter Inputs

	Adult		**Child (0-<2 yrs)**		**Child (2-<16 yrs)**	
Exposure Frequency (days/year)	spoefa	365	spoefc	365	spoefc2	365
Exposure Duration (years)	spoeda	19	spoedc	2	spoedc2	14
Exposure Time (hours/day)	spoeta	2	spoetc	2	spoetc2	2
Fraction Dust Derived from Site (unitless)	spofia	1	spofic	1	spofic2	1
Intake/Exposure Factor (non-threshold) (kg/m^3)	spoifnta	2.26E-02	spoifntc	2.38E-03	spoifntc2	1.67E-02
Intake/Exposure Factor (threshold) (kg/m^3)	spoifta	8.33E-02	spoiftc	8.33E-02	spoiftc2	8.33E-02
Particulate Emission Factor (m^3/kg) (all receptors):	2.60E+07					

Chemical	Mutagen?	Soil Concentration (mg/kg)	Predicted Outdoor Air Concentration (mg/m^3)	Non-Threshold Exposure and Risk Estimates						Threshold Exposure and Risk Estimates								
				Inhalation Unit Risk (ug/m3)-1	Adult Exposure Adjusted Air Concentration (mg/m^3)	Child 0-<2 Exposure Adjusted Air Concentration (mg/m^3)	Child 2-<16 Exposure Adjusted Air Concentration (mg/m^3)	Lifetime Exposure Adjusted Air Concentration (mg/m^3)	**Incremental Lifetime Excess Cancer Risk***	Inhalation Reference Concentration (mg/m^3)	Background Air Concentration (mg/m^3)	RfC (Background Corrected) (mg/m^3)	Adult Exposure Adjusted Air Concentration (mg/m^3)	Child 0-<2 Exposure Adjusted Air Concentration (mg/m^3)	Child 2-<16 Exposure Adjusted Air Concentration (mg/m^3)	**Adult Hazard Index (unitless)**	**Child 0-<2 Hazard Index (unitless)**	**Child 2-<16 Hazard Index (unitless)**
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene TEQ	Y	9.40E+00	3.62E-07	5.94E-04	8.18E-09	8.61E-10	6.03E-09	1.51E-08	2.07E-08	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL									**2.07E-08**							**0.0E+00**	**0.0E+00**	**0.0E+00**

* Incorporates age-dependent adjustment factors (ADAFs) applied to the oral cancer slope factor for mutagens (ADAF=10 for children 0-<2 years, ADAF=3 for children 2-16 years). See Toxicity Profiles in Report Appendices.

Summary of Risk Estimates

CoPP
M18310
Elwood Foreshore
95%UCL, >0.2 m bgl outside Management Area
Future Open Space / Recreation - Park User (Adult and Child)

	Non-Threshold Risk Estimates	Threshold Risk Estimates	
Exposure Pathway	Incremental Excess Lifetime Cancer Risk (unitless)	Adult Hazard Index	Child Hazard Index
Incidental Soil Ingestion	1.7E-07	0.0E+00	0.0E+00
Dermal Contact with Soil	5.9E-06	0.0E+00	0.0E+00
Inhalation of Soil-Derived Dust in Outdoor Air	2.1E-08	0.0E+00	0.0E+00
Inhalation of Subsurface Soil Derived Vapours in Outdoor Air	-	-	-
TOTAL	**6.1E-06**	**-**	**-**
Adopted Acceptable Risk Level	1.0E-05	1	1
Risks Acceptable?	Yes	NA	NA

Soil Ingestion Pathway - Exposure and Risk Estimates

CoPP
M18310
Elwood Foreshore
95% UCL, <0.2 m bgl for entire site area
Construction Worker

Exposure Parameter Inputs			
	Adult		
Soil Ingestion Rate (mg/day)	330		
Exposure Frequency (days/year)	240		
Exposure Duration (years)	1		
Relative Oral Absorption Factor	0.1		
Body weight (kg)	70		
Intake/Exposure Factor (non-threshold) (kg/kg/day)	4.43E-09		
Intake/Exposure Factor (threshold) (kg/kg/day)	3.10E-07		

Chemical	Mutagen?	Soil Concentration (mg/kg)	Non-Threshold Exposure and Risk Estimates						Threshold Exposure and Risk Estimates									
			Oral Cancer Slope Factor (mg/kg/day)$^{-1}$	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2-<16 Intake (mg/kg/day)	Lifetime Intake (mg/kg/day)	Incremental Lifetime Excess Cancer Risk*	Oral Reference Dose (mg/kg/day)	Background Intake (mg/kg/day)	RfD (Background Corrected) (mg/kg/day)	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2->16 Intake (mg/kg/day)	Adult Hazard Index (unitless)	Child 0-<2 Hazard Index (unitless)	Child 2-<16 Hazard Index (unitless)
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene TEQ	Y	6.00E+00	2.08E+00	1.33E-09	-	-	1.33E-09	2.76E-09	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL								**2.8E-09**							**0.0E+00**	**0.0E+00**	**0.0E+00**

* Incorporates age-dependent adjustment factors (ADAFs) applied to the oral cancer slope factor for mutagens (ADAF=10 for children 0-<2 years, ADAF=3 for children 2-16 years). See Toxicity Profiles in Report Appendices.

Soil Dermal Contact - Exposure and Risk Estimates

CoPP
M18310
Elwood Foreshore
95% UCL, <0.2 m bgl for entire site area
Construction Worker

Exposure Parameter Inputs						
	Adult					
Soil to skin adherence factor (mg/cm2)	sodadha	0.3				
Skin surface area available for soil contact (cm2/day)	sodssa	6300				
Exposure Frequency (days/year)	sodefa	240				
Exposure Duration (years)	sodeda	1				
Fraction Soil Derived from Site (unitless)	sodfia	1				
Body weight (kg)	sodbwa	70				
Intake/Exposure Factor (non-threshold) (kg/kg/day)	sodifnta	2.54E-07				
Intake/Exposure Factor (threshold) (kg/kg/day)	sodifta	1.78E-05				

				Non-Threshold Exposure and Risk Estimates						Threshold Exposure and Risk Estimates								
Chemical	Mutagen?	Soil Concentration (mg/kg)	Dermal Absorption Factor (unitless)	Dermal Cancer Slope Factor (mg/kg/day)$^{-1}$	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2-<16 Intake (mg/kg/day)	Lifetime Intake (mg/kg/day)	**Incremental Lifetime Excess Cancer Risk***	Dermal Reference Dose (mg/kg/day)	Background Intake (mg/kg/day)	RfD (Background Corrected) (mg/kg/day)	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2-<16 Intake (mg/kg/day)	**Adult Hazard Index (unitless)**	**Child 0-<2 Hazard Index (unitless)**	**Child 2-<16 Hazard Index (unitless)**
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**-**	**-**	**-**
Benzo(a)pyrene TEQ	Y	6.00E+00	5.00E-03	2.08E+00	7.61E-09	-	-	7.61E-09	1.58E-08	--	-	--	-	-	-	**-**	**-**	**-**
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**-**	**-**	**-**
TOTAL									**1.6E-08**							**0.0E+00**	**0.0E+00**	**0.0E+00**

* Incorporates age-dependent adjustment factors (ADAFs) applied to the oral cancer slope factor for mutagens (ADAF=10 for children 0-<2 years, ADAF=3 for children 2-16 years). See Toxicity Profiles in Report Appendices.

Inhalation of Outdoor Soil Derived Particulates - Exposure and Risk Estimates

CoPP
M18310
Elwood Foreshore
95% UCL, <0.2 m bgl for entire site area
Construction Worker

Exposure Parameter Inputs

	Adult					
Exposure Frequency (days/year)	spoefa	240				
Exposure Duration (years)	spoeda	1				
Exposure Time (hours/day)	spoeta	8				
Fraction Dust Derived from Site (unitless)	spofia	1				
Intake/Exposure Factor (non-threshold) (kg/m^3)	spoifnta	3.13E-03				
Intake/Exposure Factor (threshold) (kg/m^3)	spoifta	2.19E-01				
Particulate Emission Factor (m^3/kg) (all receptors):	2.60E+07					

Chemical	Mutagen?	Soil Concentration (mg/kg)	Predicted Outdoor Air Concentration (mg/m^3)	Non-Threshold Exposure and Risk Estimates						Threshold Exposure and Risk Estimates								
				Inhalation Unit Risk (ug/m3)-1	Adult Exposure Adjusted Air Concentration (mg/m^3)	Child 0-<2 Exposure Adjusted Air Concentration (mg/m^3)	Child 2-<16 Exposure Adjusted Air Concentration (mg/m^3)	Lifetime Exposure Adjusted Air Concentration (mg/m^3)	**Incremental Lifetime Excess Cancer Risk***	Inhalation Reference Concentration (mg/m^3)	Background Air Concentration (mg/m^3)	RfC (Background Corrected) (mg/m^3)	Adult Exposure Adjusted Air Concentration (mg/m^3)	Child 0-<2 Exposure Adjusted Air Concentration (mg/m^3)	Child 2-<16 Exposure Adjusted Air Concentration (mg/m^3)	**Adult Hazard Index (unitless)**	**Child 0-<2 Hazard Index (unitless)**	**Child 2-<16 Hazard Index (unitless)**
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**-**	**-**	**-**
Benzo(a)pyrene TEQ	Y	6.00E+00	2.31E-07	5.94E-04	7.23E-10	-	-	7.23E-10	4.29E-10	-	-	-	-	-	-	**-**	**-**	**-**
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**-**	**-**	**-**
TOTAL									**4.29E-10**							**0.0E+00**	**0.0E+00**	**0.0E+00**

* Incorporates age-dependent adjustment factors (ADAFs) applied to the oral cancer slope factor for mutagens (ADAF=10 for children 0-<2 years, ADAF=3 for children 2-16 years). See Toxicity Profiles in Report Appendices.

Summary of Risk Estimates

CoPP
M18310
Elwood Foreshore
95% UCL, <0.2 m bgl for entire site area
Construction Worker

Exposure Pathway	Non-Threshold Risk Estimates Incremental Excess Lifetime Cancer Risk (unitless)	Threshold Risk Estimates Adult Hazard Index	 Child Hazard Index
Incidental Soil Ingestion	2.8E-09	0.0E+00	0.0E+00
Dermal Contact with Soil	1.6E-08	0.0E+00	0.0E+00
Inhalation of Soil-Derived Dust in Outdoor Air	4.3E-10	0.0E+00	0.0E+00
Inhalation of Subsurface Soil Derived Vapours in Outdoor Air	-	-	-
TOTAL	**1.9E-08**	**-**	**-**
Adopted Acceptable Risk Level	1.0E-05	1	1
Risks Acceptable?	Yes	NA	NA

Chemicals of Concern and Concentrations in Environmental Media

CoPP
M18310
Elwood Foreshore
95%UCL, <0.2 m bgl for entire site area
Future Open Space / Recreation - Park User (Adult and Child)

	Media Concentrations					
Chemical (select from drop down list)	Surface Soil (for direct contact and dust pathways) (mg/kg)	Subsurface Soil (for vapour pathways) (mg/kg)	Groundwater (mg/L)	Ambient Air (measured, if applicable) (mg/m3)	Soil Vapour (measured, if applicable) (mg/m3)	Surface Water (mg/L)
Benzo(a)pyrene TEQ	6					

Soil Ingestion Pathway - Exposure and Risk Estimates

CoPP
M18310
Elwood Foreshore
95%UCL, <0.2 m bgl for entire site area
Future Open Space / Recreation - Park User (Adult and Child)

Exposure Parameter Inputs	**Adult**	**Child (0-<2 yrs)**	**Child (2-<16 yrs)**
Soil Ingestion Rate (mg/day)	25	40	50
Exposure Frequency (days/year)	365	365	365
Exposure Duration (years)	19	2	14
Relative Oral Absorption Factor	0.1	0.1	0.1
Body weight (kg)	70	15	35
Intake/Exposure Factor (non-threshold) (kg/kg/day)	9.69E-09	7.62E-09	2.86E-08
Intake/Exposure Factor (threshold) (kg/kg/day)	3.57E-08	2.67E-07	1.43E-07

Chemical	Mutagen?	Soil Concentration (mg/kg)	Non-Threshold Exposure and Risk Estimates						Threshold Exposure and Risk Estimates									
			Oral Cancer Slope Factor (mg/kg/day)$^{-1}$	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2-<16 Intake (mg/kg/day)	Lifetime Intake (mg/kg/day)	Incremental Lifetime Excess Cancer Risk*	Oral Reference Dose (mg/kg/day)	Background Intake (mg/kg/day)	RfD (Background Corrected) (mg/kg/day)	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2->16 Intake (mg/kg/day)	Adult Hazard Index (unitless)	Child 0-<2 Hazard Index (unitless)	Child 2-<16 Hazard Index (unitless)
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene TEQ	Y	6.00E+00	2.08E+00	2.91E-09	2.29E-09	8.57E-09	1.38E-08	1.07E-07	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL								**1.1E-07**							**0.0E+00**	**0.0E+00**	**0.0E+00**

* Incorporates age-dependent adjustment factors (ADAFs) applied to the oral cancer slope factor for mutagens (ADAF=10 for children 0-<2 years, ADAF=3 for children 2-16 years). See Toxicity Profiles in Report Appendices.

Soil Dermal Contact - Exposure and Risk Estimates

CoPP
M18310
Elwood Foreshore
95%UCL, <0.2 m bgl for entire site area
Future Open Space / Recreation - Park User (Adult and Child)

Exposure Parameter Inputs						
	Adult		**Child (0-<2 yrs)**		**Child (2-<16 yrs)**	
Soil to skin adherence factor (mg/cm2)	sodadha	0.5	sodadhc	0.5	sodadhc2	0.5
Skin surface area available for soil contact (cm2/day)	sodssa	6300	sodssc	1450	sodssc2	4000
Exposure Frequency (days/year)	sodefa	365	sodefsc	365	sodefc2	365
Exposure Duration (years)	sodeda	19	sodedc	2	sodedc2	14
Fraction Soil Derived from Site (unitless)	sodfia	1	sodfic	1	sodfic2	1
Body weight (kg)	sodbwa	70	sodbwc	15	sodbwc2	35
Intake/Exposure Factor (non-threshold) (kg/kg/day)	sodifnta	1.22E-05	sodifntc	1.38E-06	sodifntc2	1.14E-05
Intake/Exposure Factor (threshold) (kg/kg/day)	sodifta	4.50E-05	sodiftc	4.83E-05	sodiftc2	5.71E-05

Chemical	Mutagen?	Soil Concentration (mg/kg)	Dermal Absorption Factor (unitless)	Non-Threshold Exposure and Risk Estimates						Threshold Exposure and Risk Estimates								
				Dermal Cancer Slope Factor $(mg/kg/day)^{-1}$	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2-<16 Intake (mg/kg/day)	Lifetime Intake (mg/kg/day)	**Incremental Lifetime Excess Cancer Risk***	Dermal Reference Dose (mg/kg/day)	Background Intake (mg/kg/day)	RfD (Background Corrected) (mg/kg/day)	Adult Intake (mg/kg/day)	Child 0-<2 Intake (mg/kg/day)	Child 2-<16 Intake (mg/kg/day)	**Adult Hazard Index (unitless)**	**Child 0-<2 Hazard Index (unitless)**	**Child 2-<16 Hazard Index (unitless)**
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene TEQ	Y	6.00E+00	5.00E-03	2.08E+00	3.66E-07	4.14E-08	3.43E-07	7.51E-07	3.76E-06	--	-	--	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL									**3.8E-06**							**0.0E+00**	**0.0E+00**	**0.0E+00**

* Incorporates age-dependent adjustment factors (ADAFs) applied to the oral cancer slope factor for mutagens (ADAF=10 for children 0-<2 years, ADAF=3 for children 2-16 years). See Toxicity Profiles in Report Appendices.

Inhalation of Outdoor Soil Derived Particulates - Exposure and Risk Estimates

CoPP
M18310
Elwood Foreshore
95%UCL, <0.2 m bgl for entire site area
Future Open Space / Recreation - Park User (Adult and Child)

Exposure Parameter Inputs

	Adult		Child (0-<2 yrs)		Child (2-<16 yrs)	
Exposure Frequency (days/year)	spoefa	365	spoefc	365	spoefc2	365
Exposure Duration (years)	spoeda	19	spoedc	2	spoedc2	14
Exposure Time (hours/day)	spoeta	2	spoetc	2	spoetc2	2
Fraction Dust Derived from Site (unitless)	spofia	1	spofic	1	spofic2	1
Intake/Exposure Factor (non-threshold) (kg/m^3)	spoifnta	2.26E-02	spoifntc	2.38E-03	spoifntc2	1.67E-02
Intake/Exposure Factor (threshold) (kg/m^3)	spoifta	8.33E-02	spoiftc	8.33E-02	spoiftc2	8.33E-02
Particulate Emission Factor (m^3/kg) (all receptors):	2.60E+07					

Chemical	Mutagen?	Soil Concentration (mg/kg)	Predicted Outdoor Air Concentration (mg/m^3)	Non-Threshold Exposure and Risk Estimates						Threshold Exposure and Risk Estimates								
				Inhalation Unit Risk (ug/m3)-1	Adult Exposure Adjusted Air Concentration (mg/m^3)	Child 0-<2 Exposure Adjusted Air Concentration (mg/m^3)	Child 2-<16 Exposure Adjusted Air Concentration (mg/m^3)	Lifetime Exposure Adjusted Air Concentration (mg/m^3)	**Incremental Lifetime Excess Cancer Risk***	Inhalation Reference Concentration (mg/m^3)	Background Air Concentration (mg/m^3)	RfC (Background Corrected) (mg/m^3)	Adult Exposure Adjusted Air Concentration (mg/m^3)	Child 0-<2 Exposure Adjusted Air Concentration (mg/m^3)	Child 2-<16 Exposure Adjusted Air Concentration (mg/m^3)	**Adult Hazard Index (unitless)**	**Child 0-<2 Hazard Index (unitless)**	**Child 2-<16 Hazard Index (unitless)**
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene TEQ	Y	6.00E+00	2.31E-07	5.94E-04	5.22E-09	5.49E-10	3.85E-09	9.62E-09	1.32E-08	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL									**1.32E-08**							**0.0E+00**	**0.0E+00**	**0.0E+00**

* Incorporates age-dependent adjustment factors (ADAFs) applied to the oral cancer slope factor for mutagens (ADAF=10 for children 0-<2 years, ADAF=3 for children 2-16 years). See Toxicity Profiles in Report Appendices.

Summary of Risk Estimates

CoPP
M18310
Elwood Foreshore
95%UCL, <0.2 m bgl for entire site area
Future Open Space / Recreation - Park User (Adult and Child)

Exposure Pathway	Non-Threshold Risk Estimates	Threshold Risk Estimates	
	Incremental Excess Lifetime Cancer Risk (unitless)	Adult Hazard Index	Child Hazard Index
Incidental Soil Ingestion	1.1E-07	0.0E+00	0.0E+00
Dermal Contact with Soil	3.8E-06	0.0E+00	0.0E+00
Inhalation of Soil-Derived Dust in Outdoor Air	1.3E-08	0.0E+00	0.0E+00
Inhalation of Subsurface Soil Derived Vapours in Outdoor Air	-	-	-
TOTAL	**3.9E-06**	**-**	**-**
Adopted Acceptable Risk Level	1.0E-05	1	1
Risks Acceptable?	Yes	NA	NA

Attachment D: 95% UCL Statistics

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.126/03/2021 11:58:02 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Deep_ManagementArea_BaP_TEQ

General Statistics

Total Number of Observations	40	Number of Distinct Observations	32
Number of Detects	39	Number of Non-Detects	1
Number of Distinct Detects	31	Number of Distinct Non-Detects	1
Minimum Detect	1.3	Minimum Non-Detect	0.1
Maximum Detect	410	Maximum Non-Detect	0.1
Variance Detects	6272	Percent Non-Detects	2.5%
Mean Detects	52.59	SD Detects	79.2
Median Detects	27	CV Detects	1.506
Skewness Detects	2.935	Kurtosis Detects	10.4
Mean of Logged Detects	3.136	SD of Logged Detects	1.358

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.628	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.939	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.312	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.14	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	51.28	KM Standard Error of Mean	12.43
KM SD	77.62	95% KM (BCA) UCL	74.38
95% KM (t) UCL	72.22	95% KM (Percentile Bootstrap) UCL	71.25
95% KM (z) UCL	71.73	95% KM Bootstrap t UCL	86.7
90% KM Chebyshev UCL	88.58	95% KM Chebyshev UCL	105.5
97.5% KM Chebyshev UCL	128.9	99% KM Chebyshev UCL	175

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.136	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.791	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.18	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.147	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.727	k star (bias corrected MLE)	0.689
Theta hat (MLE)	72.29	Theta star (bias corrected MLE)	76.37
nu hat (MLE)	56.74	nu star (bias corrected)	53.71
Mean (detects)	52.59		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	51.27
Maximum	410	Median	26
SD	78.61	CV	1.533
k hat (MLE)	0.618	k star (bias corrected MLE)	0.589
Theta hat (MLE)	82.9	Theta star (bias corrected MLE)	87.08
nu hat (MLE)	49.48	nu star (bias corrected)	47.1
Adjusted Level of Significance (β)	0.044		
Approximate Chi Square Value (47.10, α)	32.35	Adjusted Chi Square Value (47.10, β)	31.89
95% Gamma Approximate UCL (use when n>=50)	74.65	95% Gamma Adjusted UCL (use when n<50)	75.72

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	51.28	SD (KM)	77.62
Variance (KM)	6026	SE of Mean (KM)	12.43
k hat (KM)	0.436	k star (KM)	0.42
nu hat (KM)	34.91	nu star (KM)	33.62
theta hat (KM)	117.5	theta star (KM)	122
80% gamma percentile (KM)	83.19	90% gamma percentile (KM)	143.5
95% gamma percentile (KM)	209.4	99% gamma percentile (KM)	374.2

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (33.62, α)	21.36	Adjusted Chi Square Value (33.62, β)	21
95% Gamma Approximate KM-UCL (use when n>=50)	80.7	95% Gamma Adjusted KM-UCL (use when n<50)	82.11

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.968	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.939	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0925	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.14	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	51.29	Mean in Log Scale	3.05
SD in Original Scale	78.6	SD in Log Scale	1.448
95% t UCL (assumes normality of ROS data)	72.23	95% Percentile Bootstrap UCL	72.35
95% BCA Bootstrap UCL	80.37	95% Bootstrap t UCL	86.09
95% H-UCL (Log ROS)	120		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	3	KM Geo Mean	20.09
KM SD (logged)	1.573	95% Critical H Value (KM-Log)	3.151
KM Standard Error of Mean (logged)	0.252	95% H-UCL (KM -Log)	153
KM SD (logged)	1.573	95% Critical H Value (KM-Log)	3.151
KM Standard Error of Mean (logged)	0.252		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	51.27	Mean in Log Scale	2.983
SD in Original Scale	78.61	SD in Log Scale	1.654
95% t UCL (Assumes normality)	72.22	95% H-Stat UCL	184.4

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

KM H-UCL	153

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Deep_ManagementArea_TotalPAH

General Statistics

Total Number of Observations	40	Number of Distinct Observations	36
Number of Detects	39	Number of Non-Detects	1
Number of Distinct Detects	35	Number of Distinct Non-Detects	1
Minimum Detect	8.6	Minimum Non-Detect	0.1
Maximum Detect	2237	Maximum Non-Detect	0.1
Variance Detects	293765	Percent Non-Detects	2.5%
Mean Detects	358.3	SD Detects	542
Median Detects	160	CV Detects	1.513
Skewness Detects	2.174	Kurtosis Detects	4.007
Mean of Logged Detects	4.984	SD of Logged Detects	1.386

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.634	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.939	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.356	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.14	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	349.4	KM Standard Error of Mean	85.09
KM SD	531.2	95% KM (BCA) UCL	502.8
95% KM (t) UCL	492.8	95% KM (Percentile Bootstrap) UCL	502.1
95% KM (z) UCL	489.3	95% KM Bootstrap t UCL	551
90% KM Chebyshev UCL	604.7	95% KM Chebyshev UCL	720.3
97.5% KM Chebyshev UCL	880.8	99% KM Chebyshev UCL	1196

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.758	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.796	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.204	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.148	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.677	k star (bias corrected MLE)	0.642
Theta hat (MLE)	529.4	Theta star (bias corrected MLE)	558.3
nu hat (MLE)	52.8	nu star (bias corrected)	50.07
Mean (detects)	358.3		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	349.4
Maximum	2237	Median	160
SD	538	CV	1.54
k hat (MLE)	0.561	k star (bias corrected MLE)	0.536
Theta hat (MLE)	622.3	Theta star (bias corrected MLE)	651.8
nu hat (MLE)	44.91	nu star (bias corrected)	42.88
Adjusted Level of Significance (β)	0.044		
Approximate Chi Square Value (42.88, α)	28.87	Adjusted Chi Square Value (42.88, β)	28.43
95% Gamma Approximate UCL (use when n>=50)	519	95% Gamma Adjusted UCL (use when n<50)	526.9

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	349.4	SD (KM)	531.2
Variance (KM)	282205	SE of Mean (KM)	85.09
k hat (KM)	0.433	k star (KM)	0.417
nu hat (KM)	34.6	nu star (KM)	33.34
theta hat (KM)	807.7	theta star (KM)	838.3
80% gamma percentile (KM)	566.4	90% gamma percentile (KM)	979.6
95% gamma percentile (KM)	1431	99% gamma percentile (KM)	2562

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (33.34, α)	21.14	Adjusted Chi Square Value (33.34, β)	20.77
95% Gamma Approximate KM-UCL (use when n>=50)	551.1	95% Gamma Adjusted KM-UCL (use when n<50)	560.7

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.956	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.939	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.114	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.14	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	349.5	Mean in Log Scale	4.896
SD in Original Scale	537.9	SD in Log Scale	1.477
95% t UCL (assumes normality of ROS data)	492.8	95% Percentile Bootstrap UCL	504.7
95% BCA Bootstrap UCL	514.7	95% Bootstrap t UCL	545.8
95% H-UCL (Log ROS)	813.4		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	4.802	KM Geo Mean	121.8
KM SD (logged)	1.766	95% Critical H Value (KM-Log)	3.429
KM Standard Error of Mean (logged)	0.283	95% H-UCL (KM -Log)	1528
KM SD (logged)	1.766	95% Critical H Value (KM-Log)	3.429
KM Standard Error of Mean (logged)	0.283		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	349.4	Mean in Log Scale	4.785
SD in Original Scale	538	SD in Log Scale	1.861
95% t UCL (Assumes normality)	492.7	95% H-Stat UCL	1960

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

KM H-UCL	1528

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.126/03/2021 12:03:22 PM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Deep_RemainderSite_BaP_TEQ

General Statistics

Total Number of Observations	37	Number of Distinct Observations	21
Number of Detects	25	Number of Non-Detects	12
Number of Distinct Detects	20	Number of Distinct Non-Detects	1
Minimum Detect	0.7	Minimum Non-Detect	0.5
Maximum Detect	37	Maximum Non-Detect	0.5
Variance Detects	75.48	Percent Non-Detects	32.43%
Mean Detects	8.84	SD Detects	8.688
Median Detects	7.4	CV Detects	0.983
Skewness Detects	1.488	Kurtosis Detects	3.169
Mean of Logged Detects	1.559	SD of Logged Detects	1.28

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.84	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.918	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.174	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.173	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	6.135	KM Standard Error of Mean	1.344
KM SD	8.013	95% KM (BCA) UCL	8.481
95% KM (t) UCL	8.405	95% KM (Percentile Bootstrap) UCL	8.316
95% KM (z) UCL	8.347	95% KM Bootstrap t UCL	8.848
90% KM Chebyshev UCL	10.17	95% KM Chebyshev UCL	12
97.5% KM Chebyshev UCL	14.53	99% KM Chebyshev UCL	19.51

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.838	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.776	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.151	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.18	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.938	k star (bias corrected MLE)	0.852
Theta hat (MLE)	9.427	Theta star (bias corrected MLE)	10.38
nu hat (MLE)	46.89	nu star (bias corrected)	42.59
Mean (detects)	8.84		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	5.976
Maximum	37	Median	1.1
SD	8.239	CV	1.379
k hat (MLE)	0.308	k star (bias corrected MLE)	0.301
Theta hat (MLE)	19.39	Theta star (bias corrected MLE)	19.84
nu hat (MLE)	22.8	nu star (bias corrected)	22.29
Adjusted Level of Significance (β)	0.0431		
Approximate Chi Square Value (22.29, α)	12.55	Adjusted Chi Square Value (22.29, β)	12.24
95% Gamma Approximate UCL (use when n>=50)	10.61	95% Gamma Adjusted UCL (use when n<50)	10.89

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	6.135	SD (KM)	8.013
Variance (KM)	64.2	SE of Mean (KM)	1.344
k hat (KM)	0.586	k star (KM)	0.557
nu hat (KM)	43.38	nu star (KM)	41.2
theta hat (KM)	10.46	theta star (KM)	11.02
80% gamma percentile (KM)	10.11	90% gamma percentile (KM)	16.22
95% gamma percentile (KM)	22.68	99% gamma percentile (KM)	38.4

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (41.20, α)	27.49	Adjusted Chi Square Value (41.20, β)	27
95% Gamma Approximate KM-UCL (use when n>=50)	9.195	95% Gamma Adjusted KM-UCL (use when n<50)	9.361

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.888	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.918	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.183	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.173	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	6.074	Mean in Log Scale	0.588
SD in Original Scale	8.168	SD in Log Scale	1.824
95% t UCL (assumes normality of ROS data)	8.341	95% Percentile Bootstrap UCL	8.378
95% BCA Bootstrap UCL	8.704	95% Bootstrap t UCL	8.937
95% H-UCL (Log ROS)	27.29		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.829	KM Geo Mean	2.29
KM SD (logged)	1.474	95% Critical H Value (KM-Log)	2.984
KM Standard Error of Mean (logged)	0.247	95% H-UCL (KM -Log)	14.14
KM SD (logged)	1.474	95% Critical H Value (KM-Log)	2.984
KM Standard Error of Mean (logged)	0.247		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	6.054	Mean in Log Scale	0.604
SD in Original Scale	8.182	SD in Log Scale	1.745
95% t UCL (Assumes normality)	8.325	95% H-Stat UCL	22.29

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Gamma Distributed at 5% Significance Level

Suggested UCL to Use

ısted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	9.361

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test

When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Deep_RemainderSite_TotalPAH

General Statistics

Total Number of Observations	37	Number of Distinct Observations	29
Number of Detects	30	Number of Non-Detects	7
Number of Distinct Detects	29	Number of Distinct Non-Detects	1
Minimum Detect	0.5	Minimum Non-Detect	0.5
Maximum Detect	257.6	Maximum Non-Detect	0.5
Variance Detects	3345	Percent Non-Detects	18.92%
Mean Detects	48.15	SD Detects	57.83
Median Detects	21	CV Detects	1.201
Skewness Detects	1.874	Kurtosis Detects	4.722
Mean of Logged Detects	2.837	SD of Logged Detects	1.762

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.786	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.927	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.205	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.159	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	39.14	KM Standard Error of Mean	9.112
KM SD	54.5	95% KM (BCA) UCL	54.63
95% KM (t) UCL	54.52	95% KM (Percentile Bootstrap) UCL	54.63
95% KM (z) UCL	54.13	95% KM Bootstrap t UCL	58.99
90% KM Chebyshev UCL	66.47	95% KM Chebyshev UCL	78.86
97.5% KM Chebyshev UCL	96.04	99% KM Chebyshev UCL	129.8

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.716	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.801	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.145	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.168	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.596	k star (bias corrected MLE)	0.559
Theta hat (MLE)	80.78	Theta star (bias corrected MLE)	86.18
nu hat (MLE)	35.77	nu star (bias corrected)	33.52
Mean (detects)	48.15		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	39.05
Maximum	257.6	Median	7.6
SD	55.32	CV	1.417
k hat (MLE)	0.307	k star (bias corrected MLE)	0.3
Theta hat (MLE)	127.1	Theta star (bias corrected MLE)	130
nu hat (MLE)	22.73	nu star (bias corrected)	22.22
Adjusted Level of Significance (β)	0.0431		
Approximate Chi Square Value (22.22, α)	12.51	Adjusted Chi Square Value (22.22, β)	12.19
95% Gamma Approximate UCL (use when n>=50)	69.38	95% Gamma Adjusted UCL (use when n<50)	71.19

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	39.14	SD (KM)	54.5
Variance (KM)	2970	SE of Mean (KM)	9.112
k hat (KM)	0.516	k star (KM)	0.492
nu hat (KM)	38.17	nu star (KM)	36.41
theta hat (KM)	75.88	theta star (KM)	79.55
80% gamma percentile (KM)	64.23	90% gamma percentile (KM)	106.2
95% gamma percentile (KM)	151.2	99% gamma percentile (KM)	262

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (36.41, α)	23.6	Adjusted Chi Square Value (36.41, β)	23.15
95% Gamma Approximate KM-UCL (use when n>=50)	60.39	95% Gamma Adjusted KM-UCL (use when n<50)	61.56

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.924	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.927	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.195	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.159	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	39.12	Mean in Log Scale	2.091
SD in Original Scale	55.26	SD in Log Scale	2.25
95% t UCL (assumes normality of ROS data)	54.46	95% Percentile Bootstrap UCL	54.59
95% BCA Bootstrap UCL	57.64	95% Bootstrap t UCL	57.97
95% H-UCL (Log ROS)	474.2		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.169	KM Geo Mean	8.75
KM SD (logged)	2.085	95% Critical H Value (KM-Log)	3.855
KM Standard Error of Mean (logged)	0.349	95% H-UCL (KM -Log)	293.3
KM SD (logged)	2.085	95% Critical H Value (KM-Log)	3.855
KM Standard Error of Mean (logged)	0.349		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	39.09	Mean in Log Scale	2.038
SD in Original Scale	55.28	SD in Log Scale	2.305
95% t UCL (Assumes normality)	54.43	95% H-Stat UCL	546

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

usted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	61.56

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.126/03/2021 11:54:05 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Shallow_BaP_TEQ

General Statistics

Total Number of Observations	101	Number of Distinct Observations	52
Number of Detects	70	Number of Non-Detects	31
Number of Distinct Detects	52	Number of Distinct Non-Detects	1
Minimum Detect	0.3	Minimum Non-Detect	0.5
Maximum Detect	49	Maximum Non-Detect	0.5
Variance Detects	66.84	Percent Non-Detects	30.69%
Mean Detects	6.393	SD Detects	8.175
Median Detects	3.3	CV Detects	1.279
Skewness Detects	2.895	Kurtosis Detects	10.93
Mean of Logged Detects	1.224	SD of Logged Detects	1.159

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.696	**Normal GOF Test on Detected Observations Only**
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.228	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.106	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	4.523	KM Standard Error of Mean	0.733
KM SD	7.318	95% KM (BCA) UCL	6.054
95% KM (t) UCL	5.74	95% KM (Percentile Bootstrap) UCL	5.777
95% KM (z) UCL	5.729	95% KM Bootstrap t UCL	5.99
90% KM Chebyshev UCL	6.723	95% KM Chebyshev UCL	7.72
97.5% KM Chebyshev UCL	9.103	99% KM Chebyshev UCL	11.82

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.032	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.784	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0915	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.11	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.924	k star (bias corrected MLE)	0.894
Theta hat (MLE)	6.921	Theta star (bias corrected MLE)	7.153
nu hat (MLE)	129.3	nu star (bias corrected)	125.1
Mean (detects)	6.393		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	4.434
Maximum	49	Median	1.3
SD	7.407	CV	1.671
k hat (MLE)	0.33	k star (bias corrected MLE)	0.327
Theta hat (MLE)	13.42	Theta star (bias corrected MLE)	13.55
nu hat (MLE)	66.75	nu star (bias corrected)	66.1
Adjusted Level of Significance (β)	0.0476		
Approximate Chi Square Value (66.10, α)	48.39	Adjusted Chi Square Value (66.10, β)	48.17
95% Gamma Approximate UCL (use when n>=50)	6.056	95% Gamma Adjusted UCL (use when n<50)	6.084

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	4.523	SD (KM)	7.318
Variance (KM)	53.56	SE of Mean (KM)	0.733
k hat (KM)	0.382	k star (KM)	0.377
nu hat (KM)	77.15	nu star (KM)	76.19
theta hat (KM)	11.84	theta star (KM)	11.99
80% gamma percentile (KM)	7.245	90% gamma percentile (KM)	12.9
95% gamma percentile (KM)	19.17	99% gamma percentile (KM)	35.04

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (76.19, α)	57.09	Adjusted Chi Square Value (76.19, β)	56.85
95% Gamma Approximate KM-UCL (use when n>=50)	6.036	95% Gamma Adjusted KM-UCL (use when n<50)	6.062

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.972	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0.295	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0824	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.106	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	4.524	Mean in Log Scale	0.408
SD in Original Scale	7.355	SD in Log Scale	1.624
95% t UCL (assumes normality of ROS data)	5.739	95% Percentile Bootstrap UCL	5.818
95% BCA Bootstrap UCL	6	95% Bootstrap t UCL	6.196
95% H-UCL (Log ROS)	8.938		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.479	KM Geo Mean	1.614
KM SD (logged)	1.474	95% Critical H Value (KM-Log)	2.684
KM Standard Error of Mean (logged)	0.148	95% H-UCL (KM -Log)	7.107
KM SD (logged)	1.474	95% Critical H Value (KM-Log)	2.684
KM Standard Error of Mean (logged)	0.148		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	4.507	Mean in Log Scale	0.423
SD in Original Scale	7.364	SD in Log Scale	1.547
95% t UCL (Assumes normality)	5.724	95% H-Stat UCL	7.741

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Approximate Gamma UCL	6.036

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test

When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Shallow_TotalPAH

General Statistics

Total Number of Observations	101	Number of Distinct Observations	74
Number of Detects	78	Number of Non-Detects	23
Number of Distinct Detects	74	Number of Distinct Non-Detects	1
Minimum Detect	0.5	Minimum Non-Detect	0.5
Maximum Detect	372.6	Maximum Non-Detect	0.5
Variance Detects	3172	Percent Non-Detects	22.77%
Mean Detects	36.98	SD Detects	56.32
Median Detects	19.8	CV Detects	1.523
Skewness Detects	3.712	Kurtosis Detects	17.67
Mean of Logged Detects	2.756	SD of Logged Detects	1.427

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.62	**Normal GOF Test on Detected Observations Only**
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.259	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.1	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	28.67	KM Standard Error of Mean	5.157
KM SD	51.5	95% KM (BCA) UCL	38.27
95% KM (t) UCL	37.23	95% KM (Percentile Bootstrap) UCL	37.31
95% KM (z) UCL	37.15	95% KM Bootstrap t UCL	41.47
90% KM Chebyshev UCL	44.14	95% KM Chebyshev UCL	51.15
97.5% KM Chebyshev UCL	60.88	99% KM Chebyshev UCL	79.99

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.73	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.797	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.104	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.105	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.706	k star (bias corrected MLE)	0.688
Theta hat (MLE)	52.34	Theta star (bias corrected MLE)	53.76
nu hat (MLE)	110.2	nu star (bias corrected)	107.3
Mean (detects)	36.98		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	28.56
Maximum	372.6	Median	7.8
SD	51.82	CV	1.814
k hat (MLE)	0.303	k star (bias corrected MLE)	0.301
Theta hat (MLE)	94.26	Theta star (bias corrected MLE)	95.01
nu hat (MLE)	61.2	nu star (bias corrected)	60.72
Adjusted Level of Significance (β)	0.0476		
Approximate Chi Square Value (60.72, α)	43.8	Adjusted Chi Square Value (60.72, β)	43.59
95% Gamma Approximate UCL (use when n>=50)	39.59	95% Gamma Adjusted UCL (use when n<50)	39.78

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	28.67	SD (KM)	51.5
Variance (KM)	2652	SE of Mean (KM)	5.157
k hat (KM)	0.31	k star (KM)	0.307
nu hat (KM)	62.6	nu star (KM)	62.08
theta hat (KM)	92.51	theta star (KM)	93.29
80% gamma percentile (KM)	44.22	90% gamma percentile (KM)	84.31
95% gamma percentile (KM)	130.1	99% gamma percentile (KM)	248.9

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (62.08, α)	44.95	Adjusted Chi Square Value (62.08, β)	44.74
95% Gamma Approximate KM-UCL (use when n>=50)	39.59	95% Gamma Adjusted KM-UCL (use when n<50)	39.77

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.975	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0.368	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.075	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.1	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	28.74	Mean in Log Scale	2.019
SD in Original Scale	51.72	SD in Log Scale	1.891
95% t UCL (assumes normality of ROS data)	37.28	95% Percentile Bootstrap UCL	37.88
95% BCA Bootstrap UCL	40.44	95% Bootstrap t UCL	40.6
95% H-UCL (Log ROS)	81.89		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.97	KM Geo Mean	7.174
KM SD (logged)	1.909	95% Critical H Value (KM-Log)	3.185
KM Standard Error of Mean (logged)	0.191	95% H-UCL (KM -Log)	81.55
KM SD (logged)	1.909	95% Critical H Value (KM-Log)	3.185
KM Standard Error of Mean (logged)	0.191		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	28.61	Mean in Log Scale	1.813
SD in Original Scale	51.79	SD in Log Scale	2.149
95% t UCL (Assumes normality)	37.17	95% H-Stat UCL	130

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Approximate Gamma UCL	39.59

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.18/04/2021 9:39:08 PM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Lead

General Statistics

Total Number of Observations	169	Number of Distinct Observations	99
Number of Detects	162	Number of Non-Detects	7
Number of Distinct Detects	98	Number of Distinct Non-Detects	1
Minimum Detect	5.3	Minimum Non-Detect	5
Maximum Detect	1200	Maximum Non-Detect	5
Variance Detects	31560	Percent Non-Detects	4.142%
Mean Detects	133.5	SD Detects	177.7
Median Detects	71	CV Detects	1.331
Skewness Detects	3.456	Kurtosis Detects	14.89
Mean of Logged Detects	4.357	SD of Logged Detects	1.01

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.625	**Normal GOF Test on Detected Observations Only**
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.238	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.07	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	128.1	KM Standard Error of Mean	13.52
KM SD	175.3	95% KM (BCA) UCL	151.1
95% KM (t) UCL	150.5	95% KM (Percentile Bootstrap) UCL	151
95% KM (z) UCL	150.4	95% KM Bootstrap t UCL	156.5
90% KM Chebyshev UCL	168.7	95% KM Chebyshev UCL	187.1
97.5% KM Chebyshev UCL	212.6	99% KM Chebyshev UCL	262.7

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	3.727	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.782	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.12	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.0755	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.068	k star (bias corrected MLE)	1.052
Theta hat (MLE)	125	Theta star (bias corrected MLE)	126.8
nu hat (MLE)	346	nu star (bias corrected)	340.9
Mean (detects)	133.5		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	127.9
Maximum	1200	Median	63
SD	175.9	CV	1.375
k hat (MLE)	0.699	k star (bias corrected MLE)	0.69
Theta hat (MLE)	183.1	Theta star (bias corrected MLE)	185.4
nu hat (MLE)	236.1	nu star (bias corrected)	233.3
Adjusted Level of Significance (β)	0.0486		
Approximate Chi Square Value (233.26, α)	198.9	Adjusted Chi Square Value (233.26, β)	198.6
95% Gamma Approximate UCL (use when n>=50)	150	95% Gamma Adjusted UCL (use when n<50)	150.2

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	128.1	SD (KM)	175.3
Variance (KM)	30721	SE of Mean (KM)	13.52
k hat (KM)	0.534	k star (KM)	0.529
nu hat (KM)	180.7	nu star (KM)	178.8
theta hat (KM)	239.7	theta star (KM)	242.3
80% gamma percentile (KM)	210.9	90% gamma percentile (KM)	342.6
95% gamma percentile (KM)	482.5	99% gamma percentile (KM)	824.5

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (178.78, α)	148.9	Adjusted Chi Square Value (178.78, β)	148.6
95% Gamma Approximate KM-UCL (use when n>=50)	153.9	95% Gamma Adjusted KM-UCL (use when n<50)	154.1

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.982	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0.508	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0719	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.07	Detected Data Not Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	128.2	Mean in Log Scale	4.256
SD in Original Scale	175.7	SD in Log Scale	1.105
95% t UCL (assumes normality of ROS data)	150.6	95% Percentile Bootstrap UCL	152.3
95% BCA Bootstrap UCL	155	95% Bootstrap t UCL	154.9
95% H-UCL (Log ROS)	157.4		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	4.244	KM Geo Mean	69.66
KM SD (logged)	1.128	95% Critical H Value (KM-Log)	2.276
KM Standard Error of Mean (logged)	0.087	95% H-UCL (KM -Log)	160.4
KM SD (logged)	1.128	95% Critical H Value (KM-Log)	2.276
KM Standard Error of Mean (logged)	0.087		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	128	Mean in Log Scale	4.215
SD in Original Scale	175.9	SD in Log Scale	1.204
95% t UCL (Assumes normality)	150.4	95% H-Stat UCL	173.9

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

KM H-UCL	160.4

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

TRH_C16-C34

General Statistics

Total Number of Observations	159	Number of Distinct Observations	72
		Number of Missing Observations	3
Number of Detects	128	Number of Non-Detects	31
Number of Distinct Detects	72	Number of Distinct Non-Detects	1
Minimum Detect	66	Minimum Non-Detect	100
Maximum Detect	9500	Maximum Non-Detect	100
Variance Detects	2378167	Percent Non-Detects	19.5%
Mean Detects	853.1	SD Detects	1542
Median Detects	410	CV Detects	1.808
Skewness Detects	4.294	Kurtosis Detects	19.72
Mean of Logged Detects	6.073	SD of Logged Detects	1.049

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.467	**Normal GOF Test on Detected Observations Only**
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.305	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.0787	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	700.7	KM Standard Error of Mean	112.5
KM SD	1413	95% KM (BCA) UCL	901.8
95% KM (t) UCL	886.7	95% KM (Percentile Bootstrap) UCL	901.2
95% KM (z) UCL	885.7	95% KM Bootstrap t UCL	952.7
90% KM Chebyshev UCL	1038	95% KM Chebyshev UCL	1191
97.5% KM Chebyshev UCL	1403	99% KM Chebyshev UCL	1820

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	5.517	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.79	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.153	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.0851	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.869	k star (bias corrected MLE)	0.854
Theta hat (MLE)	982	Theta star (bias corrected MLE)	999.4
nu hat (MLE)	222.4	nu star (bias corrected)	218.5
Mean (detects)	853.1		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	686.8
Maximum	9500	Median	290
SD	1424	CV	2.073
k hat (MLE)	0.275	k star (bias corrected MLE)	0.274
Theta hat (MLE)	2495	Theta star (bias corrected MLE)	2505
nu hat (MLE)	87.52	nu star (bias corrected)	87.2
Adjusted Level of Significance (β)	0.0485		
Approximate Chi Square Value (87.20, α)	66.68	Adjusted Chi Square Value (87.20, β)	66.51
95% Gamma Approximate UCL (use when n>=50)	898.3	95% Gamma Adjusted UCL (use when n<50)	900.5

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	700.7	SD (KM)	1413
Variance (KM)	1995567	SE of Mean (KM)	112.5
k hat (KM)	0.246	k star (KM)	0.246
nu hat (KM)	78.23	nu star (KM)	78.09
theta hat (KM)	2848	theta star (KM)	2853
80% gamma percentile (KM)	1011	90% gamma percentile (KM)	2106
95% gamma percentile (KM)	3410	99% gamma percentile (KM)	6889

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (78.09, α)	58.73	Adjusted Chi Square Value (78.09, β)	58.58
95% Gamma Approximate KM-UCL (use when n>=50)	931.6	95% Gamma Adjusted KM-UCL (use when n<50)	934

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.948	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	1.9558E-4	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0618	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.0787	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	697	Mean in Log Scale	5.634
SD in Original Scale	1419	SD in Log Scale	1.323
95% t UCL (assumes normality of ROS data)	883.2	95% Percentile Bootstrap UCL	892.3
95% BCA Bootstrap UCL	925.5	95% Bootstrap t UCL	960.5
95% H-UCL (Log ROS)	875.5		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	5.719	KM Geo Mean	304.8
KM SD (logged)	1.181	95% Critical H Value (KM-Log)	2.384
KM Standard Error of Mean (logged)	0.0945	95% H-UCL (KM -Log)	766.2
KM SD (logged)	1.181	95% Critical H Value (KM-Log)	2.384
KM Standard Error of Mean (logged)	0.0945		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	696.6	Mean in Log Scale	5.652
SD in Original Scale	1419	SD in Log Scale	1.273
95% t UCL (Assumes normality)	882.7	95% H-Stat UCL	823.4

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

KM H-UCL	766.2

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

BAP-TEQ

General Statistics

Total Number of Observations	183	Number of Distinct Observations	87
Number of Detects	141	Number of Non-Detects	42
Number of Distinct Detects	86	Number of Distinct Non-Detects	2
Minimum Detect	0.3	Minimum Non-Detect	0.1
Maximum Detect	410	Maximum Non-Detect	0.5
Variance Detects	2226	Percent Non-Detects	22.95%
Mean Detects	20.47	SD Detects	47.18
Median Detects	7.2	CV Detects	2.305
Skewness Detects	5.311	Kurtosis Detects	35.68
Mean of Logged Detects	1.855	SD of Logged Detects	1.486

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.444	**Normal GOF Test on Detected Observations Only**
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.335	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.075	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	15.82	KM Standard Error of Mean	3.126
KM SD	42.13	95% KM (BCA) UCL	21.24
95% KM (t) UCL	20.98	95% KM (Percentile Bootstrap) UCL	21.36
95% KM (z) UCL	20.96	95% KM Bootstrap t UCL	23.84
90% KM Chebyshev UCL	25.19	95% KM Chebyshev UCL	29.44
97.5% KM Chebyshev UCL	35.34	99% KM Chebyshev UCL	46.92

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	5.398	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.816	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.161	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.0832	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.539	k star (bias corrected MLE)	0.532
Theta hat (MLE)	37.96	Theta star (bias corrected MLE)	38.44
nu hat (MLE)	152.1	nu star (bias corrected)	150.2
Mean (detects)	20.47		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	15.77
Maximum	410	Median	3.1
SD	42.27	CV	2.68
k hat (MLE)	0.29	k star (bias corrected MLE)	0.289
Theta hat (MLE)	54.3	Theta star (bias corrected MLE)	54.51
nu hat (MLE)	106.3	nu star (bias corrected)	105.9
Adjusted Level of Significance (β)	0.0487		
Approximate Chi Square Value (105.91, α)	83.16	Adjusted Chi Square Value (105.91, β)	83
95% Gamma Approximate UCL (use when n>=50)	20.09	95% Gamma Adjusted UCL (use when n<50)	20.13

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	15.82	SD (KM)	42.13
Variance (KM)	1775	SE of Mean (KM)	3.126
k hat (KM)	0.141	k star (KM)	0.142
nu hat (KM)	51.57	nu star (KM)	52.06
theta hat (KM)	112.2	theta star (KM)	111.2
80% gamma percentile (KM)	16.45	90% gamma percentile (KM)	46.52
95% gamma percentile (KM)	87.92	99% gamma percentile (KM)	209.4

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (52.06, α)	36.49	Adjusted Chi Square Value (52.06, β)	36.38
95% Gamma Approximate KM-UCL (use when n>=50)	22.57	95% Gamma Adjusted KM-UCL (use when n<50)	22.63

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.967	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0.0304	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0594	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.075	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	15.84	Mean in Log Scale	1.073
SD in Original Scale	42.24	SD in Log Scale	1.985
95% t UCL (assumes normality of ROS data)	21	95% Percentile Bootstrap UCL	21.56
95% BCA Bootstrap UCL	23.04	95% Bootstrap t UCL	23.86
95% H-UCL (Log ROS)	33.53		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.024	KM Geo Mean	2.783
KM SD (logged)	2.019	95% Critical H Value (KM-Log)	3.232
KM Standard Error of Mean (logged)	0.174	95% H-UCL (KM -Log)	34.66
KM SD (logged)	2.019	95% Critical H Value (KM-Log)	3.232
KM Standard Error of Mean (logged)	0.174		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	15.83	Mean in Log Scale	1.102
SD in Original Scale	42.25	SD in Log Scale	1.904
95% t UCL (Assumes normality)	20.99	95% H-Stat UCL	28.54

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

KM H-UCL	34.66

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

TotalPAH

General Statistics

Total Number of Observations	183	Number of Distinct Observations	139
Number of Detects	152	Number of Non-Detects	31
Number of Distinct Detects	137	Number of Distinct Non-Detects	2
Minimum Detect	1	Minimum Non-Detect	0.1
Maximum Detect	2237	Maximum Non-Detect	0.5
Variance Detects	98533	Percent Non-Detects	16.94%
Mean Detects	128.1	SD Detects	313.9
Median Detects	38.7	CV Detects	2.451
Skewness Detects	4.509	Kurtosis Detects	22.21
Mean of Logged Detects	3.442	SD of Logged Detects	1.709

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.423	**Normal GOF Test on Detected Observations Only**
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.343	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.0723	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	106.4	KM Standard Error of Mean	21.45
KM SD	289.2	95% KM (BCA) UCL	144.4
95% KM (t) UCL	141.9	95% KM (Percentile Bootstrap) UCL	143.2
95% KM (z) UCL	141.7	95% KM Bootstrap t UCL	157.7
90% KM Chebyshev UCL	170.7	95% KM Chebyshev UCL	199.9
97.5% KM Chebyshev UCL	240.3	99% KM Chebyshev UCL	319.8

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	5.521	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.83	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.156	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.0809	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.457	k star (bias corrected MLE)	0.452
Theta hat (MLE)	280.5	Theta star (bias corrected MLE)	283.4
nu hat (MLE)	138.8	nu star (bias corrected)	137.4
Mean (detects)	128.1		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	106.4
Maximum	2237	Median	20.3
SD	289.9	CV	2.725
k hat (MLE)	0.271	k star (bias corrected MLE)	0.27
Theta hat (MLE)	392.8	Theta star (bias corrected MLE)	393.9
nu hat (MLE)	99.14	nu star (bias corrected)	98.85
Adjusted Level of Significance (β)	0.0487		
Approximate Chi Square Value (98.85, α)	76.91	Adjusted Chi Square Value (98.85, β)	76.76
95% Gamma Approximate UCL (use when n>=50)	136.7	95% Gamma Adjusted UCL (use when n<50)	137

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	106.4	SD (KM)	289.2
Variance (KM)	83608	SE of Mean (KM)	21.45
k hat (KM)	0.135	k star (KM)	0.137
nu hat (KM)	49.57	nu star (KM)	50.09
theta hat (KM)	785.7	theta star (KM)	777.6
80% gamma percentile (KM)	106.9	90% gamma percentile (KM)	310.8
95% gamma percentile (KM)	595.5	99% gamma percentile (KM)	1438

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (50.09, α)	34.84	Adjusted Chi Square Value (50.09, β)	34.74
95% Gamma Approximate KM-UCL (use when n>=50)	153	95% Gamma Adjusted KM-UCL (use when n<50)	153.4

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.969	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0.0433	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0555	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.0723	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	106.5	Mean in Log Scale	2.787
SD in Original Scale	289.9	SD in Log Scale	2.16
95% t UCL (assumes normality of ROS data)	142	95% Percentile Bootstrap UCL	146.1
95% BCA Bootstrap UCL	151.5	95% Bootstrap t UCL	155.8
95% H-UCL (Log ROS)	288.1		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.469	KM Geo Mean	11.81
KM SD (logged)	2.656	95% Critical H Value (KM-Log)	4.002
KM Standard Error of Mean (logged)	0.197	95% H-UCL (KM -Log)	882.8
KM SD (logged)	2.656	95% Critical H Value (KM-Log)	4.002
KM Standard Error of Mean (logged)	0.197		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	106.4	Mean in Log Scale	2.615
SD in Original Scale	289.9	SD in Log Scale	2.41
95% t UCL (Assumes normality)	141.9	95% H-Stat UCL	482.5

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

KM H-UCL	882.8

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Attachment E: Laboratory Reports

Molly Hoak

From: Albert Juhasz <Albert.Juhasz@unisa.edu.au>
Sent: Wednesday, 16 December 2020 10:21 AM
To: Molly Hoak
Cc: Katie Richardson
Subject: RE: Senversa -Soil samples for B(a)P bioaccessibility testing

Hi Molly,

Thanks for the sample list!

Cheers

Albert

Dr Albert Juhasz
Associate Research Professor
Strand Leader and Barbara Hardy Chair in Environmental Science and Engineering
Research Education Portfolio Leader (FII-NBE)

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Building X, X1-17 | Mawson Lakes Campus | Mawson Lakes SA 5095

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web http://unisa.edu.au/fii | **twitter** https://twitter.com/UniSAFII
CRICOS Provider Number: 00121B

From: Molly Hoak <Molly.Hoak@senversa.com.au>
Sent: Tuesday, 15 December 2020 8:22 AM
To: Albert Juhasz <Albert.Juhasz@unisa.edu.au>
Cc: Katie Richardson <Katie.Richardson@senversa.com.au>
Subject: RE: Senversa -Soil samples for B(a)P bioaccessibility testing

Hi Albert,

We received the sample results late last night. Based on these could you please analyse:

SB01_0.45
SB02_0.4
SB05_0.5

Cheers,

senversa

Molly Hoak
Risk Assessor

M: +61 438 255 132

From: Albert Juhasz <Albert.Juhasz@unisa.edu.au>
Sent: Friday, 11 December 2020 4:23 PM
To: Molly Hoak <Molly.Hoak@senversa.com.au>
Subject: RE: Senversa -Soil samples for B(a)P bioaccessibility testing

Excellent, thanks

Dr Albert Juhasz
Associate Research Professor
Strand Leader and Barbara Hardy Chair in Environmental Science and Engineering
Research Education Portfolio Leader (FII-NBE)

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Building X, X1-17 | Mawson Lakes Campus | Mawson Lakes SA 5095

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web http://unisa.edu.au/fii | **twitter** https://twitter.com/UniSAFII
CRICOS Provider Number: 00121B

University of South Australia
Future Industries Institute

Transforming the industries of today *and seeding the industries of tomorrow*

From: Molly Hoak <Molly.Hoak@senversa.com.au>
Sent: Friday, 11 December 2020 3:52 PM
To: Albert Juhasz <Albert.Juhasz@unisa.edu.au>
Cc: Katie Richardson <Katie.Richardson@senversa.com.au>; Richard Griffin <Richard.Griffin@senversa.com.au>
Subject: RE: Senversa -Soil samples for B(a)P bioaccessibility testing

Hi Albert,

Thank you for confirming the samples were received.
We should receive the results from the other samples on Monday, so I should be able to let you know before Wednesday.

Cheers,

senversa

Molly Hoak
Risk Assessor

M: +61 438 255 132

From: Albert Juhasz <Albert.Juhasz@unisa.edu.au>
Sent: Friday, 11 December 2020 4:18 PM
To: Molly Hoak <Molly.Hoak@senversa.com.au>
Cc: Katie Richardson <Katie.Richardson@senversa.com.au>; Richard Griffin <Richard.Griffin@senversa.com.au>
Subject: RE: Senversa -Soil samples for B(a)P bioaccessibility testing

Hi Molly,

I received the samples this afternoon. There wasn't a CoC form but samples received were:

SB01-0.45
SB02-0.4
SB03-0.1
SB03-0.4
SB04-0.1
SB04-0.4
SB05-0.1
SB05-0.5
SB06-0.48

If you could let me know ASAP which samples you'd like analysed, it would be greatly appreciated. Wednesday is our cut off day for initiating the assays in order to send extract to the lab for analysis (prior to the Christmas shutdown).

Cheers

Albert

Dr Albert Juhasz
Associate Research Professor
Strand Leader and Barbara Hardy Chair in Environmental Science and Engineering
Research Education Portfolio Leader (FII-NBE)

Future Industries Institute | University of South Australia
Building X, X1-17 | Mawson Lakes Campus | Mawson Lakes SA 5095

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web http://unisa.edu.au/fii | **twitter** https://twitter.com/UniSAFII
CRICOS Provider Number: 00121B

University of South Australia
Future Industries Institute
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From: Albert Juhasz
Sent: Wednesday, 9 December 2020 1:29 PM
To: 'Molly Hoak' <Molly.Hoak@senversa.com.au>
Cc: Katie Richardson <Katie.Richardson@senversa.com.au>; Richard Griffin <Richard.Griffin@senversa.com.au>
Subject: RE: Senversa -Soil samples for B(a)P bioaccessibility testing

Hi Molly,

Please find attached a quote for the assessment of oral and dermal PAH bioaccessibility for three samples. Hopefully we can sort out logistics and get the samples run before Christmas (although reporting would be dependent on analytical turnaround from ALS).

Cheers

Albert

Dr Albert Juhasz
Associate Research Professor
Strand Leader and Barbara Hardy Chair in Environmental Science and Engineering
Research Education Portfolio Leader (FII-NBE)

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web http://unisa.edu.au/fii | **twitter** https://twitter.com/UniSAFII
CRICOS Provider Number: 00121B

From: Molly Hoak <Molly.Hoak@senversa.com.au>
Sent: Wednesday, 9 December 2020 10:06 AM
To: Albert Juhasz <Albert.Juhasz@unisa.edu.au>
Cc: Katie Richardson <Katie.Richardson@senversa.com.au>; Richard Griffin <Richard.Griffin@senversa.com.au>
Subject: Senversa -Soil samples for B(a)P bioaccessibility testing

Hello Albert,

We have some samples for bioaccessibility testing and are planning to send through 3 ~1kg bags next week. Do you have time before Christmas for the analysis?

Could you also please confirm the cost per sample for combined oral and dermal bioaccessibility testing for PAH?

Thank you,
Molly

Molly Hoak
Risk Assessor

M: +61 438 255 132
T: +61 3 9606 0700
E: molly.hoak@senversa.com.au

Level 6, 15 William Street,
Melbourne VIC 3000
www.senversa.com.au

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http://www.mailguard.com.au/mg

Message protected by MailGuard: e-mail anti-virus, anti-spam and content filtering.
http://www.mailguard.com.au/mg

Report this message as spam

University of South Australia

Assessment of oral and dermal PAH bioaccessibility in contaminated soil

Prepared for:	Senversa Pty Ltd Level 6, 15 William St, Melbourne, Victoria, 3000
Attention:	Molly Hoak
Telephone:	0438 255 132
Email:	molly.hoak@senversa.com.au

Prepared by: Dr Albert Juhasz
Future Industries Institute
University of South Australia
Mawson Lakes Boulevard
Mawson Lakes, SA 5095

Telephone: 08 8302 5045
Facsimile: 08 8302 3057
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Date of issue: 7 January 2021

Important Notice

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INTRODUCTION

This report was prepared for Senversa Pty Ltd to assess PAH bioaccessibility in impacted soil. The bioaccessibility testing was conducted at the Future Industries Institute, based at the Mawson Lakes Campus of the University of South Australia (UniSA). UniSA's Flagship Institute focuses on building knowledge and capacity in core research strengths of physical chemistry and environmental science and management. The Institute has four distinct yet inter-related strands: Minerals and Resources; Energy and Advanced Manufacturing; Environmental Science and Engineering; and Bioengineering and Nanomedicine. The Institute aggregates and builds upon existing expertise and infrastructure from the Ian Wark Research Institute, the Mawson Institute and the Centre for Environmental Risk Assessment and Remediation. The vision for the Future Industries Institute aligns strongly with South Australian and National economic and research priorities by building a critical mass of trans-disciplinary research capacity focused on pressing real-world challenges.

OBJECTIVES

The objective of this assessment was to:

- Determine PAH bioaccessibility (oral and dermal) in 3 samples supplied by Senversa Pty Ltd.

OUTCOMES AND DELIVERABLES

The expected outcome from this assessment was:

- A report assessing the bioaccessibility of PAHs in impacted soil. The report was to include;
    - Assessment of PAH concentration in the < 250 µm particle size fraction;
    - Assessment of PAH bioaccessibility in the < 250 µm particle size fraction using oral and dermal vitro methods;
    - Methodology procedures; and
    - QA/QC protocols

PROJECT BACKGROUND

Testing was initiated at the invitation of Senversa Pty Ltd for an assessment of PAH bioaccessibility in 3 soil samples. Human exposure to a contaminant may be through a number of pathways including inhalation, dermal absorption and ingestion. For PAHs, significant exposure pathways are via soil ingestion and dermal absorption. Generally, soil ingestion results from the accidental or, in the case of children less than 5 years old, the incidental ingestion of soil (< 250 µm particle size fraction) via hand-to-mouth contact (Basta et al., 2001). When assessing risk to humans associated with exposure to PAH-contaminated soil, a major unknown is quantifying the dose that has been absorbed into the systemic circulation (i.e. the bioavailable fraction). It is often assumed that the contaminant is 100% bioavailable, however, it is generally accepted that contaminant bioavailability in soil may be less than 100%. As a consequence, incorporating PAH bioavailability into human health risk assessment may reduce the uncertainty in estimating exposure associated with incidental ingestion and dermal pathways.

Determination of PAH bioavailability is challenging due to the complexity of in vivo PAH metabolism, distribution and excretion. For example, following ingestion, PAHs that are absorbed across the intestinal epithelium may enter hepatic portal circulation and be transported to the liver (first pass effect) where PAH metabolism may occur as a result of cytochrome P450 monooxygenase activity (Ramesh et al., 2004; Shimada, 2006). From hepatic portal circulation, metabolised and non-metabolised PAHs may enter the systemic circulation via hepatic veins whereas a proportion of metabolised PAHs may be excreted in the faeces via the bile (Ramesh et al., 2004). Non-absorbed PAHs in the gastrointestinal tract are also excreted via the faeces. Assessment of PAH bioavailability is complicated by the fact that PAHs may be absorbed from the gastrointestinal tract and transformed in the hepatic portal system but may not reach the systemic circulation (due to biliary excretion) which by definition is the bioavailable fraction. Conversely, transformed PAHs may enter the systemic circulation, however, this may not be taken into consideration for PAH bioavailability estimations if only the concentration of the parent compound is determined.

Although in vivo studies utilising animal models are an appropriate method for determination of PAH bioavailability in contaminated soil for inclusion in human health exposure assessment, the time required for in vivo studies and the expense of animal trials preclude their use as routine relative bioavailability assessment tools. As a result, rapid, cost effective in vitro methods simulating human gastrointestinal conditions have been developed in order to estimate contaminant bioavailability. These assays determine PAH concentrations that are mobilised following gastrointestinal extraction (i.e. the bioaccessible fraction) and are therefore potentially available for absorption into the systemic circulation. Assays such as the organic Physiologically Based Extraction Test (PBET; Ruby et al., 2002), Fed ORganic Estimation human Simulation Test (FOREhST; Cave et al., 2010), Colon-extended PBET (Tilston et al., 2011) have been used to assess PAH bioaccessibility in contaminated soils, however, as detailed by Collins et al. (2013), many of these methods may underestimate PAH bioaccessibility due to limiting partitioning of PAHs into gastrointestinal fluid (i.e. solubility constraints). To overcome these limitations, silicone cord (poly[dimethylsiloxane]) has been suggested to be included in the in vitro assay as a sorption sink due to its compatibility with extracting solutions and its well suited partitioning properties and low internal diffusive resistance for hydrophobic organic contaminants (Gouliarmou et al., 2013). The inclusion of the sorption sink simulates passive molecular diffusion across the small intestinal epithelium which causes disequilibrium in the digestive fluid and therefore creates a gradient for further diffusive mobilisation of contaminants from the soil matrix (Gouliarmou et al., 2013). Without mimicking uptake, in vitro models may underestimate PAH bioaccessibility due to the finite capacity of the in vitro fluid to accommodate desorbable PAHs (Juhasz et al., 2016).

Limited information is available regarding approaches for refining the dermal PAH absorption factor. Although a default dermal absorption factor of 6% has been utilised for the derivation of NEPM investigation levels, this may be a conservative estimate. A review by MfE (2011) resulted in the adoption of a dermal PAH absorption factor of 2.6%, the arithmetic mean of data from aged PAH soil (Abdel-Rahman et al. 2002). In the derivation of soil HILs, a higher arithmetic mean (6%) was based on data from freshly spiked PAH soil which may represent a worst-case value (Wester et al., 1990; Abdel-Rahman et al., 2002; Moody et al., 2007). Conservatism in the PAH dermal absorption factor may also arise from parameters that include the strong sorption of PAHs to soil organic matter, the low solid to solution ratio when soil adheres to individual's hands and the short residence time of soil on hands.

Refining PAH absorption (bioavailability) via the dermal pathway is also challenging due to the complexity of in vivo studies in addition to ethical considerations. Similarly, determination of PAH bioaccessibility using in vitro methodologies such as those detailed in Wester et al. (1990), Moody et al. (2007) and Abdel-Rahman et al. (2010) are challenging due to the availability of human skin, differences in animal versus human skin and difference between skin permeability from different parts of the body (Beriro et al., 2016). To alleviate issues associated with in vivo and (traditional) in vitro methodologies, silicone sheeting (poly[dimethylsiloxane]) has been proposed as a 'surrogate skin' due to its well suited partitioning properties and low internal diffusive resistance for hydrophobic organic contaminants such as PAHs (Gouliarmou et al., 2013). Saturated soil (moistened with artificial perspiration) may be applied directly to the silicone sheeting which acts as a passive sampler; the sheeting facilitates the molecular diffusion of PAHs from the soil. As PAHs partition into the silicone, a gradient is created within soil-solution for further diffusive mobilisation of PAHs from the soil matrix (Gouliarmou et al., 2013; Juhasz et al., 2016). The 'sorption sink' approach may provide a methodology for refining the dermal absorption factor that provides a conservative estimate of dermal bioaccessibility due to the 'elevated' moisture content of the applied soil (i.e. the use of saturated soils), the 'infinite' capacity of the silicone sheeting to sorb PAHs and the extended timeframe (8 hours) of the assay. Additional conservatism is built into the assay as it only assesses the transfer of PAH from the soil into the 'surrogate skin' but not the penetration of PAHs through the skin (i.e. stratum corneum) to underlying or adjacent cells (Pugh and Chilcott, 2008).

FINDINGS

The concentration of PAHs in samples SB01-0.45, SB02-0.4 and SB05-0.5 is shown in Table 1 while PAH bioaccessibility results are shown in Tables 2-10.

- The concentration of PAHs (Σ16 PAHs half LOR) in the < 250 µm particle size fraction ranged from 98.6 (SB05-0.5) to 1067 mg kg^{-1} (SB02-0.4) with BaP$_{TEQ}$ (half LOR) ranging from 7.9 (SB05-0.5) to 172 mg kg^{-1} (SB02-0.4) (Table 1).

Oral Bioaccessibility

- In SB01-0.45, using half LOR, Σ16 PAHs and BaP$_{TEQ}$ bioaccessibility was 20.6% and 10.2% respectively (Tables 2 and 8).

- In SB02-0.4, using half LOR, Σ16 PAHs and BaP$_{TEQ}$ bioaccessibility was 15.7% and 9.7% respectively (Tables 3 and 9).

- In SB05-0.5, using half LOR, Σ16 PAHs and BaP$_{TEQ}$ bioaccessibility was 8.6% and 7.1% respectively (Tables 4 and10).

- In the oral assay blank control, the concentration of PAHs was below the level of reporting.

Dermal Bioaccessibility

- In SB01-0.45, using half LOR, Σ16 PAHs and BaP$_{TEQ}$ dermal bioaccessibility was 1.6% and 0.5% respectively (Tables 5 and 8).

- In SB02-0.4, using half LOR, Σ16 PAHs and BaP$_{TEQ}$ dermal bioaccessibility was 1.5% and 0.3% respectively (Table6 and 9).

- In SB05-0.5, using half LOR, Σ16 PAHs and BaP_{TEQ} dermal bioaccessibility was 1.1% and 0.3% respectively (Tables 7 and 10).

- In the dermal assay blank control, the concentration of PAHs was below the level of reporting.

Table 1. PAH concentration in samples SB01-0.45, SB02-0.4 and SB05-0.5 (< 250 µm particle size fraction).

PAH	SB01-0.45 (mg kg^{-1})			SB02-0.4 (mg kg^{-1})			SB05-0.5 (mg kg^{-1})		
	250A	250B	Av. 250	250A	250B	Av. 250	250A	250B	Av. 250
Naphthalene	<1.2	<1.2	<1.2	3.4	3.3	3.4	<0.5	<0.5	<0.5
Acenaphthylene	5.2	5.3	5.3	25.4	26.3	25.9	0.9	0.8	0.9
Acenaphthene	<1.2	<1.2	<1.2	1.4	1.4	1.4	<0.5	<0.5	<0.5
Fluorene	1.7	1.6	1.7	3.9	3.8	3.9	<0.5	<0.5	<0.5
Phenanthrene	27.2	26.8	27.0	90.5	87.9	89.2	4.4	4.2	4.3
Anthracene	7.7	7.1	7.4	24.4	24.7	24.6	1.2	1.2	1.2
Fluoranthene	52.8	52	52.4	166	165	166	13.8	12.8	13.3
Pyrene	55.7	54.7	55.2	163	160	162	15.0	13.8	14.4
Benz(a)anthracene	28.8	27.9	28.4	86.5	85.8	86.2	8.3	7.7	8.0
Chrysene	26.0	26.0	26.0	72.2	76.3	74.3	8.4	7.7	8.1
Benzo(b+j)fluoranthene	46.0	44.3	45.2	129	116	123	14.1	13.0	13.6
Benzo(k)fluoranthene	16.2	16.9	16.6	40.6	50.0	45.3	4.7	3.9	4.3
Benzo(a)pyrene	46.2	45.1	45.7	124	120	122	13.7	12.4	13.1
Indeno(1.2.3.cd)pyrene	26.6	25.6	26.1	57.3	55.0	56.2	6.8	6.1	6.5
Dibenz(a.h)anthracene	8.0	7.7	7.9	18.3	17.6	18.0	1.9	1.7	1.8
Benzo(g.h.i)perylene	35.8	34.3	35.1	69.0	65.4	67.2	9.1	8.0	8.6
Σ16 PAHs (zero LOR)	384	375	380	1075	1059	1067	102	93.3	97.8
BaP TEQ (zero LOR)	66.6	64.9	65.7	175	170	172	19.2	17.3	18.2
Σ16 PAHs (half LOR)	385	377	381	1075	1059	1067	103	94.1	98.6
BaP TEQ (half LOR)	66.6	64.9	65.7	175	170	172	19.2	17.3	18.2

*Average concentration of duplicate analysis.

Table 2. Assessment of oral PAH bioaccessibility in sample SB01-0.45 (< 250 µm particle size fraction).

PAH	SB01-1			SB01-2			Av. Bioaccessible PAHs (mg kg^{-1})ǂ
	PAH conc. in Extract (µg/l)	PAH in Extract (µg)*	Bioaccessible PAHs (mg kg^{-1})	PAH conc. in Extract (µg/l)	PAH in Extract (µg)†	Bioaccessible PAHs (mg kg^{-1})	
Naphthalene	3.2	0.24	0.30	3.4	0.25	0.32	0.31
Acenaphthylene	4.2	0.32	0.40	4.6	0.34	0.43	0.41
Acenaphthene	3.2	0.24	0.30	3.3	0.24	0.31	0.30
Fluorene	6.3	0.48	0.60	4.0	0.30	0.37	0.48
Phenanthrene	94.3	7.14	8.92	119	8.82	11.0	9.97
Anthracene	18.2	1.38	1.72	27.2	2.02	2.52	2.12
Fluoranthene	256	19.4	24.2	262	19.4	24.3	24.3
Pyrene	154	11.7	14.6	141	10.5	13.1	13.8
Benz(a)anthracene	76.3	5.77	7.22	83.0	6.15	7.69	7.45
Chrysene	14.3	1.08	1.35	12.1	0.90	1.12	1.24
Benzo(b+j)fluoranthene	57.6	4.36	5.45	52.5	3.89	4.87	5.16
Benzo(k)fluoranthene	19.0	1.44	1.80	22.8	1.69	2.11	1.96
Benzo(a)pyrene	48.0	3.63	4.54	48.9	3.63	4.53	4.54
Indeno(1.2.3.cd)pyrene	21.0	1.59	1.99	21.4	1.59	1.98	1.98
Dibenz(a.h)anthracene	4.3	0.33	0.41	5.0	0.37	0.46	0.44
Benzo(g.h.i)perylene	32.6	2.47	3.08	54.6	4.05	5.06	4.07
Σ16 PAHs (zero LOR)	813	61.5	76.9	865	64.1	80.1	78.5
BaP TEQ (zero LOR)	70.2	5.31	6.64	72.5	5.38	6.72	6.68
Σ16 PAHs (half LOR)	813	61.5	76.9	865	64.1	80.1	78.5
BaP TEQ (half LOR)	70.2	5.31	6.64	72.5	5.38	6.72	6.68

*Extract volume was 75.7 ml. †Extract volume was 74.1 ml. ǂAverage concentration of duplicate analysis.

Table 3. Assessment of oral PAH bioaccessibility in sample SB02-0.4 (< 250 µm particle size fraction).

PAH	SB02-1			SB02-2			Av. Bioaccessible PAHs (mg kg^{-1})‡
	PAH conc. in Extract (µg/l)	PAH in Extract (µg)*	Bioaccessible PAHs (mg kg^{-1})	PAH conc. in Extract (µg/l)	PAH in Extract (µg)†	Bioaccessible PAHs (mg kg^{-1})	
Naphthalene	9.6	0.68	0.85	9.0	0.63	0.79	0.82
Acenaphthylene	14.4	1.02	1.27	14.4	1.01	1.27	1.27
Acenaphthene	5.0	0.35	0.44	4.8	0.34	0.42	0.43
Fluorene	9.5	0.67	0.84	9.4	0.66	0.83	0.83
Phenanthrene	247	17.4	21.8	242	17.0	21.3	21.5
Anthracene	45.3	3.19	3.99	45.1	3.17	3.97	3.98
Fluoranthene	497	35.1	43.8	490	34.5	43.1	43.5
Pyrene	261	18.4	23.0	291	20.5	25.6	24.3
Benz(a)anthracene	116	8.18	10.2	125	8.79	11.0	10.6
Chrysene	125	8.81	11.0	127	8.94	11.2	11.1
Benzo(b+j)fluoranthene	160	11.3	14.1	131	9.22	11.5	12.8
Benzo(k)fluoranthene	66.2	4.67	5.84	42.0	2.95	3.69	4.76
Benzo(a)pyrene	81.2	5.73	7.16	113	7.95	9.94	8.55
Indeno(1.2.3.cd)pyrene	172	12.1	15.2	143	10.1	12.6	13.9
Dibenz(a.h)anthracene	42.5	3.00	3.75	42.8	3.01	3.76	3.76
Benzo(g.h.i)perylene	50.8	3.58	4.48	61.6	4.33	5.42	4.95
Σ16 PAHs (zero LOR)	1903	134	168	1891	133	166	167
BaP TEQ (zero LOR)	177	12.5	15.6	202	14.2	17.8	16.7
Σ16 PAHs (half LOR)	1903	134	168	1891	133	166	167
BaP TEQ (half LOR)	177	12.5	15.6	202	14.2	17.8	16.7

*Extract volume was 70.5 ml. †Extract volume was 70.4 ml. ‡Average concentration of duplicate analysis.

Table 4. Assessment of oral PAH bioaccessibility in sample SB05-0.5 (< 250 μm particle size fraction).

PAH	SB05-1			SB05-2			Av. Bioaccessible PAHs (mg kg^{-1})[ǂ]
	PAH conc. in Extract (μg/l)	PAH in Extract (μg)*	Bioaccessible PAHs (mg kg^{-1})	PAH conc. in Extract (μg/l)	PAH in Extract (μg)[†]	Bioaccessible PAHs (mg kg^{-1})	
Naphthalene	<2.5	<0.18	<0.22	<2.5	<0.20	<0.25	<0.25
Acenaphthylene	<2.5	<0.18	<0.22	<2.5	<0.20	<0.25	<0.25
Acenaphthene	<2.5	<0.18	<0.22	<2.5	<0.20	<0.25	<0.25
Fluorene	<2.5	<0.18	<0.22	<2.5	<0.20	<0.25	<0.25
Phenanthrene	8.6	0.62	0.77	7.7	0.61	0.76	0.77
Anthracene	<2.5	<0.18	<0.22	<2.5	<0.20	<0.25	<0.25
Fluoranthene	25.9	1.86	2.32	20.1	1.59	1.98	2.15
Pyrene	16.0	1.15	1.44	14.8	1.17	1.46	1.45
Benz(a)anthracene	7.8	0.56	0.70	10.3	0.81	1.02	0.86
Chrysene	5.5	0.39	0.49	5.2	0.41	0.51	0.50
Benzo(b+j)fluoranthene	9.0	0.65	0.81	4.7	0.37	0.46	0.64
Benzo(k)fluoranthene	4.0	0.29	0.36	<2.5	<0.20	<0.25	<0.36
Benzo(a)pyrene	11.0	0.79	0.99	9.9	0.78	0.98	0.98
Indeno(1.2.3.cd)pyrene	<2.5	<0.18	<0.22	<2.5	<0.20	<0.25	<0.25
Dibenz(a.h)anthracene	<2.5	<0.18	<0.22	<2.5	<0.20	<0.25	<0.25
Benzo(g.h.i)perylene	<2.5	<0.18	<0.22	<2.5	<0.20	<0.25	<0.25
Σ16 PAHs (zero LOR)	88.0	6.3	7.9	73.0	5.7	7.2	7.5
BaP TEQ (zero LOR)	13.1	0.94	1.18	11.5	0.90	1.13	1.15
Σ16 PAHs (half LOR)	97.8	7.0	8.8	84.0	6.6	8.3	8.5
BaP TEQ (half LOR)	14.5	1.04	1.30	13.0	1.02	1.28	1.29

*Extract volume was 71.8 ml. [†]Extract volume was 78.9 ml. [ǂ]Average concentration of duplicate analysis.

Table 5. Assessment of dermal PAH bioaccessibility in sample SB01-0.45 (< 250 µm particle size fraction).

PAH	SB01-D1			SB01-D2			Av. Bioaccessible PAHs (mg kg^{-1})‡
	PAH conc. in Extract (µg/l)	PAH in Extract (µg)*	Bioaccessible PAHs (mg kg^{-1})	PAH conc. in Extract (µg/l)	PAH in Extract (µg)†	Bioaccessible PAHs (mg kg^{-1})	
Naphthalene	4.4	0.25	0.08	4.2	0.25	0.08	0.08
Acenaphthylene	3.5	0.20	0.06	3.2	0.19	0.06	0.06
Acenaphthene	5.2	0.29	0.09	5.0	0.30	0.09	0.09
Fluorene	5.6	0.32	0.10	5.6	0.34	0.11	0.10
Phenanthrene	123	6.96	2.18	118	7.12	2.23	2.21
Anthracene	23.8	1.35	0.42	22.5	1.36	0.43	0.42
Fluoranthene	50.5	2.86	0.90	46.8	2.82	0.89	0.89
Pyrene	43.7	2.47	0.77	41.9	2.53	0.79	0.78
Benz(a)anthracene	9.5	0.54	0.17	9.2	0.56	0.17	0.17
Chrysene	<2.5	<0.14	<0.04	<2.5	<0.15	<0.05	<0.05
Benzo(b+j)fluoranthene	27.6	1.56	0.49	32	1.93	0.61	0.55
Benzo(k)fluoranthene	9.4	0.53	0.17	9.6	0.58	0.18	0.17
Benzo(a)pyrene	10.2	0.58	0.18	9.6	0.58	0.18	0.18
Indeno(1.2.3.cd)pyrene	9.1	0.51	0.16	8.6	0.52	0.16	0.16
Dibenz(a.h)anthracene	<2.5	<0.14	<0.04	<2.5	<0.15	<0.05	<0.05
Benzo(g.h.i)perylene	8.0	0.45	0.14	11.5	0.69	0.22	0.18
Σ16 PAHs (zero LOR)	334	18.9	5.9	328	19.8	6.2	6.1
BaP TEQ (zero LOR)	15.8	0.90	0.28	15.7	0.94	0.30	0.29
Σ16 PAHs (half LOR)	336	19.0	6.0	330	19.9	6.2	6.1
BaP TEQ (half LOR)	17.1	0.97	0.30	16.9	1.02	0.32	0.31

*Extract volume was 56.6 ml. †Extract volume was 60.3 ml. ‡Average concentration of duplicate analysis.

Table 6. Assessment of dermal PAH bioaccessibility in sample SB02-0.4 (< 250 μm particle size fraction).

PAH	SB02-D1			SB02-D2			Av. Bioaccessible PAHs (mg kg^{-1})ǂ
	PAH conc. in Extract (μg/l)	PAH in Extract (μg)*	Bioaccessible PAHs (mg kg^{-1})	PAH conc. in Extract (μg/l)	PAH in Extract (μg)†	Bioaccessible PAHs (mg kg^{-1})	
Naphthalene	15.8	0.91	0.29	15.1	0.89	0.28	0.28
Acenaphthylene	13.8	0.79	0.25	13.3	0.78	0.24	0.25
Acenaphthene	8.3	0.48	0.15	7.9	0.46	0.15	0.15
Fluorene	11.5	0.66	0.21	14.0	0.82	0.26	0.23
Phenanthrene	310	17.84	5.59	246	14.45	4.53	5.06
Anthracene	58.0	3.34	1.05	38.8	2.28	0.71	0.88
Fluoranthene	195	11.22	3.52	227	13.33	4.18	3.85
Pyrene	157	9.03	2.83	185	10.87	3.41	3.12
Benz(a)anthracene	22.7	1.31	0.41	30.5	1.79	0.56	0.49
Chrysene	4.0	0.23	0.07	31.4	1.84	0.58	0.33
Benzo(b+j)fluoranthene	54.9	3.16	0.99	19.6	1.15	0.36	0.68
Benzo(k)fluoranthene	17.0	0.98	0.31	6.7	0.39	0.12	0.22
Benzo(a)pyrene	20.8	1.20	0.38	19.2	1.13	0.35	0.36
Indeno(1.2.3.cd)pyrene	11.8	0.68	0.21	11.9	0.70	0.22	0.22
Dibenz(a.h)anthracene	<2.5	<0.14	<0.05	<2.5	<0.15	<0.05	<0.05
Benzo(g.h.i)perylene	10.0	0.58	0.18	5.8	0.34	0.11	0.14
Σ16 PAHs (zero LOR)	911	52.4	16.4	872	51.2	16.1	16.2
BaP TEQ (zero LOR)	31.6	1.82	0.57	26.4	1.55	0.49	0.53
Σ16 PAHs (half LOR)	912	52.5	16.4	873	51.3	16.1	16.3
BaP TEQ (half LOR)	32.8	1.89	0.59	27.7	1.63	0.51	0.55

*Extract volume was 57.5 ml. †Extract volume was 58.7 ml. ǂAverage concentration of duplicate analysis.

Table 7. Assessment of dermal PAH bioaccessibility in sample SB05-0.5 (< 250 µm particle size fraction).

PAH	**SB05-D1**			**SB05-D2**			**Av. Bioaccessible PAHs (mg kg^{-1})^{ǂ}**
	PAH conc. in Extract (µg/l)	**PAH in Extract (µg)***	**Bioaccessible PAHs (mg kg^{-1})**	**PAH conc. in Extract (µg/l)**	**PAH in Extract (µg)†**	**Bioaccessible PAHs (mg kg^{-1})**	
Naphthalene	<2.5	<0.13	<0.04	<2.5	<0.14	<0.04	<0.04
Acenaphthylene	<2.5	<0.13	<0.04	<2.5	<0.14	<0.04	<0.04
Acenaphthene	<2.5	<0.13	<0.04	<2.5	<0.14	<0.04	<0.04
Fluorene	<2.5	<0.13	<0.04	<2.5	<0.14	<0.04	<0.04
Phenanthrene	11.9	0.62	0.19	11.5	0.66	0.21	0.20
Anthracene	<2.5	<0.13	<0.04	<2.5	<0.14	<0.04	<0.04
Fluoranthene	14	0.73	0.23	15.3	0.87	0.27	0.25
Pyrene	13.9	0.73	0.23	15.0	0.86	0.27	0.25
Benz(a)anthracene	3.2	0.17	0.05	2.9	0.17	0.05	0.05
Chrysene	3.6	0.19	0.06	4.7	0.27	0.08	0.07
Benzo(b+j)fluoranthene	<2.5	<0.13	<0.04	<2.5	<0.14	<0.04	<0.04
Benzo(k)fluoranthene	<2.5	<0.13	<0.04	<2.5	<0.14	<0.04	<0.04
Benzo(a)pyrene	<2.5	<0.13	<0.04	<2.5	<0.14	<0.04	<0.04
Indeno(1.2.3.cd)pyrene	<2.5	<0.13	<0.04	<2.5	<0.14	<0.04	<0.04
Dibenz(a.h)anthracene	<2.5	<0.13	<0.04	<2.5	<0.14	<0.04	<0.04
Benzo(g.h.i)perylene	<2.5	<0.13	<0.04	<2.5	<0.14	<0.04	<0.04
Σ16 PAHs (zero LOR)	46.6	2.4	0.76	49.4	2.8	0.88	0.82
BaP TEQ (zero LOR)	0.4	0.02	0.01	0.3	0.02	0.01	0.01
Σ16 PAHs (half LOR)	60.4	3.1	1.0	63.2	3.6	1.1	1.1
BaP TEQ (half LOR)	3.2	0.17	0.05	3.2	0.18	0.06	0.06

*Extract volume was 52.2 ml. †Extract volume was 57.1 ml. ǂAverage concentration of duplicate analysis.

Table 8. Total PAH concentration and bioaccessible PAHs in sample SB01-0.45 (< 250 μm particle size fraction).

PAH	Total PAHs (mg kg^{-1})	Bioaccessible PAH (mg kg^{-1})		PAH Bioaccessibility (%)	
		Oral	Dermal	Oral	Dermal
Naphthalene	<1.2	0.31	0.08	-[†]	-
Acenaphthylene	5.3	0.41	0.06	7.7	1.1
Acenaphthene	<1.2	0.30	0.09	-	-
Fluorene	1.7	0.48	0.10	28.2	5.9
Phenanthrene	27.0	9.97	2.21	36.9	8.2
Anthracene	7.4	2.12	0.42	28.6	5.7
Fluoranthene	52.4	24.3	0.89	46.4	1.7
Pyrene	55.2	13.8	0.78	25.0	1.4
Benz(a)anthracene	28.4	7.45	0.17	26.2	0.6
Chrysene	26.0	1.24	<0.05	4.8	<0.2
Benzo(b+j)fluoranthene	45.2	5.16	0.55	11.4	1.2
Benzo(k)fluoranthene	16.6	1.96	0.17	11.8	1.0
Benzo(a)pyrene	45.7	4.54	0.18	9.9	0.4
Indeno(1.2.3.cd)pyrene	26.1	1.98	0.16	7.6	0.6
Dibenz(a.h)anthracene	7.9	0.44	<0.05	5.6	<0.6
Benzo(g.h.i)perylene	35.1	4.07	0.18	11.6	0.5
Σ16 PAHs (zero LOR)	380	78.5	6.1	20.7	1.6
BaP TEQ (zero LOR)	65.7	6.68	0.29	10.2	0.4
Σ16 PAHs (half LOR)	381	78.5	6.1	20.6	1.6
BaP TEQ (half LOR)	65.7	6.68	0.31	10.2	0.5

[†] Not determined

Table 9. Total PAH concentration and bioaccessible PAHs in sample SB02-0.4 (< 250 µm particle size fraction).

PAH	Total PAHs (mg kg^{-1})	Bioaccessible PAH (mg kg^{-1})		PAH Bioaccessibility (%)	
		Oral	Dermal	Oral	Dermal
Naphthalene	3.4	0.82	0.28	24.1	8.2
Acenaphthylene	25.9	1.27	0.25	4.9	1.0
Acenaphthene	1.4	0.43	0.15	30.7	10.7
Fluorene	3.9	0.83	0.23	21.3	5.9
Phenanthrene	89.2	21.5	5.06	24.1	5.7
Anthracene	24.6	3.98	0.88	16.2	3.6
Fluoranthene	166	43.5	3.85	26.2	2.3
Pyrene	162	24.3	3.12	15.0	1.9
Benz(a)anthracene	86.2	10.6	0.49	12.3	0.6
Chrysene	74.3	11.1	0.33	14.9	0.4
Benzo(b+j)fluoranthene	123	12.8	0.68	10.4	0.6
Benzo(k)fluoranthene	45.3	4.76	0.22	10.5	0.5
Benzo(a)pyrene	122	8.55	0.36	7.0	0.3
Indeno(1.2.3.cd)pyrene	56.2	13.9	0.22	24.7	0.4
Dibenz(a.h)anthracene	18.0	3.76	<0.05	20.9	<0.3
Benzo(g.h.i)perylene	67.2	4.95	0.14	7.4	0.2
Σ16 PAHs (zero LOR)	1067	167	16.2	15.7	1.5
BaP TEQ (zero LOR)	172	16.7	0.53	9.7	0.3
Σ16 PAHs (half LOR)	1067	167	16.3	15.7	1.5
BaP TEQ (half LOR)	172	16.7	0.55	9.7	0.3

Table 10. Total PAH concentration and bioaccessible PAHs in sample SB05-0.5 (< 250 μm particle size fraction).

PAH	Total PAHs (mg kg^{-1})	Bioaccessible PAH (mg kg^{-1})		PAH Bioaccessibility (%)	
		Oral	**Dermal**	**Oral**	**Dermal**
Naphthalene	<0.5	<0.25	<0.04	-	-
Acenaphthylene	0.9	<0.25	<0.04	<27.8	<4.4
Acenaphthene	<0.5	<0.25	<0.04	-	-
Fluorene	<0.5	<0.25	<0.04	-	-
Phenanthrene	4.3	0.77	0.20	17.9	4.7
Anthracene	1.2	<0.25	<0.04	<20.8	<3.3
Fluoranthene	13.3	2.15	0.25	16.2	1.9
Pyrene	14.4	1.45	0.25	10.1	1.7
Benz(a)anthracene	8.0	0.86	0.05	10.8	0.6
Chrysene	8.1	0.50	0.07	6.2	0.9
Benzo(b+j)fluoranthene	13.6	0.64	<0.04	4.7	<0.3
Benzo(k)fluoranthene	4.3	<0.36	<0.04	<8.4	<0.9
Benzo(a)pyrene	13.1	0.98	<0.04	7.5	<0.3
Indeno(1.2.3.cd)pyrene	6.5	<0.25	<0.04	<3.8	<0.6
Dibenz(a.h)anthracene	1.8	<0.25	<0.04	<13.9	<2.2
Benzo(g.h.i)perylene	8.6	<0.25	<0.04	<2.9	<0.5
Σ16 PAHs (zero LOR)	97.8	7.5	0.82	7.7	0.8
BaP TEQ (zero LOR)	18.2	1.15	0.01	6.3	0.1
Σ16 PAHs (half LOR)	98.6	8.5	1.1	8.6	1.1
BaP TEQ (half LOR)	18.2	1.29	0.06	7.1	0.3

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CONFIDENTIALITY

We acknowledge the confidential nature of the results of this project and will treat the results and project reports with appropriate confidentiality and security.

APPENDIX 1 - METHODOLOGY

Samples

The samples, supplied by Senversa Pty Ltd, were oven-dried at 40°C for 96 hours and sieved to recover the < 250 µm particle size fraction. This particle size fraction was used to assess PAH bioaccessibility.

Assessment of PAH concentration in the <250 µm particle size fraction

PAH concentration in the < 250 µm particle size fraction was determined by ALS Laboratories. A copy of the ALS analytical report is included in Appendix 3.

Assessment of oral PAH bioaccessibility in the <250 µm particle size fraction

PAH bioaccessibility was assessed using the organic Physiologically Based extraction Test (org-PBET) (Ruby et al., 2002) with minor modifications. Gastric phase solution was prepared by dissolving glycine (15.0 g l^{-1}), sodium chloride (8.8 g l^{-1}), pepsin (1.0 g l^{-1}), bovine serum albumin (5.0 g l^{-1}) and mucine (2.5 g l^{-1}) in MilliQ water and adjusting the pH to 1.5 ± 0.05 through the addition of concentrated hydrochloric acid. When gastric phase conditions were transitioned into the intestinal phase, the pH was adjusted to 7.2 ± 0.2 using sodium hydroxide (50% w/v) and porcine pancreatin (0.6 g l^{-1}) and bovine bile (4.0 g l^{-1}) were added. PAH bioaccessibility assays were conducted using 0.8 g of PAH-contaminated soil and 80 ml of org-PBET solution in the presence of silicone cord (diameter of 3 mm; 8 g m^{-1}). A silicone mass of approximately 100 times that of the soil organic matter content was added to gastrointestinal fluid. Suspensions were incubated at 37°C and 40 rpm on a Ratek suspension mixer. Following a 1 hr gastric phase, in vitro conditions were modified to the intestinal phase and incubation continued for a further 16 hr. At the end of the incubation period, the silicone cord was removed, rinsed with MilliQ water, gently wiped with lint free tissue and extracted with acetone (2 x 50 ml) (Gouliarmou et al., 2013). PAHs recovered from silicone cord extracts were designated as the bioaccessible fraction.

Assessment of dermal PAH bioaccessibility in the <250 µm particle size fraction

Dermal PAH bioaccessibility was assessed using a sorption sink approach in which silicone sheeting was utilised as a surrogate for human skin. PAH-contaminated soil was applied to silicone sheeting (translucent, talc-free, thickness of 0.5 mm; Altec, UK) at 100 mg / 2.54 cm^2 as per Wester et al. (1990). Soil (< 250 µm particle size fraction) was saturated with EU artificial perspiration (EN1811; 0.5% NaCl, 0.1% urea, 0.1% lactic acid, pH adjusted to 6.6 using NH_4OH) and maintained in a saturated state for 8 hr at 37°C (via moisture adjustment every 20 minutes). At the end of the exposure period, silicone sheeting was rinsed with MilliQ water, gently wiped with lint free tissue (to remove attached particles) and extracted with acetone (2 x 40 ml) (Gouliarmou et al., 2013). PAHs recovered from silicone sheeting extracts were designated as the bioaccessible fraction.

QA/QC procedures

ALS laboratories conducted the analysis for total and bioaccessible PAH concentrations for all samples. ALS Laboratories are a NATA accredited laboratory for the chemical testing of environmental materials. Quality Control results are reported in Appendix 3. An additional sample was included in bioaccessibility assays for quality assurance and quality control. The sample consisted of a blank control (i.e. org-PBET solution without soil addition).

APPENDIX 2 – CHAIN OF CUSTODY FORMS

CHAIN OF COUSTODY

ALS Laboratory: *please tick* →

☐ **Sydney:** 277 Woodpark Rd, Smithfield NSW 2176
Ph: 02 8784 8555 E:samples.sydney@alsenviro.com
☐ **Newcastle:** 5 Rosegum Rd, Warabrook NSW 2304
Ph:02 4968 9433 E:samples.newcastle@alsenviro.com

☐ **Brisbane:** 32 Shand St, Stafford QLD 4053
Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ **Townsville:** 14-15 Desma Ct, Bohle QLD 4818
Ph:07 4796 0600 E: townsville.environmental@alsenviro.com

☐ **Melbourne:** 2-4 Westall Rd, Springvale VIC 3171
Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ **Adelaide:** 2-1 Burma Rd, Pooraka SA 5095
Ph: 08 8359 0890 E:adelaide@alsenviro.com

☐ **Perth:** 10 Hod Way, Malaga WA 6090
Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ Launceston: 27 Wellington St, Launceston TAS 7250
Ph: 03 6331 2158 E: launceston@alsenviro.com

FREIGHT

CLIENT: University of South Australia
OFFICE: Mawson Lakes Campus X1-17
PROJECT: Sen PAH
ORDER NUMBER:
PROJECT MANAGER: Albert Juhasz **CONTACT PH:** 08 8302 5045
SAMPLER: Albert Juhasz **SAMPLER MOBILE:** 0418 818 121
COC emailed to ALS? (NO) **EDD FORMAT (or default):**
Email Reports to (will default to PM if no other addresses are listed): Albert.Juhasz@unisa.edu.au
Email Invoice to (will default to PM if no other addresses are listed): Albert.Juhasz@unisa.edu.au

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
☒ Standard TAT **(List due date):**
☐ Non Standard or urgent TAT **(List due date):**

ALS QUOTE NO.:

COC SEQUENCE NUMBER (Circle)
COC: [✓ 1] 2 3 4 5 6 7
OF: 1 [✓ 2] 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact?
Free ice / frozen ice bricks present upon receipt?
Random Sample Temperature on Receipt:
Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Albert Juhasz			
DATE/TIME: 23/12/20	DATE/TIME:	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).	Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	PAHs	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	SB01-250A	23/12/2020	S	AV	1	1	Soils are dried and sieved
2	SB01-250B	23/12/2020	S	AV	1	1	
3	SB02-250A	23/12/2020	S	AV	1	1	
4	SB02-250B	23/12/2020	S	AV	1	1	
5	SB05-250A	23/12/2020	S	AV	1	1	
6	SB05-250B	23/12/2020	S	AV	1	1	
7	SB01-1	23/12/2020	W	AG	1	1	Samples are in acetone
8	SB01-2	23/12/2020	W	AG	1	1	
9	SB01-D1	23/12/2020	W	AG	1	1	
10	SB01-D2	23/12/2020	W	AG	1	1	
				TOTAL	10	10	

Environmental Division
Melbourne
Work Order Reference
EM2023022
Telephone : + 61-3-8549 9600

SH
24/12

Received: 24/12 10:00 Carrier: TNT
C/note: BEN01185 8249
Temp: 10.6C Seal: [✓ Y] N
[✓ Ice /] Icebricks / NA

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ **Sydney:** 277 Woodpark Rd, Smithfield NSW 2176
Ph: 02 8784 8555 E:samples.sydney@alsenviro.com

☐ **Newcastle:** 5 Rosegum Rd, Warabrook NSW 2304
Ph:02 4968 9433 E:samples.newcastle@alsenviro.com

☐ **Brisbane:** 32 Shand St, Stafford QLD 4053
Ph:07 3243 7222 E:samples.brisbane@alsenviro.com

☐ **Townsville:** 14-15 Desma Ct, Bohle QLD 4818
Ph:07 4796 0600 E: townsville.environmental@alsenviro.com

☐ **Melbourne:** 2-4 Westall Rd, Springvale VIC 3171
Ph:03 8549 9600 E: samples.melbourne@alsenviro.com

☐ **Adelaide:** 2-1 Burma Rd, Pooraka SA 5095
Ph: 08 8359 0890 E:adelaide@alsenviro.com

☐ **Perth:** 10 Hod Way, Malaga WA 6090
Ph: 08 9209 7655 E: samples.perth@alsenviro.com

☐ **Launceston:** 27 Wellington St, Launceston TAS 7250
Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT: University of South Australia

OFFICE: Mawson Lakes Campus X1-17

PROJECT: Sen PAH

ORDER NUMBER:

PROJECT MANAGER: Albert Juhasz **CONTACT PH:** 08 8302 5045

SAMPLER: Albert Juhasz **SAMPLER MOBILE:** 0418 818 121

COC emailed to ALS? (NO)

EDD FORMAT (or default):

Email Reports to (will default to PM if no other addresses are listed): Albert.Juhasz@unisa.edu.au

Email Invoice to (will default to PM if no other addresses are listed): Albert.Juhasz@unisa.edu.au

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)

☒ Standard TAT **(List due date):**

☐ Non Standard or urgent TAT **(List due date):**

ALS QUOTE NO.:

COC SEQUENCE NUMBER (Circle)

COC: 1 [✓ 2] 3 4 5 6 7

OF: 1 [✓ 2] 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comment:

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Albert Juhasz			
DATE/TIME: 23/12/20	DATE/TIME:	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).									Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	PAHs									Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
11	SB02-1	23/12/2020	W	AG	1	1									Samples are in acetone
12	SB02-2	23/12/2020	W	AG	1	1									
13	SB02-D1	23/12/2020	W	AG	1	1									
14	SB02-D2	23/12/2020	W	AG	1	1									
15	SB05-1	23/12/2020	W	AG	1	1									
16	SB05-2	23/12/2020	W	AG	1	1									
17	SB05-D1	23/12/2020	W	AG	1	1									
18	SB05-D2	23/12/2020	W	AG	1	1									
19	QC1	23/12/2020	W	AG	1	1									Samples are in acetone
20	QC2	23/12/2020	W	AG	1	1									
					TOTAL	10	10								

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

APPENDIX 3 – ANALYTICAL RESULTS AND QA/QC

CERTIFICATE OF ANALYSIS

Work Order	: **EM2023022**	Page	: 1 of 8
Client	: **UNISA - CENTRE FOR ENVIRONMENT RISK ASSESSMENT & REMEDIATION**	Laboratory	: Environmental Division Melbourne
Contact	: MR ALBERT JUHASZ	Contact	: Customer Services EM
Address	: UNIVERSITY OF SOUTH AUSTRALIA CENTRE FOR ENVIRONMENT RISK ASSESSMENT & REMEDIATION BUILDING X MAWSON LAKES CAMPUS MAWSON LAKES SOUTH AUSTRALIA 5095	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 08 8302 6273	Telephone	: +61-3-8549 9600
Project	: Sen PAH	Date Samples Received	: 24-Dec-2020 10:00
Order number	: ----	Date Analysis Commenced	: 29-Dec-2020
C-O-C number	: ----	Issue Date	: 06-Jan-2021 17:06
Sampler	: ALBERT JUHASZ		
Site	: ----		
Quote number	: ADBQ/011/10		
No. of samples received	: 20		
No. of samples analysed	: 20		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Bronwyn Sheen	Assistant Laboratory Manager	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EP075(SIM): EM2023022_001 + 002 Particular samples required dilution due to the presence of high level contaminants. LOR values have been adjusted accordingly.
- EP075(SIM): Particular samples EM2023022 required dilution prior to extraction due to matrix interferences. LOR values have been adjusted accordingly.
- EP075(SIM): Surrogate recoveries for particular samples EM2023022 fall outside of published limits as a result of suspected matrix interferences. Surrogate recoveries have been confirmed by re-analysis.

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Sample ID*	**SB01-250A**	**SB01-250B**	**SB02-250A**	**SB02-250B**	**SB05-250A**
			Sampling date / time	23-Dec-2020 00:00	23-Dec-2020 00:00	23-Dec-2020 00:00	23-Dec-2020 00:00	23-Dec-2020 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EM2023022-001**	**EM2023022-002**	**EM2023022-003**	**EM2023022-004**	**EM2023022-005**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<1.2	<1.2	**3.4**	**3.3**	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	**5.2**	**5.3**	**25.4**	**26.3**	**0.9**
Acenaphthene	83-32-9	0.5	mg/kg	<1.2	<1.2	**1.4**	**1.4**	<0.5
Fluorene	86-73-7	0.5	mg/kg	**1.7**	**1.6**	**3.9**	**3.8**	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	**27.2**	**26.8**	**90.5**	**87.9**	**4.4**
Anthracene	120-12-7	0.5	mg/kg	**7.7**	**7.1**	**24.4**	**24.7**	**1.2**
Fluoranthene	206-44-0	0.5	mg/kg	**52.8**	**52.0**	**166**	**165**	**13.8**
Pyrene	129-00-0	0.5	mg/kg	**55.7**	**54.7**	**163**	**160**	**15.0**
Benz(a)anthracene	56-55-3	0.5	mg/kg	**28.8**	**27.9**	**86.5**	**85.8**	**8.3**
Chrysene	218-01-9	0.5	mg/kg	**26.0**	**26.0**	**72.2**	**76.3**	**8.4**
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	**46.0**	**44.3**	**129**	**116**	**14.1**
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	**16.2**	**16.9**	**40.6**	**50.0**	**4.7**
Benzo(a)pyrene	50-32-8	0.5	mg/kg	**46.2**	**45.1**	**124**	**120**	**13.7**
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	**26.6**	**25.6**	**57.3**	**55.0**	**6.8**
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	**8.0**	**7.7**	**18.3**	**17.6**	**1.9**
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	**35.8**	**34.3**	**69.0**	**65.4**	**9.1**
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**102**	**99.5**	**95.3**	**97.1**	**108**
2-Chlorophenol-D4	93951-73-6	0.5	%	**106**	**104**	**96.5**	**100**	**111**
2.4.6-Tribromophenol	118-79-6	0.5	%	**92.3**	**92.3**	**94.0**	**95.8**	**106**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**121**	**119**	**118**	**117**	**121**
Anthracene-d10	1719-06-8	0.5	%	**108**	**108**	**104**	**112**	**126**
4-Terphenyl-d14	1718-51-0	0.5	%	**124**	**120**	**113**	**111**	**117**

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL)**			*Sample ID*	**SB05-250B**	**----**	**----**	**----**	**----**
			Sampling date / time	23-Dec-2020 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EM2023022-006**	**--------**	**--------**	**--------**	**--------**
				Result	----	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	**0.8**	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	**4.2**	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg	**1.2**	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	**12.8**	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg	**13.8**	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	**7.7**	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg	**7.7**	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	**13.0**	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	**3.9**	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	**12.4**	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	**6.1**	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	**1.7**	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	**8.0**	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**108**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	**111**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	**105**	----	----	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**118**	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%	**125**	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	**116**	----	----	----	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Sample ID*	**SB01-1**	**SB01-2**	**SB01-D1**	**SB01-D2**	**SB02-1**
			Sampling date / time	23-Dec-2020 00:00	23-Dec-2020 00:00	23-Dec-2020 00:00	23-Dec-2020 00:00	23-Dec-2020 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EM2023022-007**	**EM2023022-008**	**EM2023022-009**	**EM2023022-010**	**EM2023022-011**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	**3.2**	**3.4**	**4.4**	**4.2**	**9.6**
Acenaphthylene	208-96-8	1.0	µg/L	**4.2**	**4.6**	**3.5**	**3.2**	**14.4**
Acenaphthene	83-32-9	1.0	µg/L	**3.2**	**3.3**	**5.2**	**5.0**	**5.0**
Fluorene	86-73-7	1.0	µg/L	**6.3**	**4.0**	**5.6**	**5.6**	**9.5**
Phenanthrene	85-01-8	1.0	µg/L	**94.3**	**119**	**123**	**118**	**247**
Anthracene	120-12-7	1.0	µg/L	**18.2**	**27.2**	**23.8**	**22.5**	**45.3**
Fluoranthene	206-44-0	1.0	µg/L	**256**	**262**	**50.5**	**46.8**	**497**
Pyrene	129-00-0	1.0	µg/L	**154**	**141**	**43.7**	**41.9**	**261**
Benz(a)anthracene	56-55-3	1.0	µg/L	**76.3**	**83.0**	**9.5**	**9.2**	**116**
Chrysene	218-01-9	1.0	µg/L	**14.3**	**12.1**	<2.5	<2.5	**125**
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	**57.6**	**52.5**	**27.6**	**32.0**	**160**
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	**19.0**	**22.8**	**9.4**	**9.6**	**66.2**
Benzo(a)pyrene	50-32-8	0.5	µg/L	**48.0**	**48.9**	**10.2**	**9.6**	**81.2**
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	**21.0**	**21.4**	**9.1**	**8.6**	**172**
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	**4.3**	**5.0**	<2.5	<2.5	**42.5**
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	**32.6**	**54.6**	**8.0**	**11.5**	**50.8**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	**117**	**126**	**111**	**116**	**117**
Anthracene-d10	1719-06-8	1.0	%	**110**	**162**	**136**	**134**	**107**
4-Terphenyl-d14	1718-51-0	1.0	%	**137**	**117**	**88.1**	**77.2**	**89.5**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Sample ID*	**SB02-2**	**SB02-D1**	**SB02-D2**	**SB05-1**	**SB05-2**
			Sampling date / time	23-Dec-2020 00:00	23-Dec-2020 00:00	23-Dec-2020 00:00	23-Dec-2020 00:00	23-Dec-2020 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EM2023022-012**	**EM2023022-013**	**EM2023022-014**	**EM2023022-015**	**EM2023022-016**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	**9.0**	**15.8**	**15.1**	<2.5	<2.5
Acenaphthylene	208-96-8	1.0	µg/L	**14.4**	**13.8**	**13.3**	<2.5	<2.5
Acenaphthene	83-32-9	1.0	µg/L	**4.8**	**8.3**	**7.9**	<2.5	<2.5
Fluorene	86-73-7	1.0	µg/L	**9.4**	**11.5**	**14.0**	<2.5	<2.5
Phenanthrene	85-01-8	1.0	µg/L	**242**	**310**	**246**	**8.6**	**7.7**
Anthracene	120-12-7	1.0	µg/L	**45.1**	**58.0**	**38.8**	<2.5	<2.5
Fluoranthene	206-44-0	1.0	µg/L	**490**	**195**	**227**	**25.9**	**20.1**
Pyrene	129-00-0	1.0	µg/L	**291**	**157**	**185**	**16.0**	**14.8**
Benz(a)anthracene	56-55-3	1.0	µg/L	**125**	**22.7**	**30.5**	**7.8**	**10.3**
Chrysene	218-01-9	1.0	µg/L	**127**	**4.0**	**31.4**	**5.5**	**5.2**
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	**131**	**54.9**	**19.6**	**9.0**	**4.7**
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	**42.0**	**17.0**	**6.7**	**4.0**	<2.5
Benzo(a)pyrene	50-32-8	0.5	µg/L	**113**	**20.8**	**19.2**	**11.0**	**9.9**
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	**143**	**11.8**	**11.9**	<2.5	<2.5
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	**42.8**	<2.5	<2.5	<2.5	<2.5
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	**61.6**	**10.0**	**5.8**	<2.5	<2.5
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	**110**	**127**	**106**	**113**	**111**
Anthracene-d10	1719-06-8	1.0	%	**105**	**146**	**107**	**114**	**111**
4-Terphenyl-d14	1718-51-0	1.0	%	**104**	**80.0**	**133**	**78.7**	**82.8**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Sample ID*	**SB05-D1**	**SB05-D2**	**QC1**	**QC2**	**----**
			Sampling date / time	23-Dec-2020 00:00	23-Dec-2020 00:00	23-Dec-2020 00:00	23-Dec-2020 00:00	----
Compound	*CAS Number*	*LOR*	*Unit*	**EM2023022-017**	**EM2023022-018**	**EM2023022-019**	**EM2023022-020**	**--------**
				Result	Result	Result	Result	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<2.5	<2.5	<2.5	<2.5	----
Acenaphthylene	208-96-8	1.0	µg/L	<2.5	<2.5	<2.5	<2.5	----
Acenaphthene	83-32-9	1.0	µg/L	<2.5	<2.5	<2.5	<2.5	----
Fluorene	86-73-7	1.0	µg/L	<2.5	<2.5	<2.5	<2.5	----
Phenanthrene	85-01-8	1.0	µg/L	**11.9**	**11.5**	<2.5	<2.5	----
Anthracene	120-12-7	1.0	µg/L	<2.5	<2.5	<2.5	<2.5	----
Fluoranthene	206-44-0	1.0	µg/L	**14.0**	**15.3**	<2.5	<2.5	----
Pyrene	129-00-0	1.0	µg/L	**13.9**	**15.0**	<2.5	<2.5	----
Benz(a)anthracene	56-55-3	1.0	µg/L	**3.2**	**2.9**	<2.5	<2.5	----
Chrysene	218-01-9	1.0	µg/L	**3.6**	**4.7**	<2.5	<2.5	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	<2.5	<2.5	<2.5	<2.5	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	<2.5	<2.5	<2.5	<2.5	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<2.5	<2.5	<2.5	<2.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	<2.5	<2.5	<2.5	<2.5	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<2.5	<2.5	<2.5	<2.5	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	<2.5	<2.5	<2.5	<2.5	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	**119**	**127**	**75.8**	**87.6**	----
Anthracene-d10	1719-06-8	1.0	%	**114**	**115**	**85.6**	**89.6**	----
4-Terphenyl-d14	1718-51-0	1.0	%	**129**	**169**	**103**	**104**	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	Recovery Limits (%) High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2.4.6-Tribromophenol	118-79-6	34	122
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	133

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	Recovery Limits (%) High
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	35	127
Anthracene-d10	1719-06-8	44	122
4-Terphenyl-d14	1718-51-0	44	124

QUALITY CONTROL REPORT

Work Order	: **EM2023022**	Page	: 1 of 5
Client	: **UNISA - CENTRE FOR ENVIRONMENT RISK ASSESSMENT & REMEDIATION**	Laboratory	: Environmental Division Melbourne
Contact	: MR ALBERT JUHASZ	Contact	: Customer Services EM
Address	: UNIVERSITY OF SOUTH AUSTRALIA CENTRE FOR ENVIRONMENT RISK ASSESSMENT & REMEDIATION BUILDING X MAWSON LAKES CAMPUS MAWSON LAKES SOUTH AUSTRALIA 5095	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 08 8302 6273	Telephone	: +61-3-8549 9600
Project	: Sen PAH	Date Samples Received	: 24-Dec-2020
Order number	: ----	Date Analysis Commenced	: 29-Dec-2020
C-O-C number	: ----	Issue Date	: 06-Jan-2021
Sampler	: ALBERT JUHASZ		
Site	: ----		
Quote number	: ADBQ/011/10		
No. of samples received	: 20		
No. of samples analysed	: 20		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Bronwyn Sheen	Assistant Laboratory Manager	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3442361)									
EM2023009-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EM2023018-029	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	1.0	1.5	33.2	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	2.8	4.6	48.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	2.8	4.6	48.4	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3442361) - continued									
EM2023018-029	Anonymous	EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	2.0	3.4	52.2	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	2.0	3.1	41.3	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	3.9	6.4	48.9	0% - 50%
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	1.1	1.8	45.2	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	2.5	4.3	52.7	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	1.6	2.6	46.6	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	0.7	39.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	2.1	3.4	45.3	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

Method: Compound	*CAS Number*	*LOR*	*Unit*	*Method Blank (MB) Report*	*Laboratory Control Spike (LCS) Report*			
					Spike	*Spike Recovery (%)*	*Recovery Limits (%)*	
				Result	*Concentration*	*LCS*	*Low*	*High*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3442361)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	111	85.7	123
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	103	81.0	123
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	103	83.6	120
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	100	81.3	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	105	79.4	123
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	111	81.7	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	105	78.3	124
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	110	79.9	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	104	76.9	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	111	80.9	130
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	95.5	70.0	121
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	106	80.4	130
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	92.0	70.2	123
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	90.8	67.9	122
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	91.6	65.8	123
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	96.5	65.8	127

Sub-Matrix: **WATER**

Method: Compound	*CAS Number*	*LOR*	*Unit*	*Method Blank (MB) Report*	*Laboratory Control Spike (LCS) Report*			
					Spike	*Spike Recovery (%)*	*Recovery Limits (%)*	
				Result	*Concentration*	*LCS*	*Low*	*High*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3441810)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.2	5 µg/L	84.2	42.8	114
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.2	5 µg/L	79.5	48.6	119
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.2	5 µg/L	89.8	47.0	117
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.2	5 µg/L	92.7	49.5	119
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.2	5 µg/L	103	49.4	121
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.2	5 µg/L	102	48.4	122
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.2	5 µg/L	109	50.3	124
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.2	5 µg/L	109	50.0	126
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.2	5 µg/L	104	49.4	127
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.2	5 µg/L	110	48.7	126
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.2	5 µg/L	109	54.5	134
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.2	5 µg/L	113	56.1	134

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3441810) - continued								
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<1.2	5 µg/L	110	55.6	135
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.2	5 µg/L	114	54.4	126
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.2	5 µg/L	112	54.5	126
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.2	5 µg/L	122	54.4	126

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3442361)							
EM2023009-002	Anonymous	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	98.4	77.2	116
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	112	65.5	136

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2023022**	Page	: 1 of 5
Client	: **UNISA - CENTRE FOR ENVIRONMENT RISK ASSESSMENT & REMEDIATION**	Laboratory	: Environmental Division Melbourne
Contact	: MR ALBERT JUHASZ	Telephone	: +61-3-8549 9600
Project	: Sen PAH	Date Samples Received	: 24-Dec-2020
Site	: ----	Issue Date	: 06-Jan-2021
Sampler	: ALBERT JUHASZ	No. of samples received	: 20
Order number	: ----	No. of samples analysed	: 20

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Regular Sample Surrogates

Sub-Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	**Analyte**	CAS Number	Data	Limits	**Comment**
Samples Submitted							
EP075(SIM)T: PAH Surrogates	EM2023022-008	SB01-2	**Anthracene-d10**	1719-06-8	162 %	44.3-122 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	EM2023022-009	SB01-D1	**Anthracene-d10**	1719-06-8	136 %	44.3-122 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	EM2023022-010	SB01-D2	**Anthracene-d10**	1719-06-8	134 %	44.3-122 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	EM2023022-013	SB02-D1	**Anthracene-d10**	1719-06-8	146 %	44.3-122 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	EM2023022-007	SB01-1	**4-Terphenyl-d14**	1718-51-0	137 %	43.6-124 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	EM2023022-014	SB02-D2	**4-Terphenyl-d14**	1718-51-0	133 %	43.6-124 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	EM2023022-017	SB05-D1	**4-Terphenyl-d14**	1718-51-0	129 %	43.6-124 %	**Recovery greater than upper data quality objective**
EP075(SIM)T: PAH Surrogates	EM2023022-018	SB05-D2	**4-Terphenyl-d14**	1718-51-0	169 %	43.6-124 %	**Recovery greater than upper data quality objective**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	14	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	14	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	***Sample Date***	*Extraction / Preparation*			*Analysis*		
Container */ Client Sample ID(s)*		***Date extracted***	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method *Container / Client Sample ID(s)*		*Sample Date*	*Extraction / Preparation*			*Analysis*		
			Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
SB01-250A, SB02-250A, SB05-250A,	SB01-250B, SB02-250B, SB05-250B	**23-Dec-2020**	**29-Dec-2020**	06-Jan-2021	✓	**30-Dec-2020**	07-Feb-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method *Container / Client Sample ID(s)*		*Sample Date*	*Extraction / Preparation*			*Analysis*		
			Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP075(SIM))								
SB01-1, SB01-D1, SB02-1, SB02-D1, SB05-1, SB05-D1, QC1,	SB01-2, SB01-D2, SB02-2, SB02-D2, SB05-2, SB05-D2, QC2	**23-Dec-2020**	**29-Dec-2020**	30-Dec-2020	✓	**29-Dec-2020**	07-Feb-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
PAH/Phenols (SIM)	EP075(SIM)	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	14	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	14	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.

Chain of Custody Documentation

Senversa Pty Ltd

www.senversa.com.au
ABN 89 132 231 380

Laboratory: Future Industries Institute, University of South Australia
Address: Building X, X1-17, Mawson Lakes Campus, Mawson Lakes SA
Contact: Dr. Albert Juhasz
Phone: 08 8302 5045

Job Number:	M18310	**Purchase Order:**	
Project Name:	Elwood DSI	**Quote No:**	
Sampled By:	Molly Hoak	**Turn Around Time:**	Standard
Project Manager:	Katie Richardson	**Page:**	1 of 1
Email Report To:	molly.hoak@senversa.com.au katie.richardson@senversa.com.au	**Phone/Mobile:**	Molly:0438 255 132 Katie: 0403993727

Sample Information					Container Information		Analysis Required											
Lab ID	**Sample ID**	**Matrix ***	**Date**	**Time**	**Type / Code**	**Total Bottles**	B(a)P Oral and Dermal Bioaccessibility Testing											Comments: e.g. Highly contaminated sample; hazardous materials present; trace LORs etc.
	SB30 - 0.15 -0.25 SB38_0.15-0.25 BULK	SOIL	2/02/2021		Bag	1	X											SB30-0.15-0.25
	SB16_0.45-0.55 BULK	SOIL	2/02/2021		Bag	1	X											BULK
Total						2	2											

Sampler: I attest that proper field sampling procedures in accordance with Senversa standard procedures and/or project specifications were used during the collection of these samples:	**Sampler Name:**	Molly Hoak	**Signature:**	**Date:**	2/02/2021

Relinquished By:		**Method of Shipment (if applicable):**	**Received by:**	
Name/Signature:	Date:	Carrier / Reference #:	Name/Signature: ALBERT JUHASZ	Date: 4/2/21
Of:	Time:	Date/Time:	Of: Uni SA	Time:
Name/Signature:	Date:	Carrier / Reference #:	Name/Signature:	Date:
Of:	Time:	Date/Time:	Of:	Time:
Name/Signature:	Date:	Carrier / Reference #:	Name/Signature:	Date:
Of:	Time:	Date/Time:	Of:	Time:

Water Container Codes: P = Unpreserved Plastic; N = Nitric Acid (HNO_3) Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide (NaOH)/Cadmium (Cd) Preserved; S = Sodium Hydroxide Preserved Plastic; STH = Sodium thiosulfate preserved plastic; V = VOA Vial Hydochloric Acid (HCl) Preserved; VS = VOA Vial Sulphuric Preserved; VSA = Sulphuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation Bottle; SP = Sulphuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; UA = Unpreserved Amber Glass; L=Lugol's iodine preserved white plastic bottle; SW= sulfuric acid preserved wide mouth glass jar

Completed by: ________
Checked by: ________

University of South Australia

Assessment of oral and dermal PAH bioaccessibility in contaminated soil

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Date of issue: 18 February 2021

Important Notice

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INTRODUCTION

This report was prepared for Senversa Pty Ltd to assess PAH bioaccessibility in impacted soil. The bioaccessibility testing was conducted at the Future Industries Institute, based at the Mawson Lakes Campus of the University of South Australia (UniSA). UniSA's Flagship Institute focuses on building knowledge and capacity in core research strengths of physical chemistry and environmental science and management. The Institute has four distinct yet inter-related strands: Minerals and Resources; Energy and Advanced Manufacturing; Environmental Science and Engineering; and Bioengineering and Nanomedicine. The Institute aggregates and builds upon existing expertise and infrastructure from the Ian Wark Research Institute, the Mawson Institute and the Centre for Environmental Risk Assessment and Remediation. The vision for the Future Industries Institute aligns strongly with South Australian and National economic and research priorities by building a critical mass of trans-disciplinary research capacity focused on pressing real-world challenges.

OBJECTIVES

The objective of this assessment was to:

- Determine PAH bioaccessibility (oral and dermal) in 2 samples supplied by Senversa Pty Ltd.

OUTCOMES AND DELIVERABLES

The expected outcome from this assessment was:

- A report assessing the bioaccessibility of PAHs in impacted soil. The report was to include;
    - Assessment of PAH concentration in the < 250 μm particle size fraction;
    - Assessment of PAH bioaccessibility in the < 250 μm particle size fraction using oral and dermal vitro methods;
    - Methodology procedures; and
    - QA/QC protocols

PROJECT BACKGROUND

Testing was initiated at the invitation of Senversa Pty Ltd for an assessment of PAH bioaccessibility in 2 soil samples. Human exposure to a contaminant may be through a number of pathways including inhalation, dermal absorption and ingestion. For PAHs, significant exposure pathways are via soil ingestion and dermal absorption. Generally, soil ingestion results from the accidental or, in the case of children less than 5 years old, the incidental ingestion of soil (< 250 μm particle size fraction) via hand-to-mouth contact (Basta et al., 2001). When assessing risk to humans associated with exposure to PAH-contaminated soil, a major unknown is quantifying the dose that has been absorbed into the systemic circulation (i.e. the bioavailable fraction). It is often assumed that the contaminant is 100% bioavailable, however, it is generally accepted that contaminant bioavailability in soil may be less than 100%. As a consequence, incorporating PAH bioavailability into human health risk assessment may reduce the uncertainty in estimating exposure associated with incidental ingestion and dermal pathways.

Determination of PAH bioavailability is challenging due to the complexity of in vivo PAH metabolism, distribution and excretion. For example, following ingestion, PAHs that are absorbed across the intestinal epithelium may enter hepatic portal circulation and be transported to the liver (first pass effect) where PAH metabolism may occur as a result of cytochrome P450 monooxygenase activity (Ramesh et al., 2004; Shimada, 2006). From hepatic portal circulation, metabolised and non-metabolised PAHs may enter the systemic circulation via hepatic veins whereas a proportion of metabolised PAHs may be excreted in the faeces via the bile (Ramesh et al., 2004). Non-absorbed PAHs in the gastrointestinal tract are also excreted via the faeces. Assessment of PAH bioavailability is complicated by the fact that PAHs may be absorbed from the gastrointestinal tract and transformed in the hepatic portal system but may not reach the systemic circulation (due to biliary excretion) which by definition is the bioavailable fraction. Conversely, transformed PAHs may enter the systemic circulation, however, this may not be taken into consideration for PAH bioavailability estimations if only the concentration of the parent compound is determined.

Although in vivo studies utilising animal models are an appropriate method for determination of PAH bioavailability in contaminated soil for inclusion in human health exposure assessment, the time required for in vivo studies and the expense of animal trials preclude their use as routine relative bioavailability assessment tools. As a result, rapid, cost effective in vitro methods simulating human gastrointestinal conditions have been developed in order to estimate contaminant bioavailability. These assays determine PAH concentrations that are mobilised following gastrointestinal extraction (i.e. the bioaccessible fraction) and are therefore potentially available for absorption into the systemic circulation. Assays such as the organic Physiologically Based Extraction Test (PBET; Ruby et al., 2002), Fed ORganic Estimation human Simulation Test (FOREhST; Cave et al., 2010), Colon-extended PBET (Tilston et al., 2011) have been used to assess PAH bioaccessibility in contaminated soils, however, as detailed by Collins et al. (2013), many of these methods may underestimate PAH bioaccessibility due to limiting partitioning of PAHs into gastrointestinal fluid (i.e. solubility constraints). To overcome these limitations, silicone cord (poly[dimethylsiloxane]) has been suggested to be included in the in vitro assay as a sorption sink due to its compatibility with extracting solutions and its well suited partitioning properties and low internal diffusive resistance for hydrophobic organic contaminants (Gouliarmou et al., 2013). The inclusion of the sorption sink simulates passive molecular diffusion across the small intestinal epithelium which causes disequilibrium in the digestive fluid and therefore creates a gradient for further diffusive mobilisation of contaminants from the soil matrix (Gouliarmou et al., 2013). Without mimicking uptake, in vitro models may underestimate PAH bioaccessibility due to the finite capacity of the in vitro fluid to accommodate desorbable PAHs (Juhasz et al., 2016).

Limited information is available regarding approaches for refining the dermal PAH absorption factor. Although a default dermal absorption factor of 6% has been utilised for the derivation of NEPM investigation levels, this may be a conservative estimate. A review by MfE (2011) resulted in the adoption of a dermal PAH absorption factor of 2.6%, the arithmetic mean of data from aged PAH soil (Abdel-Rahman et al. 2002). In the derivation of soil HILs, a higher arithmetic mean (6%) was based on data from freshly spiked PAH soil which may represent a worst-case value (Wester et al., 1990; Abdel-Rahman et al., 2002; Moody et al., 2007). Conservatism in the PAH dermal absorption factor may also arise from parameters that include the strong sorption of PAHs to soil organic matter, the low solid to solution ratio when soil adheres to individual's hands and the short residence time of soil on hands.

Refining PAH absorption (bioavailability) via the dermal pathway is also challenging due to the complexity of in vivo studies in addition to ethical considerations. Similarly, determination of PAH bioaccessibility using in vitro methodologies such as those detailed in Wester et al. (1990), Moody et al. (2007) and Abdel-Rahman et al. (2010) are challenging due to the availability of human skin, differences in animal versus human skin and difference between skin permeability from different parts of the body (Beriro et al., 2016). To alleviate issues associated with in vivo and (traditional) in vitro methodologies, silicone sheeting (poly[dimethylsiloxane]) has been proposed as a 'surrogate skin' due to its well suited partitioning properties and low internal diffusive resistance for hydrophobic organic contaminants such as PAHs (Gouliarmou et al., 2013). Saturated soil (moistened with artificial perspiration) may be applied directly to the silicone sheeting which acts as a passive sampler; the sheeting facilitates the molecular diffusion of PAHs from the soil. As PAHs partition into the silicone, a gradient is created within soil-solution for further diffusive mobilisation of PAHs from the soil matrix (Gouliarmou et al., 2013; Juhasz et al., 2016). The 'sorption sink' approach may provide a methodology for refining the dermal absorption factor that provides a conservative estimate of dermal bioaccessibility due to the 'elevated' moisture content of the applied soil (i.e. the use of saturated soils), the 'infinite' capacity of the silicone sheeting to sorb PAHs and the extended timeframe (8 hours) of the assay. Additional conservatism is built into the assay as it only assesses the transfer of PAH from the soil into the 'surrogate skin' but not the penetration of PAHs through the skin (i.e. stratum corneum) to underlying or adjacent cells (Pugh and Chilcott, 2008).

FINDINGS

The concentration of PAHs in samples SB16_0.45-0.55 and SB30_0.15-0.25 is shown in Table 1 while PAH bioaccessibility results are shown in Tables 2-10.

- The concentration of PAHs (Σ16 PAHs half LOR) in the < 250 μm particle size fraction was 394 (SB16_0.45-0.55) and 119 mg kg^{-1} (SB30_0.15-0.25) with a BaP$_{TEQ}$ (half LOR) of 63.5 (SB16_0.45-0.55) and 22.5 mg kg^{-1} (SB30_0.15-0.25) (Table 1).

Oral Bioaccessibility

- In SB16_0.45-0.55, using half LOR, Σ16 PAHs and BaP$_{TEQ}$ bioaccessibility was 13.1% and 10.4% respectively (Tables 2 and 6).

- In SB30_0.15-0.25, using half LOR, Σ16 PAHs and BaP$_{TEQ}$ bioaccessibility was 11.7% and 10.9% respectively (Tables 3 and 7).

- In the oral assay blank control, the concentration of PAHs was below the level of reporting.

Dermal Bioaccessibility

- In SB16_0.45-0.55, using half LOR, Σ16 PAHs and BaP$_{TEQ}$ dermal bioaccessibility was 0.7% and 0.2% respectively (Tables 4 and 6).

- In SB30_0.15-0.25, using half LOR, Σ16 PAHs and BaP$_{TEQ}$ dermal bioaccessibility was 0.4% and 0.2% respectively (Table 5 and 7).

- In the dermal assay blank control, the concentration of PAHs was below the level of reporting.

Table 1. PAH concentration in samples SB16_0.45-0.55 and SB30_0.15-0.25 (< 250 μm particle size fraction).

PAH	**SB16_0.45-0.55 (mg kg^{-1})**			**SB30_0.15-0.25 (mg kg^{-1})**		
	250A	**250B**	**Av. 250**	**250A**	**250B**	**Av. 250**
Naphthalene	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
Acenaphthylene	5.8	6.0	5.9	<1.2	<1.2	<1.2
Acenaphthene	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
Fluorene	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
Phenanthrene	21.3	21.0	21.2	3.0	2.9	3.0
Anthracene	7.8	7.8	7.8	1.4	1.3	1.4
Fluoranthene	61.9	60.6	61.3	13.7	13.0	13.4
Pyrene	65.2	64.1	64.7	16.3	15.4	15.9
Benz(a)anthracene	32.9	33.2	33.1	9.3	8.8	9.1
Chrysene	29.0	28.9	29.0	9.8	9.3	9.6
Benzo(b+j)fluoranthene	47.5	48.8	48.2	18.6	17.8	18.2
Benzo(k)fluoranthene	17.7	16.1	16.9	6.2	5.7	6.0
Benzo(a)pyrene	45.3	45.0	45.2	16.4	15.6	16.0
Indeno(1.2.3.cd)pyrene	23.9	23.4	23.7	9.7	9.3	9.5
Dibenz(a.h)anthracene	5.4	5.7	5.6	2.0	2.0	2.0
Benzo(g.h.i)perylene	30.4	29.3	29.9	12.8	12.3	12.6
Σ16 PAHs (zero LOR)	394	390	392	119	113	116
BaP TEQ (zero LOR)	63.5	63.4	63.5	23.0	22.0	22.5
Σ16 PAHs (half LOR)	396	392	394	122	116	119
BaP TEQ (half LOR)	63.5	63.4	63.5	23.0	22.0	22.5

*Average concentration of duplicate analysis.

Table 2. Assessment of oral PAH bioaccessibility in sample SB16_0.15-0.25 (< 250 μm particle size fraction).

PAH	SB16-1			SB16-2			Av. Bioaccessible PAHs (mg kg^{-1})ǂ
	PAH conc. in Extract (μg/l)	PAH in Extract (μg)*	Bioaccessible PAHs (mg kg^{-1})	PAH conc. in Extract (μg/l)	PAH in Extract (μg)†	Bioaccessible PAHs (mg kg^{-1})	
Naphthalene	<2.5	<0.24	<0.30	<2.5	<0.25	<0.31	<0.31
Acenaphthylene	<2.5	<0.24	<0.30	<2.5	<0.25	<0.31	<0.31
Acenaphthene	<2.5	<0.24	<0.30	<2.5	<0.25	<0.31	<0.31
Fluorene	<2.5	<0.24	<0.30	<2.5	<0.25	<0.31	<0.31
Phenanthrene	38.2	3.70	4.63	31.4	3.11	3.89	4.26
Anthracene	10.2	0.99	1.24	8.4	0.83	1.04	<0.31
Fluoranthene	102	9.88	12.35	83.7	8.29	10.36	11.36
Pyrene	94.8	9.19	11.48	78.1	7.74	9.67	10.58
Benz(a)anthracene	49.7	4.82	6.02	39.6	3.92	4.90	5.46
Chrysene	41.7	4.04	5.05	35.8	3.55	4.43	4.74
Benzo(b+j)fluoranthene	20.6	2.00	2.50	14.1	1.40	1.75	2.12
Benzo(k)fluoranthene	8.1	0.78	0.98	6.1	0.60	0.76	0.87
Benzo(a)pyrene	47.3	4.58	5.73	39.3	3.89	4.87	5.30
Indeno(1.2.3.cd)pyrene	19.1	1.85	2.31	18.3	1.81	2.27	2.29
Dibenz(a.h)anthracene	<2.5	<0.24	<0.30	<2.5	<0.25	<0.31	<0.31
Benzo(g.h.i)perylene	23.9	2.32	2.89	20.6	2.04	2.55	2.72
Σ16 PAHs (zero LOR)	456	44.1	55.2	375	37.2	46.5	50.8
BaP TEQ (zero LOR)	57.7	5.59	6.99	47.7	4.72	5.83	6.41
Σ16 PAHs (half LOR)	462	44.8	55.9	382	37.8	47.2	51.6
BaP TEQ (half LOR)	59.0	5.71	7.14	48.9	4.85	6.06	6.60

*Extract volume was 96. ml. †Extract volume was 99.0 ml. ǂAverage concentration of duplicate analysis.

Table 3. Assessment of oral PAH bioaccessibility in sample SB30_0.45-0.55 (< 250 µm particle size fraction).

PAH	SB30-1			SB30-2			Av. Bioaccessible PAHs (mg kg^{-1})‡
	PAH conc. in Extract (µg/l)	PAH in Extract (µg)*	Bioaccessible PAHs (mg kg^{-1})	PAH conc. in Extract (µg/l)	PAH in Extract (µg)†	Bioaccessible PAHs (mg kg^{-1})	
Naphthalene	<2.5	<0.25	<0.31	<2.5	<0.24	<0.30	<0.31
Acenaphthylene	<2.5	<0.25	<0.31	<2.5	<0.24	<0.30	<0.31
Acenaphthene	<2.5	<0.25	<0.31	<2.5	<0.24	<0.30	<0.31
Fluorene	<2.5	<0.25	<0.31	<2.5	<0.24	<0.30	<0.31
Phenanthrene	3.9	0.39	0.49	3.8	0.37	0.46	0.47
Anthracene	<2.5	<0.25	<0.31	<2.5	<0.24	<0.30	<0.31
Fluoranthene	14.2	1.42	1.77	13.8	1.34	1.67	1.72
Pyrene	15	1.50	1.87	13.9	1.35	1.68	1.78
Benz(a)anthracene	9.3	0.93	1.16	8.8	0.85	1.07	1.11
Chrysene	9.4	0.94	1.17	8.7	0.84	1.05	1.11
Benzo(b+j)fluoranthene	19.1	1.91	2.38	4.7	0.46	0.57	1.48
Benzo(k)fluoranthene	9.1	0.91	1.14	<2.5	<0.24	<0.30	<1.14
Benzo(a)pyrene	15.7	1.57	1.96	14	1.36	1.70	1.83
Indeno(1.2.3.cd)pyrene	10.8	1.08	1.35	8.7	0.84	1.05	1.20
Dibenz(a.h)anthracene	<2.5	<0.25	<0.31	<2.5	<0.24	<0.30	<0.31
Benzo(g.h.i)perylene	14.3	1.43	1.78	12.3	1.19	1.49	1.64
Σ16 PAHs (zero LOR)	121	12.1	15.1	89	8.6	10.7	12.9
BaP TEQ (zero LOR)	20.8	2.07	2.59	16.4	1.59	1.99	2.29
Σ16 PAHs (half LOR)	128	12.8	16.0	97	9.4	11.8	13.9
BaP TEQ (half LOR)	22.0	2.20	2.75	17.8	1.73	2.16	2.45

*Extract volume was 99.8 ml. †Extract volume was 96.9 ml. ‡Average concentration of duplicate analysis.

Table 4. Assessment of dermal PAH bioaccessibility in sample SB16_0.45-0.55 (< 250 µm particle size fraction).

PAH	SB16-D1			SB16-D2			Av. Bioaccessible PAHs (mg kg^{-1})ǂ
	PAH conc. in Extract (µg/l)	PAH in Extract (µg)*	Bioaccessible PAHs (mg kg^{-1})	PAH conc. in Extract (µg/l)	PAH in Extract (µg)†	Bioaccessible PAHs (mg kg^{-1})	
Naphthalene	<2.5	<0.14	<0.04	2.8	0.13	0.04	<0.04
Acenaphthylene	<2.5	<0.14	<0.04	<2.5	<0.11	<0.04	<0.04
Acenaphthene	3.3	0.18	0.06	4.2	0.19	0.06	<0.31
Fluorene	<2.5	<0.14	<0.04	3.3	0.15	0.05	<0.05
Phenanthrene	38.4	2.10	0.66	47.7	2.15	0.67	0.67
Anthracene	8.1	0.44	0.14	10.1	0.45	0.14	0.14
Fluoranthene	41	2.24	0.70	59.5	2.68	0.84	0.77
Pyrene	34.7	1.89	0.59	51.3	2.31	0.72	0.66
Benz(a)anthracene	7.6	0.41	0.13	10	0.45	0.14	0.14
Chrysene	7	0.38	0.12	9.8	0.44	0.14	0.13
Benzo(b+j)fluoranthene	<2.5	<0.14	<0.04	<2.5	<0.11	<0.04	<0.04
Benzo(k)fluoranthene	<2.5	<0.14	<0.04	<2.5	<0.11	<0.04	<0.04
Benzo(a)pyrene	3.1	0.17	0.05	4.7	0.21	0.07	0.06
Indeno(1.2.3.cd)pyrene	<2.5	<0.14	<0.04	<2.5	<0.11	<0.04	<0.04
Dibenz(a.h)anthracene	<2.5	<0.14	<0.04	<2.5	<0.11	<0.04	<0.04
Benzo(g.h.i)perylene	<2.5	<0.14	<0.04	<2.5	<0.11	<0.04	<0.04
Σ16 PAHs (zero LOR)	143	7.8	2.45	203	9.2	2.87	2.66
BaP TEQ (zero LOR)	3.9	0.21	0.07	5.8	0.26	0.08	0.07
Σ16 PAHs (half LOR)	153	8.4	2.62	211	9.5	2.98	2.80
BaP TEQ (half LOR)	5.6	0.30	0.10	7.4	0.33	0.10	0.10

*Extract volume was 54.6 ml. †Extract volume was 45.1 ml. ǂAverage concentration of duplicate analysis.

Table 5. Assessment of dermal PAH bioaccessibility in sample SB30_0.15-0.25 (< 250 µm particle size fraction).

PAH	SB30-D1			SB30-D2			Av. Bioaccessible PAHs (mg kg^{-1})‡
	PAH conc. in Extract (µg/l)	**PAH in Extract (µg)***	**Bioaccessible PAHs (mg kg^{-1})**	**PAH conc. in Extract (µg/l)**	**PAH in Extract (µg)†**	**Bioaccessible PAHs (mg kg^{-1})**	
Naphthalene	<2.5	<0.14	<0.04	<2.5	<0.14	<0.04	<0.04
Acenaphthylene	<2.5	<0.14	<0.04	<2.5	<0.14	<0.04	<0.04
Acenaphthene	<2.5	<0.14	<0.04	<2.5	<0.14	<0.04	<0.04
Fluorene	<2.5	<0.14	<0.04	<2.5	<0.14	<0.04	<0.04
Phenanthrene	3.5	0.20	0.06	3.4	0.19	0.06	0.06
Anthracene	<2.5	<0.14	<0.04	<2.5	<0.14	<0.04	<0.04
Fluoranthene	3.7	0.21	0.07	3.2	0.17	0.05	0.06
Pyrene	4.1	0.23	0.07	3.7	0.20	0.06	0.07
Benz(a)anthracene	<2.5	<0.14	<0.04	<2.5	<0.14	<0.04	<0.04
Chrysene	<2.5	<0.14	<0.04	<2.5	<0.14	<0.04	<0.04
Benzo(b+j)fluoranthene	<2.5	<0.14	<0.04	<2.5	<0.14	<0.04	<0.04
Benzo(k)fluoranthene	<2.5	<0.14	<0.04	<2.5	<0.14	<0.04	<0.04
Benzo(a)pyrene	<2.5	<0.14	<0.04	<2.5	<0.14	<0.04	<0.04
Indeno(1.2.3.cd)pyrene	<2.5	<0.14	<0.04	<2.5	<0.14	<0.04	<0.04
Dibenz(a.h)anthracene	<2.5	<0.14	<0.04	<2.5	<0.14	<0.04	<0.04
Benzo(g.h.i)perylene	<2.5	<0.14	<0.04	<2.5	<0.14	<0.04	<0.04
Σ16 PAHs (zero LOR)	11.3	0.6	0.20	10.3	0.6	0.18	0.19
BaP TEQ (zero LOR)	<2.5	<0.14	<0.04	<2.5	<0.14	<0.04	<0.04
Σ16 PAHs (half LOR)	27.6	1.6	0.49	26.6	1.5	0.45	0.47
BaP TEQ (half LOR)	3.0	0.17	0.05	3.0	0.17	0.05	0.05

*Extract volume was 57.1 ml. †Extract volume was 54.7 ml. ‡Average concentration of duplicate analysis.

Table 6. Total PAH concentration and bioaccessible PAHs in sample SB16_0.45-0.55 (< 250 μm particle size fraction).

PAH	**Total PAHs (mg kg^{-1})**	**Bioaccessible PAH (mg kg^{-1})**		**PAH Bioaccessibility (%)**	
		Oral	**Dermal**	**Oral**	**Dermal**
Naphthalene	<1.2	<0.31	<0.04	-[†]	-
Acenaphthylene	5.9	<0.31	<0.04	<5.3	<0.7
Acenaphthene	<1.2	<0.31	<0.31	-	-
Fluorene	<1.2	<0.31	<0.05	-	-
Phenanthrene	21.2	4.26	0.67	20.1	3.2
Anthracene	7.8	<0.31	0.14	<4.0	1.8
Fluoranthene	61.3	11.36	0.77	18.5	1.3
Pyrene	64.7	10.58	0.66	16.4	1.0
Benz(a)anthracene	33.1	5.46	0.14	16.5	0.4
Chrysene	29.0	4.74	0.13	16.4	0.4
Benzo(b+j)fluoranthene	48.2	2.12	<0.04	4.4	<0.1
Benzo(k)fluoranthene	16.9	0.87	<0.04	5.1	<0.2
Benzo(a)pyrene	45.2	5.30	0.06	11.7	0.1
Indeno(1.2.3.cd)pyrene	23.7	2.29	<0.04	9.7	<0.2
Dibenz(a.h)anthracene	5.6	<0.31	<0.04	<5.6	<0.7
Benzo(g.h.i)perylene	29.9	2.72	<0.04	9.1	<0.1
Σ16 PAHs (zero LOR)	392	50.8	2.66	13.0	0.7
BaP TEQ (zero LOR)	63.5	6.41	0.07	10.1	0.1
Σ16 PAHs (half LOR)	394	51.6	2.80	13.1	0.7
BaP TEQ (half LOR)	63.5	6.60	0.10	10.4	0.2

[†] Not determined

Table 7. Total PAH concentration and bioaccessible PAHs in sample SB30_0.15-0.25 (< 250 µm particle size fraction).

PAH	Total PAHs (mg kg^{-1})	Bioaccessible PAH (mg kg^{-1})		PAH Bioaccessibility (%)	
		Oral	Dermal	Oral	Dermal
Naphthalene	<1.2	<0.31	<0.04	-[†]	-
Acenaphthylene	<1.2	<0.31	<0.04	-	-
Acenaphthene	<1.2	<0.31	<0.04	-	-
Fluorene	<1.2	<0.31	<0.04	-	-
Phenanthrene	3.0	0.47	0.06	15.9	2.0
Anthracene	1.4	<0.31	<0.04	<23.0	<3.0
Fluoranthene	13.4	1.72	0.06	12.9	0.4
Pyrene	15.9	1.78	0.07	11.2	0.4
Benz(a)anthracene	9.1	1.11	<0.04	12.3	<0.4
Chrysene	9.6	1.11	<0.04	11.6	<0.4
Benzo(b+j)fluoranthene	18.2	1.48	<0.04	8.1	<0.2
Benzo(k)fluoranthene	6.0	<1.14	<0.04	<19.2	<0.7
Benzo(a)pyrene	16.0	1.83	<0.04	11.4	<0.3
Indeno(1.2.3.cd)pyrene	9.5	1.20	<0.04	12.6	<0.4
Dibenz(a.h)anthracene	2.0	<0.31	<0.04	<15.5	<2.0
Benzo(g.h.i)perylene	12.6	1.64	<0.04	13.1	<0.3
Σ16 PAHs (zero LOR)	116	12.9	0.19	11.1	0.2
BaP TEQ (zero LOR)	22.5	2.29	<0.04	10.2	<0.2
Σ16 PAHs (half LOR)	119	13.9	0.47	11.7	0.4
BaP TEQ (half LOR)	22.5	2.45	0.05	10.9	0.2

[†] Not determined

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CONFIDENTIALITY

We acknowledge the confidential nature of the results of this project and will treat the results and project reports with appropriate confidentiality and security.

APPENDIX 1 - METHODOLOGY

Samples

The samples, supplied by Senversa Pty Ltd, were oven-dried at 40°C for 96 hours and sieved to recover the < 250 µm particle size fraction. This particle size fraction was used to assess PAH bioaccessibility.

Assessment of PAH concentration in the <250 µm particle size fraction

PAH concentration in the < 250 µm particle size fraction was determined by ALS Laboratories. A copy of the ALS analytical report is included in Appendix 3.

Assessment of oral PAH bioaccessibility in the <250 µm particle size fraction

PAH bioaccessibility was assessed using the organic Physiologically Based extraction Test (org-PBET) (Ruby et al., 2002) with minor modifications. Gastric phase solution was prepared by dissolving glycine (15.0 g l^{-1}), sodium chloride (8.8 g l^{-1}), pepsin (1.0 g l^{-1}), bovine serum albumin (5.0 g l^{-1}) and mucine (2.5 g l^{-1}) in MilliQ water and adjusting the pH to 1.5 ± 0.05 through the addition of concentrated hydrochloric acid. When gastric phase conditions were transitioned into the intestinal phase, the pH was adjusted to 7.2 ± 0.2 using sodium hydroxide (50% w/v) and porcine pancreatin (0.6 g l^{-1}) and bovine bile (4.0 g l^{-1}) were added. PAH bioaccessibility assays were conducted using 0.8 g of PAH-contaminated soil and 80 ml of org-PBET solution in the presence of silicone cord (diameter of 3 mm; 8 g m^{-1}). A silicone mass of approximately 100 times that of the soil organic matter content was added to gastrointestinal fluid. Suspensions were incubated at 37°C and 40 rpm on a Ratek suspension mixer. Following a 1 hr gastric phase, in vitro conditions were modified to the intestinal phase and incubation continued for a further 16 hr. At the end of the incubation period, the silicone cord was removed, rinsed with MilliQ water, gently wiped with lint free tissue and extracted with acetone (2 x 50 ml) (Gouliarmou et al., 2013). PAHs recovered from silicone cord extracts were designated as the bioaccessible fraction.

Assessment of dermal PAH bioaccessibility in the <250 µm particle size fraction

Dermal PAH bioaccessibility was assessed using a sorption sink approach in which silicone sheeting was utilised as a surrogate for human skin. PAH-contaminated soil was applied to silicone sheeting (translucent, talc-free, thickness of 0.5 mm; Altec, UK) at 100 mg / 2.54 cm^2 as per Wester et al. (1990). Soil (< 250 µm particle size fraction) was saturated with EU artificial perspiration (EN1811; 0.5% NaCl, 0.1% urea, 0.1% lactic acid, pH adjusted to 6.6 using NH_4OH) and maintained in a saturated state for 8 hr at 37°C (via moisture adjustment every 20 minutes). At the end of the exposure period, silicone sheeting was rinsed with MilliQ water, gently wiped with lint free tissue (to remove attached particles) and extracted with acetone (2 x 40 ml) (Gouliarmou et al., 2013). PAHs recovered from silicone sheeting extracts were designated as the bioaccessible fraction.

QA/QC procedures

ALS laboratories conducted the analysis for total and bioaccessible PAH concentrations for all samples. ALS Laboratories are a NATA accredited laboratory for the chemical testing of environmental materials. Quality Control results are reported in Appendix 3. An additional sample was included in bioaccessibility assays for quality assurance and quality control. The sample consisted of a blank control (i.e. org-PBET solution without soil addition).

APPENDIX 2 – CHAIN OF CUSTODY FORMS

senversa

Senversa Pty Ltd

www.senversa.com.au
ABN 89 132 231 380

Chain of Custody Documentation

Laboratory: Future Industries Institute, University of South Australia
Address: Building X, X1-17, Mawson Lakes Campus, Mawson Lakes SA
Contact: Dr. Albert Juhasz
Phone: 08 8302 5045

Job Number:	M18310	**Purchase Order:**	
Project Name:	Elwood DSI	**Quote No:**	
Sampled By:	Molly Hoak	**Turn Around Time:**	Standard
Project Manager:	Katie Richardson	**Page:**	1 of 1
Email Report To:	molly.hoak@senversa.com.au katie.richardson@senversa.com.au	**Phone/Mobile:**	Molly:0438 255 132 Katie: 0403993727

Sample Information					Container Information		Analysis Required	
Lab ID	**Sample ID**	**Matrix ***	**Date**	**Time**	**Type / Code**	**Total Bottles**	B(a)P Oral and Dermal Bioaccessibility Testing	Comments: e.g. Highly contaminated sample; hazardous materials present; trace LORs etc.
	SB30 - 0.15 - 0.25 SB38_0.15-0.25 BULK	SOIL	2/02/2021		Bag	1	X	SB30-0.15-0.25 BULK
	SB16_0.45-0.55 BULK	SOIL	2/02/2021		Bag	1	X	
Total						2	2	

Sampler: I attest that proper field sampling procedures in accordance with Senversa standard procedures and/or project specifications were used during the collection of these samples:	**Sampler Name:** Molly Hoak	**Signature:**		**Date:**	2/02/2021

Relinquished By:		**Method of Shipment (if applicable):**	**Received by:**	
Name/Signature:	Date:	Carrier / Reference #:	Name/Signature: ALBERT JUHASZ	Date: 4/2/21
Of:	Time:	Date/Time:	Of: Uni SA	Time:
Name/Signature:	Date:	Carrier / Reference #:	Name/Signature:	Date:
Of:	Time:	Date/Time:	Of:	Time:
Name/Signature:	Date:	Carrier / Reference #:	Name/Signature:	Date:
Of:	Time:	Date/Time:	Of:	Time:

Water Container Codes: P = Unpreserved Plastic; N = Nitric Acid (HNO_3) Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide (NaOH)/Cadmium (Cd) Preserved; S = Sodium Hydroxide Preserved Plastic; STH = Sodium thiosulfate preserved plastic; V = VOA Vial Hydochloric Acid (HCl) Preserved; VS = VOA Vial Sulphuric Preserved; VSA = Sulphuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation Bottle; SP = Sulphuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; UA = Unpreserved Amber Glass; L=Lugol's iodine preserved white plastic bottle; SW= sulfuric acid preserved wide mouth glass jar

Completed by: ________
Checked by: ________

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ **Sydney**: 277 Woodpark Rd, Smithfield NSW 2176
Ph: 02 8784 8555 E:samples.sydney@alsenviro.com
☐ **Newcastle:** 5 Rosegum Rd, Warabrook NSW 2304
Ph:02 4968 9433 E:samples.newcastle@alsenviro.com

☐ **Brisbane**: 32 Shand St, Stafford QLD 4053
Ph:07 3243 7222 E:samples.brisbane@alsenviro.com
☐ **Townsville:** 14-15 Desma Ct, Bohle QLD 4818
Ph:07 4796 0600 E: townsville.environmental@alsenviro.com

☐ **Melbourne**: 2-4 Westall Rd, Springvale VIC 3171
Ph:03 8549 9600 E: samples.melbourne@alsenviro.com
☐ **Adelaide**: 2-1 Burma Rd, Pooraka SA 5095
Ph: 08 8359 0890 E:adelaide@alsenviro.com

☐ **Perth**: 10 Hod Way, Malaga WA 6090
Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ **Launceston**: 27 Wellington St, Launceston TAS 7250
Ph: 03 6331 2158 E: launceston@alsenviro.com

FREIGHT

CLIENT: University of South Australia
OFFICE: Mawson Lakes Campus X1-17
PROJECT: Sen PAH IVBA
ORDER NUMBER:
PROJECT MANAGER: Albert Juhasz **CONTACT PH:** 08 8302 5045
SAMPLER: Albert Juhasz **SAMPLER MOBILE:** 0418 818 121
COC emailed to ALS? (NO)
EDD FORMAT (or default):
Email Reports to (will default to PM if no other addresses are listed): Albert.Juhasz@unisa.edu.au
Email Invoice to (will default to PM if no other addresses are listed): Albert.Juhasz@unisa.edu.au

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
☒ Standard TAT **(List due date):**
☐ Non Standard or urgent TAT **(List due date):**

ALS QUOTE NO.:

COC SEQUENCE NUMBER (Circle)
COC: [✓ 1] 2 3 4 5 6 7
OF: 1 [✓ 2] 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact?
Free ice / frozen ice bricks present upon receipt?
Random Sample Temperature on Receipt:
Other comment:

RELINQUISHED BY:	**RECEIVED BY:**	**RELINQUISHED BY:**	**RECEIVED BY:**
Albert Juhasz			Mawu
DATE/TIME: 11/2/21	DATE/TIME:	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	PAHs								Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	SB16-250A	11/02/2021	S	AV	1	1								Soils are dried and sieved
2	SB16-250B	11/02/2021	S	AV	1	1								
3	SB30-250A	11/02/2021	S	AV	1	1								
4	SB30-250B	11/02/2021	S	AV	1	1								
5	SB16-1	11/02/2021	W	AG	1	1								Samples are in acetone
6	SB16-2	11/02/2021	W	AG	1	1								
7	SB16-D1	11/02/2021	W	AG	1	1								
8	SB16-D2	11/02/2021	W	AG	1	1								
9	SB30-1	11/02/2021	W	AG	1	1								
10	SB30-2	11/02/2021	W	AG	1	1								
11	SB30-D1	11/02/2021	W	AG	1	1								
12	SB30-D2	11/02/2021	W	AG	1	1								
				TOTAL	12	12								

Environmental Division
Melbourne
Work Order Reference
EM2102143
Telephone : + 61-3-8549 9600

Received: 12/2, 1200 Carrier: TNT
C/note: CC917627
Temp: 6.4 °C Seal: [✓ Y] / N
[✓ Ice] / Icebricks / [✓ NA]

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ **Sydney**: 277 Woodpark Rd, Smithfield NSW 2176
Ph: 02 8784 8555 E:samples.sydney@alsenviro.com

☐ **Newcastle:** 5 Rosegum Rd, Warabrook NSW 2304
Ph:02 4968 9433 E:samples.newcastle@alsenviro.com

☐ **Brisbane:** 32 Shand St, Stafford QLD 4053
Ph:07 3243 7222 E:samples.brisbane@alsenviro.com

☐ **Townsville:** 14-15 Desma Ct, Bohle QLD 4818
Ph:07 4796 0600 E: townsville.environmental@alsenviro.com

☐ **Melbourne:** 2-4 Westall Rd, Springvale VIC 3171
Ph.03 8549 9600 E: samples.melbourne@alsenviro.com

☐ **Adelaide:** 2-1 Burma Rd, Pooraka SA 5095
Ph: 08 8359 0890 E:adelaide@alsenviro.com

☐ **Perth:** 10 Hod Way, Malaga WA 6090
Ph: 08 9209 7655 E. samples.perth@alsenviro.com

☐ **Launceston:** 27 Wellington St, Launceston TAS 7250
Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT: University of South Australia
OFFICE: Mawson Lakes Campus X1-17
PROJECT: Sen PAH IVBA
ORDER NUMBER:
PROJECT MANAGER: Albert Juhasz
CONTACT PH: 08 8302 5045
SAMPLER: Albert Juhasz
SAMPLER MOBILE: 0418 818 121
COC emailed to ALS? (NO)
EDD FORMAT (or default):
Email Reports to (will default to PM if no other addresses are listed): Albert.Juhasz@unisa.edu.au
Email Invoice to (will default to PM if no other addresses are listed): Albert.Juhasz@unisa.edu.au

TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
☒ Standard TAT **(List due date):**
☐ Non Standard or urgent TAT **(List due date):**

ALS QUOTE NO.:

COC SEQUENCE NUMBER (Circle)
COC: 1 [✓ 2] 3 4 5 6 7
OF: 1 [✓ 2] 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comment:

RELINQUISHED BY: *Albert Juhasz*
DATE/TIME: 11/2/21

RECEIVED BY:
DATE/TIME:

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY:
DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	PAHs								Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
13	QC1	11/02/2021	W	AG	1	1								Samples are in acetone
14	QC2	11/02/2021	W	AG	1	1								
				TOTAL	2	2								

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

APPENDIX 3 – ANALYTICAL RESULTS AND QA/QC

Note: A sample labelling issue was identified following submission of samples to ALS for analysis. PAH oral bioaccessibility samples labelled SB16-1 and SB16-2 were mislabelled SB30-1 and SB30-2 (and visa versa). Data reported in Tables 2-7 are reflective of oral bioaccessibility values generated for SB16_0.45-0.55 and SB30_0.15-0.25 respectively.

CERTIFICATE OF ANALYSIS

Work Order : **EM2102143**
Client : **UNISA - CENTRE FOR ENVIRONMENT RISK ASSESSMENT & REMEDIATION**
Contact : MR ALBERT JUHASZ
Address : UNIVERSITY OF SOUTH AUSTRALIA CENTRE FOR
ENVIRONMENT RISK ASSESSMENT & REMEDIATION
BUILDING X MAWSON LAKES CAMPUS
MAWSON LAKES SOUTH AUSTRALIA 5095
Telephone : +61 08 8302 6273
Project : Sen PAH IVBA
Order number : ----
C-O-C number : ----
Sampler : ALBERT JUHASZ
Site : ----
Quote number : ADBQ/011/10
No. of samples received : 14
No. of samples analysed : 14

Page : 1 of 6
Laboratory : Environmental Division Melbourne
Contact : Customer Services EM
Address : 4 Westall Rd Springvale VIC Australia 3171
Telephone : +61-3-8549 9600
Date Samples Received : 12-Feb-2021 12:00
Date Analysis Commenced : 12-Feb-2021
Issue Date : 16-Feb-2021 13:39

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key :
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP075 (SIM): Where reported, Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EP075(SIM): Particular samples required dilution due to the presence of high level contaminants. LOR values have been adjusted accordingly.

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)			*Sample ID*	**SB16-250A**	**SB16-250B**	**SB30-250A**	**SB30-250B**	**----**
			Sampling date / time	11-Feb-2021 00:00	11-Feb-2021 00:00	11-Feb-2021 00:00	11-Feb-2021 00:00	----
Compound	*CAS Number*	*LOR*	*Unit*	**EM2102143-001**	**EM2102143-002**	**EM2102143-003**	**EM2102143-004**	**--------**
				Result	Result	Result	Result	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<1.2	<1.2	<1.2	<1.2	----
Acenaphthylene	208-96-8	0.5	mg/kg	**5.8**	**6.0**	<1.2	<1.2	----
Acenaphthene	83-32-9	0.5	mg/kg	<1.2	<1.2	<1.2	<1.2	----
Fluorene	86-73-7	0.5	mg/kg	<1.2	<1.2	<1.2	<1.2	----
Phenanthrene	85-01-8	0.5	mg/kg	**21.3**	**21.0**	**3.0**	**2.9**	----
Anthracene	120-12-7	0.5	mg/kg	**7.8**	**7.8**	**1.4**	**1.3**	----
Fluoranthene	206-44-0	0.5	mg/kg	**61.9**	**60.6**	**13.7**	**13.0**	----
Pyrene	129-00-0	0.5	mg/kg	**65.2**	**64.1**	**16.3**	**15.4**	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	**32.9**	**33.2**	**9.3**	**8.8**	----
Chrysene	218-01-9	0.5	mg/kg	**29.0**	**28.9**	**9.8**	**9.3**	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	**47.5**	**48.8**	**18.6**	**17.8**	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	**17.7**	**16.1**	**6.2**	**5.7**	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	**45.3**	**45.0**	**16.4**	**15.6**	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	**23.9**	**23.4**	**9.7**	**9.3**	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	**5.4**	**5.7**	**2.0**	**2.0**	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	**30.4**	**29.3**	**12.8**	**12.3**	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	**71.8**	**72.5**	**80.9**	**79.5**	----
2-Chlorophenol-D4	93951-73-6	0.5	%	**80.6**	**81.0**	**90.8**	**88.3**	----
2.4.6-Tribromophenol	118-79-6	0.5	%	**70.0**	**74.0**	**75.8**	**84.7**	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	**96.6**	**96.4**	**100**	**94.1**	----
Anthracene-d10	1719-06-8	0.5	%	**116**	**115**	**126**	**113**	----
4-Terphenyl-d14	1718-51-0	0.5	%	**105**	**103**	**114**	**110**	----

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Sample ID*	**SB16-1**	**SB16-2**	**SB16-D1**	**SB16-D2**	**SB30-1**
			Sampling date / time	11-Feb-2021 00:00	11-Feb-2021 00:00	11-Feb-2021 00:00	11-Feb-2021 00:00	11-Feb-2021 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EM2102143-005**	**EM2102143-006**	**EM2102143-007**	**EM2102143-008**	**EM2102143-009**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<2.5	<2.5	<2.5	**2.8**	<2.5
Acenaphthylene	208-96-8	1.0	µg/L	<2.5	<2.5	<2.5	<2.5	<2.5
Acenaphthene	83-32-9	1.0	µg/L	<2.5	<2.5	**3.3**	**4.2**	<2.5
Fluorene	86-73-7	1.0	µg/L	<2.5	<2.5	<2.5	**3.3**	<2.5
Phenanthrene	85-01-8	1.0	µg/L	**3.9**	**3.8**	**38.4**	**47.7**	**38.2**
Anthracene	120-12-7	1.0	µg/L	<2.5	<2.5	**8.1**	**10.1**	**10.2**
Fluoranthene	206-44-0	1.0	µg/L	**14.2**	**13.8**	**41.0**	**59.5**	**102**
Pyrene	129-00-0	1.0	µg/L	**15.0**	**13.9**	**34.7**	**51.3**	**94.8**
Benz(a)anthracene	56-55-3	1.0	µg/L	**9.3**	**8.8**	**7.6**	**10.0**	**49.7**
Chrysene	218-01-9	1.0	µg/L	**9.4**	**8.7**	**7.0**	**9.8**	**41.7**
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	**19.1**	**4.7**	<2.5	<2.5	**20.6**
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	**9.1**	<2.5	<2.5	<2.5	**8.1**
Benzo(a)pyrene	50-32-8	0.5	µg/L	**15.7**	**14.0**	**3.1**	**4.7**	**47.3**
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	**10.8**	**8.7**	<2.5	<2.5	**19.1**
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<2.5	<2.5	<2.5	<2.5	<2.5
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	**14.3**	**12.3**	<2.5	<2.5	**23.9**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	**109**	**107**	**106**	**106**	**113**
Anthracene-d10	1719-06-8	1.0	%	**108**	**110**	**106**	**105**	**109**
4-Terphenyl-d14	1718-51-0	1.0	%	**103**	**96.9**	**97.8**	**121**	**96.6**

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)			*Sample ID*	**SB30-2**	**SB30-D1**	**SB30-D2**	**QC1**	**QC2**
			Sampling date / time	11-Feb-2021 00:00	11-Feb-2021 00:00	11-Feb-2021 00:00	11-Feb-2021 00:00	11-Feb-2021 00:00
Compound	*CAS Number*	*LOR*	*Unit*	**EM2102143-010**	**EM2102143-011**	**EM2102143-012**	**EM2102143-013**	**EM2102143-014**
				Result	Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	1.0	µg/L	<2.5	<2.5	<2.5	<2.5	<2.5
Acenaphthylene	208-96-8	1.0	µg/L	<2.5	<2.5	<2.5	<2.5	<2.5
Acenaphthene	83-32-9	1.0	µg/L	<2.5	<2.5	<2.5	<2.5	<2.5
Fluorene	86-73-7	1.0	µg/L	<2.5	<2.5	<2.5	<2.5	<2.5
Phenanthrene	85-01-8	1.0	µg/L	**31.4**	**3.5**	**3.4**	<2.5	<2.5
Anthracene	120-12-7	1.0	µg/L	**8.4**	<2.5	<2.5	<2.5	<2.5
Fluoranthene	206-44-0	1.0	µg/L	**83.7**	**3.7**	**3.2**	<2.5	<2.5
Pyrene	129-00-0	1.0	µg/L	**78.1**	**4.1**	**3.7**	<2.5	<2.5
Benz(a)anthracene	56-55-3	1.0	µg/L	**39.6**	<2.5	<2.5	<2.5	<2.5
Chrysene	218-01-9	1.0	µg/L	**35.8**	<2.5	<2.5	<2.5	<2.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L	**14.1**	<2.5	<2.5	<2.5	<2.5
Benzo(k)fluoranthene	207-08-9	1.0	µg/L	**6.1**	<2.5	<2.5	<2.5	<2.5
Benzo(a)pyrene	50-32-8	0.5	µg/L	**39.3**	<2.5	<2.5	<2.5	<2.5
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L	**18.3**	<2.5	<2.5	<2.5	<2.5
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L	<2.5	<2.5	<2.5	<2.5	<2.5
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L	**20.6**	<2.5	<2.5	<2.5	<2.5
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	**104**	**109**	**110**	**89.0**	**81.7**
Anthracene-d10	1719-06-8	1.0	%	**101**	**93.8**	**101**	**89.3**	**77.8**
4-Terphenyl-d14	1718-51-0	1.0	%	**93.8**	**98.8**	**106**	**106**	**74.3**

Surrogate Control Limits

Sub-Matrix: **SOIL**

		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2.4.6-Tribromophenol	118-79-6	34	122
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	133

Sub-Matrix: **WATER**

		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	35	127
Anthracene-d10	1719-06-8	44	122
4-Terphenyl-d14	1718-51-0	44	124

QUALITY CONTROL REPORT

Work Order	: **EM2102143**	Page	: 1 of 5
Client	: **UNISA - CENTRE FOR ENVIRONMENT RISK ASSESSMENT & REMEDIATION**	Laboratory	: Environmental Division Melbourne
Contact	: MR ALBERT JUHASZ	Contact	: Customer Services EM
Address	: UNIVERSITY OF SOUTH AUSTRALIA CENTRE FOR ENVIRONMENT RISK ASSESSMENT & REMEDIATION BUILDING X MAWSON LAKES CAMPUS MAWSON LAKES SOUTH AUSTRALIA 5095	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: +61 08 8302 6273	Telephone	: +61-3-8549 9600
Project	: Sen PAH IVBA	Date Samples Received	: 12-Feb-2021
Order number	: ----	Date Analysis Commenced	: 12-Feb-2021
C-O-C number	: ----	Issue Date	: 16-Feb-2021
Sampler	: ALBERT JUHASZ		
Site	: ----		
Quote number	: ADBQ/011/10		
No. of samples received	: 14		
No. of samples analysed	: 14		

NATA

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to hig

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3510443)									
EM2102139-005	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EM2102176-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3510443) - continued									
EM2102176-001	Anonymous	EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	*Laboratory Control Spike (LCS) Report*			
					Spike	*Spike Recovery (%)*	*Recovery Limits (%)*	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3510443)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	3 mg/kg	120	85.7	123
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	3 mg/kg	119	81.0	123
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	3 mg/kg	119	83.6	120
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	3 mg/kg	118	81.3	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	3 mg/kg	120	79.4	123
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	3 mg/kg	126	81.7	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	3 mg/kg	123	78.3	124
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	3 mg/kg	125	79.9	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	3 mg/kg	118	76.9	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	3 mg/kg	129	80.9	130
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	3 mg/kg	110	70.0	121
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	3 mg/kg	120	80.4	130
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	3 mg/kg	114	70.2	123
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	3 mg/kg	116	67.9	122
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	3 mg/kg	115	65.8	123
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	3 mg/kg	116	65.8	127

Sub-Matrix: **WATER**

				Method Blank (MB) Report	*Laboratory Control Spike (LCS) Report*			
					Spike	*Spike Recovery (%)*	*Recovery Limits (%)*	
Method: Compound	*CAS Number*	*LOR*	*Unit*	*Result*	*Concentration*	*LCS*	*Low*	*High*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3508888)								
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.2	5 µg/L	86.2	42.8	114
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.2	5 µg/L	84.3	48.6	119
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.2	5 µg/L	86.7	47.0	117
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.2	5 µg/L	86.8	49.5	119
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.2	5 µg/L	90.2	49.4	121
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.2	5 µg/L	89.0	48.4	122
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.2	5 µg/L	87.4	50.3	124
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.2	5 µg/L	87.2	50.0	126
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.2	5 µg/L	89.7	49.4	127
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.2	5 µg/L	90.0	48.7	126
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.2	5 µg/L	86.6	54.5	134
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.2	5 µg/L	92.2	56.1	134

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3508888) - continued								
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<1.2	5 µg/L	89.7	55.6	135
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.2	5 µg/L	88.5	54.4	126
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.2	5 µg/L	88.0	54.5	126
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.2	5 µg/L	90.1	54.4	126

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3510443)							
EM2102139-009	Anonymous	EP075(SIM): Acenaphthene	83-32-9	3 mg/kg	95.9	77.2	116
		EP075(SIM): Pyrene	129-00-0	3 mg/kg	105	65.5	136

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EM2102143**	Page	: 1 of 4
Client	: **UNISA - CENTRE FOR ENVIRONMENT RISK ASSESSMENT & REMEDIATION**	Laboratory	: Environmental Division Melbourne
Contact	: MR ALBERT JUHASZ	Telephone	: +61-3-8549 9600
Project	: Sen PAH IVBA	Date Samples Received	: 12-Feb-2021
Site	: ----	Issue Date	: 16-Feb-2021
Sampler	: ALBERT JUHASZ	No. of samples received	: 14
Order number	: ----	No. of samples analysed	: 14

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	10	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
PAH/Phenols (GC/MS - SIM)	0	10	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM)) SB16-250A, SB16-250B, SB30-250A, SB30-250B	**11-Feb-2021**	**15-Feb-2021**	25-Feb-2021	✓	**15-Feb-2021**	27-Mar-2021	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method	*Sample Date*	*Extraction / Preparation*			*Analysis*		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM)) SB16-1, SB16-2, SB16-D1, SB16-D2, SB30-1, SB30-2, SB30-D1, SB30-D2, QC1, QC2	**11-Feb-2021**	**12-Feb-2021**	18-Feb-2021	✓	**12-Feb-2021**	24-Mar-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
PAH/Phenols (SIM)	EP075(SIM)	2	13	**15.38**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: ✗ = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	10	**0.00**	**10.00**	✗	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	10	**0.00**	**5.00**	✗	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	*Method*	*Matrix*	*Method Descriptions*
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)

Preparation Methods	*Method*	*Matrix*	*Method Descriptions*
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.

Appendix B: Borelogs

BOREHOLE NUMBER SB01

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 8/12/20 **COMPLETED** 8/12/20 **LOGGED BY** MoH **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 322866.11, 5807368.2, 55H

EQUIPMENT Hand Auger/Shovel **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES Bioaccessibilty sample

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING		
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)	
HE					▨	FILL	FILL: Silty SAND, medium to coarse, sub-angular to sub-rounded, poorly graded sand, low plasticity, brown, loose, dry				
					▨					■	SB01_0.10 - 0.20
					▨	FILL	Anthropogenic material including trace bitumen and brick fragments				
					▨	FILL	Trace gravel				
					▨					■	SB01_0.40 - 0.45 SB01_0.45 BULK
				0.5			SB01 terminated at 0.45 m bgl Target Depth				
				1.0							
				1.5							

1. SENVERSA STANDARD M18310_ELWOOD FORESHORE_REV2.GPJ SENVERSA_GINT.GDT 12/3/21

BOREHOLE NUMBER SB02

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 8/12/20 **COMPLETED** 8/12/20 **LOGGED BY** MoH **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 322884.78, 5804420.12, 55H

EQUIPMENT Hand Auger/Shovel **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES Bioaccessibilty sample

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HE					▨	FILL	FILL: Silty SAND, medium to coarse, sub-angular to sub-rounded, poorly graded sand, low plasticity silt, brown, loose, dry, trace gravel			SB02_0.00 - 0.10
					▨	FILL	Moist	PAH odours		SB02_0.30 - 0.40 SB02_0.4 BULK, QC01, QC02
				0.5 1.0 1.5			SB02 terminated at 0.40 m bgl Target Depth			

These logs have been prepared for environmental purposes and should not be used for geotechnical design and interpretive purposes

senversa

BOREHOLE NUMBER SB03

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 8/12/20 **COMPLETED** 8/12/20 **LOGGED BY** MoH **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 322820.45, 5804522.53, 55H

EQUIPMENT Hand Auger/Shovel **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES Bioaccessibilty sample

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HE					▨	FILL	FILL: Silty SAND, medium to coarse, sub-angular to sub-rounded, poorly graded sand, low plasticity silt, trace gravel and shells, light brown, loose, dry. Anthropogenic material including trace brick and plastic.			SB03_0.00 - 0.10 SB03_0.1 BULK SB03_0.30 - 0.40 SB03_0.4 BULK
				0.5 1.0 1.5			SB03 terminated at 0.40 m bgl Target Depth			

These logs have been prepared for environmental purposes and should not be used for geotechnical design and interpretive purposes

BOREHOLE NUMBER SB04

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 8/12/20 **COMPLETED** 8/12/20 **LOGGED BY** MoH **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 322878.36, 5804644.12, 55H

EQUIPMENT Hand Auger/Shovel **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES Bioaccessibilty sample

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HE					▨	FILL	FILL: Silty SAND, fine to medium grained, sub-angular to sub-rounded, poorly graded sand, low plasticity silt, trace roots, dark brown, loose, moist.			SB04_0.00 - 0.10 SB04_0.1 BULK
					▨	FILL	Trace gravel. Anthropogenic material including trace brick fragments, glass and ceramic.			SB04_0.30 - 0.40 SB04_0.4 BULK
				0.5	░	SP	SAND: medium to coarse, sub-angular to sub-rounded, poorly graded sand, grey, loose, moist			SB04_0.40 - 0.50
							SB04 terminated at 0.50 m bgl Target Depth			
				1.0						
				1.5						

1. SENVERSA STANDARD M18310_ELWOOD FORESHORE_REV2.GPJ SENVERSA_GINT.GDT 12/3/21

These logs have been prepared for environmental purposes and should not be used for geotechnical design and interpretive purposes

BOREHOLE NUMBER SB05

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 8/12/20 **COMPLETED** 8/12/20 **LOGGED BY** MoH **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 322805.77, 5804660.32, 55H

EQUIPMENT Hand Auger/Shovel **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES Bioaccessibilty sample

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING		
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)		Sample ID & Interval (QA/QC)
HE					▨	FILL	FILL: Silty SAND, medium to coarse, sub-angular to sub-rounded, poorly graded sand, low plasticity silt, trace gravel, roots, shells, dark brown, loose, dry. Anthropogenic material including trace plastic.			■	SB05_0.00 - 0.10 SB05_0.1 BULK
					▨	FILL	Brown. Anthropogenic material including trace terracotta and brick fragments				
					▨	FILL	Dark brown, moist			■	SB05_0.35 - 0.45 SB05_0.45 BULK
				0.5			SB05 terminated at 0.45 m bgl Target Depth				
				1.0							
				1.5							

senversa

BOREHOLE NUMBER SB06

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 8/12/20 **COMPLETED** 8/12/20 **LOGGED BY** MoH **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 322680.85, 5804679.93, 55H

EQUIPMENT Hand Auger/Shovel **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES Bioaccessibilty sample

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HE					▨	FILL	FILL: Silty SAND, fine to medium grained, sub-angular to sub-rounded, poorly graded sand, low plasticity silt, trace roots, gravel, shells, dark brown, loose, moist. Anthropogenic material including trace glass and plastic			SB06_0.00 - 0.10
					▨					SB06_0.38 - 0.48 SB06_0.48 BULK
HA				0.5	▨					
					▨	FILL	FILL: SAND, medium to coarse, sub-angular to sub-rounded, poorly graded sand, black, loose, moist.			SB06_0.70 - 0.80
				1.0	░	SP	SAND: medium to coarse, sub-angular to sub-rounded, poorly graded sand, grey, loose, moist			SB06_0.90 - 1.00
				1.5			SB06 terminated at 1.00 m bgl Target Depth			

These logs have been prepared for environmental purposes and should not be used for geotechnical design and interpretive purposes

BOREHOLE NUMBER SB07

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 12/1/21 **COMPLETED** 12/1/21 **LOGGED BY** NN **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 320516.99, 5804511.85, 55H

EQUIPMENT Hand Auger **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Organic Material (root matter)			
					▨	FILL	FILL: Sandy CLAY, high plasticity, fine to medium grained, poorly graded, sub-rounded sand, brown, firm, moist, near plastic limit. Anthropogenic materials including trace brick fragments			SB07_0.10 - 0.20
					▨	FILL	Light brown, dry to moist, near plastic limit.			
				0.5	▨	FILL	FILL: Clayey SAND, fine to medium grained, poorly graded, sub-rounded sand, medium plasticity clay, brown, loose, dry to moist. Anthropogenic materials including trace brick fragments, glass, slag and shells			SB07_0.70 - 0.80
				1.0 1.5			SB07 terminated at 1.00 m bgl Target Depth			

These logs have been prepared for environmental purposes and should not be used for geotechnical design and interpretive purposes

BOREHOLE NUMBER SB08

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 12/1/21 **COMPLETED** 12/1/21 **LOGGED BY** NN **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 322929.08, 5804601.59, 55H

EQUIPMENT Hand Auger **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Organic Material (root matter)			
					▨	FILL	FILL: Silty SAND, fine to medium grained, poorly graded, sub-rounded sand, low plasticty silt, brown, medium dense, dry. Anthropogenic material including trace glass fragments			SB08_0.10 - 0.20
				0.5			SB08 terminated at 0.30 m bgl Refusal of HA on gravel			
				1.0						
				1.5						

1. SENVERSA STANDARD M18310_ELWOOD FORESHORE_REV2.GPJ SENVERSA_GINT.GDT 12/3/21

BOREHOLE NUMBER SB09

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 13/1/21 **COMPLETED** 13/1/21 **LOGGED BY** NN **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 322844.90, 5804523.28, 55H

EQUIPMENT Hand Auger **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Organic Material (root matter)			
					▨	FILL	FILL: Sandy CLAY, high plasticity, fine to medium grained, poorly graded, sub-rounded sand, light brown, dense, moist, dry of plastic limit.			SB09_0.10 - 0.20
				0.5	▨	FILL	FILL: Silty SAND, fine to medium grained, poorly graded, sub-rounded sand, low plasticity silt, brown-red, very loose, dry.			SB09_0.40 - 0.50
				1.0 1.5			SB09 terminated at 0.50 m bgl Borehole collapse			

These logs have been prepared for environmental purposes and should not be used for geotechnical design and interpretive purposes

BOREHOLE NUMBER SB10

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 12/1/21 **COMPLETED** 12/1/21 **LOGGED BY** NN **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 322956.53, 5804560.77, 55H

EQUIPMENT Hand Auger **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING		
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)		Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Organic Material (root matter)				
					▨	FILL	FILL: Silty SAND, fine to medium grained, poorly graded, sub-rounded sand, low plasticty silt, brown, medium dense, moist.			■	SB10_0.10 - 0.20
				0.5 1.0	▨	FILL	FILL: Sandy CLAY, high plasticity, fine to medium grained, poorly graded, sub-rounded sand, light brown - mottled yellow, firm, moist, near plastic limit. Anthropogenic material including trace brick fragments, ceramics fragments and glass			■	SB10_0.70 - 0.80
				1.5			SB10 terminated at 1.00 m bgl Target Depth				

These logs have been prepared for environmental purposes and should not be used for geotechnical design and interpretive purposes

BOREHOLE NUMBER SB11

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 13/1/21 **COMPLETED** 13/1/21 **LOGGED BY** NN **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 323018.51, 5804546.57, 55H

EQUIPMENT Hand Auger **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Organic Material (root matter)			
					▨	FILL	FILL: Silty SAND, fine to medium grained, poorly graded, sub-rounded sand, low plasticity silt, brown, medium dense, moist.			SB11_0.10 - 0.20
				0.5 1.0	▨	FILL	FILL: Clayey SAND, fine to medium grained, poorly graded, sub-rounded sand, medium plasticity clay, brown - yellow , medium dense, moist.			SB11_0.60 - 0.70
				1.5			SB11 terminated at 1.00 m bgl Target Depth			

BOREHOLE NUMBER SB12

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 13/1/21 **COMPLETED** 5/3/21 **LOGGED BY** NN/IG **CHECKED BY** EC/SMS

CONTRACTOR Senversa, A.C. Drilling Services **LOCATION (Easting, Northing, Zone)** 322992.03, 5804530.12, 55H

EQUIPMENT Hand Auger, Solid Flight Auger **DIMENSIONS** 200mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Organic Material (root matter).			
					▨	FILL	FILL: Silty SAND, fine to medium grained, poorly graded, sub-rounded sand, low plasticity silt, brown, medium dense, dry.			SB12_0.10 - 0.20
					▨	FILL	FILL: Gravelly SAND, fine to medium grained, poorly graded, sub-rounded sand, medium to coarse grained, poorly graded, angular gravel, minor low plasticity silt, brown, medium dense, dry. Anthropogenic material including trace brick fragments			
SFA					▨		Trace clay.			SB12_0.40 - 0.50
				0.5	▨					
					▨					SB12_0.90 - 1.00
				1.0	▨					
					▨	FILL	FILL: Silty CLAY, high plasticity, trace gravel, grey, stiff, moist, near plastic limit.			SB12_1.40 - 1.50
				1.5	▨					
					☰	CH	Silty CLAY, high plasticity, grey, stiff, moist, near plastic limit.			SB12_1.90 - 2.00
				2.0			SB12 terminated at 2.00 m bgl Target Depth			
				2.5						

These logs have been prepared for environmental purposes and should not be used for geotechnical design and interpretive purposes

BOREHOLE NUMBER SB13

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PROJECT NAME Detailed Site Investigation
PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 12/1/21 **COMPLETED** 5/3/21 **LOGGED BY** NN/IG **CHECKED BY** EC/SMS
CONTRACTOR Senversa, A.C. Drilling Services **LOCATION (Easting, Northing, Zone)** 322936.48, 5804490.95, 55H
EQUIPMENT Hand Auger, Solid Flight Auger **DIMENSIONS** 200mm **INCLINATION** Vertical
GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -
GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA						FILL	FILL: Organic Material (root matter)			
						FILL	FILL: Silty SAND, fine grained, poorly graded, sub-rounded sand, low plasticity silt, brown, very loose, dry.			SB13_0.10 - 0.20
						FILL	FILL: Clayey SAND, fine to medium grained, poorly graded, sub-rounded sand, medium plasticity clay, brown to light brown, medium dense, moist.			
				0.5 1.0		FILL	FILL: Sandy CLAY, high plasticity, fine to medium grained, poorly graded, sub-rounded sand, light brown, firm, moist, near plastic limit.			SB13_0.80 - 0.90 SB13_1.10 - 1.20
SFA										
				1.5		CL	Silty CLAY: Low plasticity, dark brown, soft, moist, near plastic limit.			SB13_1.40 - 1.50
				2.0		CH	Silty CLAY: High plasticity, light grey-brown, firm, near plastic limit.			SB13_1.90 - 2.00
				2.5			SB13 terminated at 2.00 m bgl Target Depth			

These logs have been prepared for environmental purposes and should not be used for geotechnical design and interpretive purposes

BOREHOLE NUMBER SB14

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 12/1/21 **COMPLETED** 5/3/21 **LOGGED BY** NN/IG **CHECKED BY** EC/SMS

CONTRACTOR Senversa, A.C. Drilling Services **LOCATION (Easting, Northing, Zone)** 322877.73, 5804482.02, 55H

EQUIPMENT Hand Auger, Solid Flight Auger **DIMENSIONS** 200mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Organic Material (root matter)			
					▨	FILL	FILL: Clayey SAND, fine to medium grained, poorly graded, sub-rounded sand, medium plasticity clay, brown, medium dense, moist.			SB14_0.10 - 0.20
				0.5	▨	FILL	FILL: Sandy CLAY, high plasticity, fine to medium grained, poorly graded, sub-rounded sand, light brown- mottled yellow, firm, moist, near plastic limit.			
					▨	FILL	FILL: Clayey SAND, fine to medium grained, poorly graded, sub-rounded sand, medium plasticity clay, brown, medium dense, moist.			
				1.0	▨	FILL	FILL: Sandy CLAY, high plasticity, fine to medium grained, poorly graded, sub-rounded sand, light brown, firm, moist, near plastic limit.			SB14_0.80 - 0.90
SFA				1.5	▨	FILL	FILL: Silty SAND, fine to medium grained, sub-rounded, poorly graded sand, low plasticity silt, red-brown, medium dense, moist.			SB14_1.40 - 1.50
				2.0	▤	CH	Silty CLAY: High plasticity, grey mottled orange and brown, firm, moist, near plastic limit.			SB14_1.90 - 2.00
				2.5			SB14 terminated at 2.00 m bgl Target Depth			

BOREHOLE NUMBER SB15

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 12/1/21 **COMPLETED** 12/1/21 **LOGGED BY** NN **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 322895.63, 5804439.11, 55H

EQUIPMENT Hand Auger **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Organic Material (root matter)			
					▨	FILL	FILL: Silty SAND, fine grained, poorly graded, sub-rounded sand, low plasticty silt, brown, medium dense, dry.			
										SB15_0.10 - 0.20
										SB15_0.40 - 0.50
				0.5						
							SB15 terminated at 0.50 m bgl Refusal of HA on gravel or brick			
				1.0						
				1.5						

BOREHOLE NUMBER SB16

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 13/1/21 **COMPLETED** 13/1/21 **LOGGED BY** MoH **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 322921.64, 5804420.58, 55H

EQUIPMENT Hand Auger **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING		
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)	
HA					▨	FILL	FILL: Silty SAND, fine to medium grained, sub-angular to sub-rounded, poorly graded sand, low plasticity silt, dark brown, loose to very loose, moist, trace roots, gravel. Anthropogenic material including trace glass and plastic.			■	SB16_0.05 - 0.15 QC03, QC04
					▨	FILL	FILL: Sandy GRAVEL, medium to coarse, angular to sub-angular, poorly graded gravel, medium to coarse, sub-angular to sub-rounded, poorly graded sand, trace silt, dark brown, loose, dry. Anthropogenic material including trace glass.				
				0.5	▨	FILL	FILL: Gravelly SAND, fine to medium, sub-angular to sub-rounded, poorly graded sand, fine to medium, angular to sub-angular, poorly graded gravel, dark brown, loose, dry. Anthropogenic material including trace glass.	Slight hydrocarbon odour		■	SB16_0.45 - 0.55
				1.0 1.5			SB16 terminated at 0.55 m bgl Refusal of HA on gravel				

These logs have been prepared for environmental purposes and should not be used for geotechnical design and interpretive purposes

BOREHOLE NUMBER SB17

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 13/1/21 **COMPLETED** 13/1/21 **LOGGED BY** MoH **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 322964.49, 5804457.14, 55H

EQUIPMENT Hand Auger **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Silty SAND, fine to medium grained, sub-angular to sub-rounded, poorly graded sand, low plasticity silt, trace gravel, brown to dark brown, loose to very loose, moist. Anthropogenic material including trace brick fragements, terracotta, slag.			SB17_0.05 - 0.15 QC07, QC08 SB17_0.35 - 0.45
				0.5 1.0 1.5			SB17 terminated at 0.45 m bgl Refusal of HA on gravel			

These logs have been prepared for environmental purposes and should not be used for geotechnical design and interpretive purposes

BOREHOLE NUMBER SB18

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310

PROJECT LOCATION Elwood Foreshore, Elwood, Victoria

DATE STARTED 13/1/21

COMPLETED 13/1/21

LOGGED BY NN

CHECKED BY EC/SMS

CONTRACTOR Senversa

LOCATION (Easting, Northing, Zone) 322975.59, 5804476.70, 55H

EQUIPMENT Hand Auger

DIMENSIONS 50mm

INCLINATION Vertical

GROUNDWATER NOTES Not encountered during drilling

CASING LEVEL -

SURFACE LEVEL -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Organic Material (root matter)			
				0.5	▨	FILL	FILL: Silty SAND, fine to medium grained, poorly graded, sub-rounded sand, low plasticity silt, trace gravel, brown, medium dense, moist. Anthropogenic materials including trace brick, glass, ceramics and animal bone fragments.			SB18_0.10 - 0.20 SB18_0.40 - 0.50
				1.0 1.5			SB18 terminated at 0.50 m bgl Refusal of HA on gravel			

These logs have been prepared for environmental purposes and should not be used for geotechnical design and interpretive purposes

BOREHOLE NUMBER SB19

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 2/2/21 **COMPLETED** 2/2/21 **LOGGED BY** MoH **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 323011.05, 5804476.69, 55H

EQUIPMENT Hand Auger **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Organic Material (root matter)			
					▨	FILL	FILL: SAND, fine to medium grained, poorly graded, rounded sand, brown grey, medium dense, moist.			SB19_0.10 - 0.20
					▨	FILL	FILL: Silty SAND, fine to medium, sub-angular to sub-rounded, poorly graded sand, low plasticity silt, trace gravel, roots, dark brown to black, loose, moist. Anthropogenic material including trace brick fragments.			
					▨	FILL	FILL: Clayey SAND, fine to medium grained, poorly graded, sub-rounded sand, low plasticity clay, brown, medium dense, moist. Anthropogenic material including trace brick fragments.			SB19_0.35 - 0.45
				0.5	▨	FILL	FILL: Silty SAND, fine to medium, sub-angular to sub-rounded, poorly graded sand, low plasticity silt, trace gravel, clay, roots, dark brown to black, loose, moist. Anthropogenic material including trace brick fragments and slag.			
				1.0 1.5			SB19 terminated at 0.60 m bgl Refusal of HA on gravel			

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BOREHOLE NUMBER SB20

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 2/2/21 **COMPLETED** 5/3/21 **LOGGED BY** MoH/IG **CHECKED BY** EC/SMS

CONTRACTOR Senversa, A.C. Drilling Services **LOCATION (Easting, Northing, Zone)** 323070.84, 5804498.85, 55H

EQUIPMENT Hand Auger, Solid Flight Auger **DIMENSIONS** 200mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA						FILL	FILL: Organic Material (root matter)			
						FILL	FILL: SAND, fine to medium grained, poorly graded, rounded sand, brown grey, medium dense, moist.			SB20_0.10 - 0.20 QC09, QC10
						FILL	FILL: Silty SAND, fine to medium, sub-angular to sub-rounded, poorly graded sand, low plasticity silt, trace gravel, roots, dark brown to black, loose, moist. Anthropogenic material including trace brick fragments.			
				0.5		FILL	FILL: Clayey SAND, fine to medium grained, poorly graded, sub-rounded sand, low plasticity clay, trace gravel, brown, medium dense, moist. Anthropogenic material including trace brick fragments and slag.			SB20_0.50 - 0.60
SFA				1.0		FILL	Minor gravel. Anthropogenic material including trace plastic (PVC).			SB20_0.90 - 1.00
				1.5		FILL	FILL: Silty CLAY, trace sand, gravel, grey, firm, moist, near plastic limit.			SB20_1.40 - 1.50
				2.0 2.5 3.0		FILL	FILL: Clayey SAND, fine to medium grained, poorly graded, sub-rounded sand, low plasticity clay, trace gravel, brown, medium dense, moist.			SB20_1.90 - 2.00 SB20_2.40 - 2.50 SB20_2.90 - 3.00
				3.5			SB20 terminated at 3.00 m bgl Target Depth			

These logs have been prepared for environmental purposes and should not be used for geotechnical design and interpretive purposes

BOREHOLE NUMBER SB21

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 13/1/21 **COMPLETED** 13/1/21 **LOGGED BY** MoH **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 322972.05, 5804440.76, 55H

EQUIPMENT Hand Auger **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Silty SAND, fine to medium grained, sub-angular to sub-rounded, poorly graded sand, low plasticity silt, trace gravel, dark brown, loose dry. Anthropogenic material including trace glass, plastic.			■ SB21_0.10 - 0.20
				0.5 1.0 1.5			SB21 terminated at 0.20 m bgl Appearance of orange (warning?) plastic			

These logs have been prepared for environmental purposes and should not be used for geotechnical design and interpretive purposes

BOREHOLE NUMBER SB22

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 13/1/21 **COMPLETED** 5/3/21 **LOGGED BY** MoH/IG **CHECKED BY** EC/SMS

CONTRACTOR Senversa, A.C. Drilling Services **LOCATION (Easting, Northing, Zone)** 322964.49, 5804416.40, 55H

EQUIPMENT Hand Auger, Solid Flight Auger **DIMENSIONS** 200mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA						FILL	FILL: Silty SAND, fine to medium grained, sub-aungular to sub-rounded, poorly graded sand, low plasticity silt, trace gravel, roots, dark brown to black, loose, moist.			SB22_0.10 - 0.20
						FILL	FILL: Silty CLAY, medium plasticity, trace gravel, grey mottled yellow, soft to firm, moist near plastic limit. Anthropogenic material including trace brick fragments.			
				0.5		FILL	FILL: Silty SAND, medium to coarse, sub-rounded to angular, poorly graded sand, low plasticity silt, trace gravel, brown, loose, moist. Anthropogenic material including trace brick fragments.			SB22_0.48 - 0.58
SFA				1.0						SB22_0.90 - 1.00
				1.5		SP	SAND: fine to medium, sub-rounded to sub-angular, poorly graded, trace silt, grey, loose, wet.			SB22_1.40 - 1.50
				2.0		CH	Silty CLAY: High plasticity, grey, firm, moist, near plastic limit.			SB22_1.90 - 2.00
				2.5			SB22 terminated at 2.20 m bgl Target Depth			

1. SENVERSA STANDARD M18310_ELWOOD FORESHORE_REV2.GPJ SENVERSA_GINT.GDT 12/3/21

These logs have been prepared for environmental purposes and should not be used for geotechnical design and interpretive purposes

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BOREHOLE NUMBER SB23

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 12/1/21 **COMPLETED** 5/3/21 **LOGGED BY** MoH/IG **CHECKED BY** EC/SMS

CONTRACTOR Senversa, A.C. Drilling Services **LOCATION (Easting, Northing, Zone)** 322935.35, 5804376.13, 55H

EQUIPMENT Hand Auger, Solid Flight Auger **DIMENSIONS** 200mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Silty SAND, fine to medium, sub-angular to sub-rounded, poorly graded sand, low plasticity silt, trace gravel, roots, dark brown, loose, moist.			SB23_0.10 - 0.20
					▨	FILL	Becoming dark brown to black, trace shell. Anthropogenic material including brick fragments	Slight hydrocarbon odour		
					▨	FILL	Minor coarse, angular gravel, trace clay.			SB23_0.35 - 0.45
SFA				0.5	▨					
				1.0	▨					SB23_0.90 - 1.00
					░	SP	SAND: Fine to medium grained, sub-rounded, poorly graded, minor clay, grey-brown mottled orange becoming grey, medium dense, moist.			
				1.5	░					SB23_1.40 - 1.50
				2.0	░					SB23_1.90 - 2.00
							SB23 terminated at 2.10 m bgl Target Depth			
				2.5						

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BOREHOLE NUMBER SB24

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 12/1/21 **COMPLETED** 12/1/21 **LOGGED BY** MoH **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 322980.91, 5804373.01, 55H

EQUIPMENT Hand Auger **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Silty SAND, fine to medium, sub-angular to sub-rounded, poorly graded sand, medium plasticity silt, trace gravel, roots, dark brown, loose, moist.			SB24_0.10 - 0.20
					▨	FILL	Dark brown-black mottled yellow, trace clay			
					▨	FILL	FILL: Silty CLAY, medium plasticity, trace gravel, grey mottled yellow, soft to firm, moist near plastic limit. Anthropogenic material including trace brick fragments.			
				0.5	▨	FILL	FILL: Silty SAND, fine to medium, sub-angular to sub-rounded, poorly graded sand, low plasticity silt, trace gravel, roots, dark brown, loose, moist. Anthropogenic material including trace brick fragments, metals.			
					▨	FILL	FILL: Silty CLAY, medium plasticity, trace gravel, dark brown mottled yellow, soft to firm, moist near plastic limit. Anthropogenic material: trace brick fragments.			SB24_0.90 - 1.00
				1.0	▨	FILL	Black mottled yellow			
				1.5			SB24 terminated at 1.00 m bgl Target Depth			

These logs have been prepared for environmental purposes and should not be used for geotechnical design and interpretive purposes

BOREHOLE NUMBER SB25

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 12/1/21 **COMPLETED** 5/3/21 **LOGGED BY** MoH/IG **CHECKED BY** EC/SMS

CONTRACTOR Senversa, A.C. Drilling Services **LOCATION (Easting, Northing, Zone)** 323023.80, 5804362.94, 55H

EQUIPMENT Hand Auger, Solid Flight Auger **DIMENSIONS** 200mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Silty SAND, fine to medium, sub-angular to sub-rounded, poorly graded sand, low plasticity silt, trace gravel, roots, dark brown, loose, moist.			
					▨					SB25_0.10 - 0.20
					▨					
					▨	FILL	Trace shells. Anthropogenic material including trace brick fragments, concrete, glass			SB25_0.30 - 0.40
SFA					▨					
				0.5	▨					SB25_0.50 - 0.60
							SB25 terminated at 0.60 m bgl Refusal of SFA on concrete (potential service)			
				1.0						
				1.5						

These logs have been prepared for environmental purposes and should not be used for geotechnical design and interpretive purposes

BOREHOLE NUMBER SB26

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 13/1/21 **COMPLETED** 13/1/21 **LOGGED BY** MoH **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 323007.88, 5804411.56, 55H

EQUIPMENT Hand Auger **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Silty SAND, fine to medium grained, sub-rounded to sub-angular, poorly graded sand, low plasticity silt, trace gravel. Anthropogenic material including trace brick fragments, glass, tile			SB26_0.10 - 0.20
					▨	FILL	Increasing gravel content			SB26_0.30 - 0.40
				0.5 1.0 1.5			SB26 terminated at 0.40 m bgl Refusal of HA on gravel			

1. SENVERSA STANDARD M18310_ELWOOD FORESHORE_REV2.GPJ SENVERSA_GINT.GDT 12/3/21

These logs have been prepared for environmental purposes and should not be used for geotechnical design and interpretive purposes

senversa

BOREHOLE NUMBER SB27

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 13/1/21 **COMPLETED** 13/1/21 **LOGGED BY** MoH **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 323030.84, 5804431.93, 55H

EQUIPMENT Hand Auger **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Silty SAND, fine to medium, sub-angular to sub-rounded, poorly graded sand, low plasticity silt, trace gravel, roots, shells, brown, moist. Anthropogenic material including trace terracotta, glass, slag			SB27_0.10 - 0.20 SB27_0.30 - 0.40
				0.5			SB27 terminated at 0.40 m bgl Refusal of HA on gravel			
				1.0						
				1.5						

BOREHOLE NUMBER SB28

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 13/1/21 **COMPLETED** 13/1/21 **LOGGED BY** NN **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 323073.53, 5804439.07, 55H

EQUIPMENT Hand Auger **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Organic Material (root matter)			
					▨	FILL	FILL: SAND, fine to medium grained, poorly graded, rounded sand, grey, medium dense, moist.			SB28_0.10 - 0.20
				0.5	▨	FILL	FILL: Clayey SAND, fine to medium grained, poorly graded, sub-rounded sand, low plasticity clay, brown, medium dense, moist. Anthropogenic material including trace brick and glass fragments.			SB28_0.60 - 0.70
				1.0 1.5			SB28 terminated at 0.70 m bgl Refusal of HA on gravel			

1. SENVERSA STANDARD M18310_ELWOOD FORESHORE_REV2.GPJ SENVERSA_GINT.GDT 12/3/21

These logs have been prepared for environmental purposes and should not be used for geotechnical design and interpretive purposes

senversa

BOREHOLE NUMBER SB29

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 12/1/21 **COMPLETED** 12/1/21 **LOGGED BY** MoH **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 323048.12, 5804405.77, 55H

EQUIPMENT Hand Auger **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Silty SAND, fine to medium, sub-angular to sub-rounded, poorly graded sand, low plasticity silt, trace gravel, roots, dark brown, loose, dry.			SB29_0.05 - 0.15 SB29_0.10 - 0.10 Possible asbestos cement sheet
				0.5 1.0 1.5			SB29 terminated at 0.20 m bgl Borehole terminated due to possible asbestos presence			

These logs have been prepared for environmental purposes and should not be used for geotechnical design and interpretive purposes

BOREHOLE NUMBER SB30

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 12/1/21 **COMPLETED** 12/1/21 **LOGGED BY** MoH **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 323079.10, 5804368.47, 55H

EQUIPMENT Hand Auger **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▩	FILL	FILL: Silty SAND, fine to medium, sub-angular to sub-rounded, poorly graded sand, low plasticity silt, trace gravel, roots, dark brown, loose, moist.			SB30_0.10 - 0.20
					▩	FILL	FILL: Silty CLAY, medium plasticity, trace gravel, grey mottled yellow, soft to firm, moist near plastic limit. Anthropogenic material including trace brick fragments.			SB30_0.30 - 0.40
				0.5	▩	FILL	Trace gravel, dark brown mottled yellow			
					▩	FILL	Brown mottled yellow-orange			
				1.0 1.5			SB30 terminated at 0.55 m bgl Refusal of HA on gravel			

BOREHOLE NUMBER SB31

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PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 13/1/21 **COMPLETED** 13/1/21 **LOGGED BY** NN **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 323133.82, 5804430.15, 55H

EQUIPMENT Hand Auger **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Organic Material (root matter)			
				0.5	▨	FILL	FILL: Silty SAND, fine to medium grained, poorly graded, sub-rounded sand, low plasticty silt, dark brown, medium dense, moist. Anthropogenic material including trace brick and glass fragments.			■ SB31_0.10 - 0.20 QC05, QC06 ■ SB31_0.40 - 0.50
				1.0 1.5			SB31 terminated at 0.50 m bgl Refusal of HA on gravel			

senversa

BOREHOLE NUMBER SB32

PAGE 1 OF 1

PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 13/1/21 **COMPLETED** 5/3/21 **LOGGED BY** MoH/IG **CHECKED BY** EC/SMS

CONTRACTOR Senversa, A.C. Drilling Services **LOCATION (Easting, Northing, Zone)** 323126.43, 5804340.18, 55H

EQUIPMENT Hand Auger, Solid Flight Auger **DIMENSIONS** 200mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Silty SAND, fine to medium grained, sub-angular to sub-rounded, poorly graded sand, medium plasticity silt, trace gravel, dark brown, loose to very loose, moist. Anthropogenic material including brick fragments, terracotta.			SB32_0.05 - 0.15
SFA					▨	FILL	Minor gravel.			
				0.5 1.0	▨	FILL	FILL: Sandy CLAY, medium plasticity clay, fine to medium grained, sub-rounded, poorly graded sand, trace gravel, dark brown, moist, near plastic limit.			SB32_0.90 - 1.00
				1.5	▨	FILL	FILL: GRAVEL, coarse grained, sub-rounded to sub-angular, poorly graded, grey, loose, dry. Unable to recover sample with SFA.			
				2.0 2.5			SB32 terminated at 1.80 m bgl Refusal of SFA on gravel / highly compacted fill			

1. SENVERSA STANDARD M18310_ELWOOD FORESHORE_REV2.GPJ SENVERSA_GINT.GDT 12/3/21

These logs have been prepared for environmental purposes and should not be used for geotechnical design and interpretive purposes

BOREHOLE NUMBER SB33

PAGE 1 OF 1

PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 12/1/21 **COMPLETED** 12/1/21 **LOGGED BY** NN **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 323164.54, 5804380.41, 55H

EQUIPMENT Hand Auger **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Water level at 0.2 m bgl **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Organic Material (root matter)			
					▨	FILL	FILL: Silty SAND, fine grained, poorly graded, sub-rounded sand, low plasticty silt, brown, very loose, dry.			SB33_0.10 - 0.20
		▼					SB33 terminated at 0.20 m bgl Borehole collapse due to water			
				0.5						
				1.0						
				1.5						

These logs have been prepared for environmental purposes and should not be used for geotechnical design and interpretive purposes

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BOREHOLE NUMBER SB34

PAGE 1 OF 1

PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310

PROJECT LOCATION Elwood Foreshore, Elwood, Victoria

DATE STARTED 13/1/21 **COMPLETED** 13/1/21 **LOGGED BY** NN **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 323184.41, 5804405.38, 55H

EQUIPMENT Hand Auger **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Organic Material (root matter)			
					▨	FILL	FILL: Silty SAND, fine to medium grained, poorly graded, sub-rounded sand, low plasticity silt, dark brown, medium dense, dry to moist.			
										SB34_0.10 - 0.20
										SB34_0.40 - 0.50
				0.5						
							SB34 terminated at 0.50 m bgl Refusal of HA on gravel			
				1.0						
				1.5						

1. SENVERSA STANDARD M18310_ELWOOD FORESHORE_REV2.GPJ SENVERSA_GINT.GDT 12/3/21

BOREHOLE NUMBER SB35

PAGE 1 OF 1

PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 12/1/21 **COMPLETED** 12/1/21 **LOGGED BY** NN **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 323235.46, 5804388.27, 55H

EQUIPMENT Hand Auger **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING		
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)	
HA					▨	FILL	FILL: Organic Material (root matter)				
					▨	FILL	FILL: Silty SAND, fine to medium grained, poorly graded, sub-rounded sand, low plasticty silt, brown - grey, medium dense, moist. Anthropogenic material including trace brick and glass fragments.			■	SB35_0.10 - 0.20 QC01, QC02
				0.5	▨					■	SB35_0.40 - 0.50
							SB35 terminated at 0.50 m bgl Refusal of HA on brick				
				1.0							
				1.5							

BOREHOLE NUMBER SB36

PAGE 1 OF 1

PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 12/1/21 **COMPLETED** 12/1/21 **LOGGED BY** NN **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 323206.39, 5804324.59, 55H

EQUIPMENT Hand Auger **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Silty SAND, fine grained, poorly graded, sub-rounded sand, low plasticty silt, brown, very loose, dry.			
					▨					SB36_0.10 - 0.20
				0.5	▨					SB36_0.40 - 0.50
							SB36 terminated at 0.50 m bgl Borehole collapse			
				1.0						
				1.5						

BOREHOLE NUMBER SB37

PAGE 1 OF 1

PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 12/1/21 **COMPLETED** 5/3/21 **LOGGED BY** NN/IG **CHECKED BY** EC/SMS

CONTRACTOR Senversa, A.C. Drilling Services **LOCATION (Easting, Northing, Zone)** 323250.26, 5804338.52, 55H

EQUIPMENT Hand Auger, Solid Flight Auger **DIMENSIONS** 200mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA						FILL	FILL: Organic Material (root matter)			
						FILL	FILL: Silty SAND, fine to medium grained, poorly graded, sub-rounded sand, low plasticty silt, trace gravel, brown, medium dense, moist. Anthropogenic material including trace brick and concrete fragments.			SB37_0.10 - 0.20
				0.5						SB37_0.50 - 0.60
SFA						FILL	FILL: Sandy CLAY, medium plasticity, fine to medium grained, sub-rounded, poorly graded sand, trace gravel and silt, brown, hard, moist, near plastic limit. Anthropogenic material including trace black ash substance.			SB37_0.90 - 1.00
				1.0						
										SB37_1.40 - 1.50
				1.5						
										SB37_1.70 - 1.80
							SB37 terminated at 1.80 m bgl Refusal of SFA on gravel / highly compacted fill			
				2.0						
				2.5						

1. SENVERSA STANDARD M18310_ELWOOD FORESHORE_REV2.GPJ SENVERSA_GINT.GDT 12/3/21

senversa

BOREHOLE NUMBER SB38

PAGE 1 OF 1

PROJECT NAME Detailed Site Investigation

PROJECT NUMBER M18310 **PROJECT LOCATION** Elwood Foreshore, Elwood, Victoria

DATE STARTED 12/1/21 **COMPLETED** 12/1/21 **LOGGED BY** NN **CHECKED BY** EC/SMS

CONTRACTOR Senversa **LOCATION (Easting, Northing, Zone)** 323292.08, 5804320.55, 55H

EQUIPMENT Hand Auger **DIMENSIONS** 50mm **INCLINATION** Vertical

GROUNDWATER NOTES Not encountered during drilling **CASING LEVEL** - **SURFACE LEVEL** -

GENERAL NOTES

DRILLING						FIELD MATERIAL DESCRIPTION			SAMPLING	
Method	Core Recovery (%)	Water	Well Details	Depth (m)	Graphic Log	Classification Symbol	Material Description	Additional Observations	PID (ppm)	Sample ID & Interval (QA/QC)
HA					▨	FILL	FILL: Organic Material (root matter)			
					▨	FILL	FILL: Silty SAND, fine to medium grained, poorly graded, sub-rounded sand, low plasticty silt, minor gravel, brown, medium dense, moist. Anthropogenic material including trace brick and plastic fragments.			
					▨					■ SB38_0.10 - 0.20
					▨					■ SB38_0.30 - 0.40
							SB38 terminated at 0.40 m bgl Refusal of HA on brick			
				0.5						
				1.0						
				1.5						

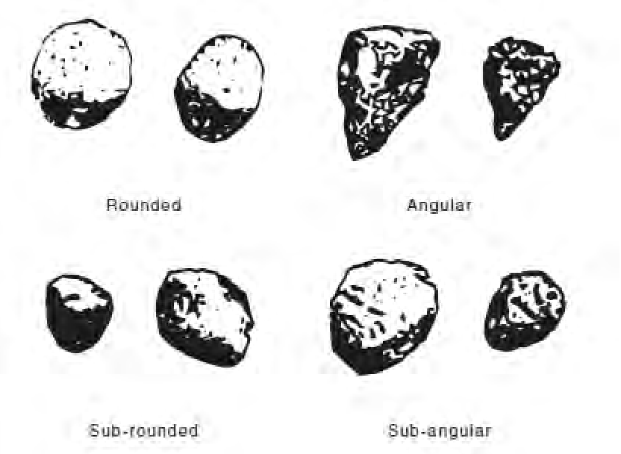
Environmental Soil Description Notes & Abbreviations

In accordance with AS1726 (2017) *Geotechnical Site Investigations*

Description		Particle Size (mm)	Graphic	Group Symbol	Typical Composition
	TOPSOIL		▨	**TOPSOIL**	Topsoil
	FILL		▨	**FILL**	Fill
Coarse-grained Soils (>65% >0.075mm)		>63	▨	**B**	Boulders and Cobbles
	GRAVEL	**Coarse** 63 to 19 **Medium** 19 to 6.7 **Fine** 6.7 to 2.36	▨	**GP**	Poorly graded gravel and gravel-sand mixture, little or no fines
			▨	**GW**	Well graded gravel and gravel-sand mixture, little or no fines
			▨	**GM**	Gravel-silt mixture and gravel-sand-silt mixture
			▨	**GC**	Gravel-clay mixture and gravel-sand-clay mixture
	SAND	**Coarse** 2.36 to 0.6 **Medium** 0.6 to 0.21 **Fine** 0.21 to 0.075	▨	**SP**	Poorly graded sand and gravel-sand mixture, little to no fines
			▨	**SW**	Well graded sand and gravel-sand mixture, little or no fines
			▨	**SM**	Sand-silt mixture
			▨	**SC**	Sand-clay mixture
Fine-grained Soils (>35% <0.075mm)	SILT	0.075 to 0.002	▨	**ML**	Inorganic silt with low plasticity, Liquid Limit ≤50%
			▨	**MH**	Inorganic silt with high plasticity, Liquid Limit >50%
	CLAY	<0.002	▨	**CL**	Inorganic clay low plasticity Liquid Limit ≤35%
			▨	**CI**	Inorganic clay with medium plasticity, Liquid Limit >35% and ≤50%
			▨	**CH**	Inorganic clay of high plasticity, Liquid Limit >50%
	Organic Soil		▨	**OL**	Organic silt or clay of low plasticity, 2 to 25% organic content by dry mass
			▨	**OH**	Organic silt or clay of medium to high plasticity, 2 to 25% organic content by dry mass
			▨	**Pt**	Peat, Highly organic, >25% organic content by dry mass
Composite Soils	Composite soils, Clayey SILT, Gravelly SILT, Sandy SILT, Sandy GRAVEL, Gravelly SAND, and Silty CLAY may be represented by a combined graphic symbol.				

Method	
HA	Hand Auger
SFA	Solid Flight Auger
HFA	Hollow Flight Auger
NDD	Non-Destructive Digging
DP	Direct Push
WB	Wash Bore
E(H)	Excavation (Hydraulic)
E(M)	Excavation (Manual)
Field Test	
ASS	Acid sulfate soil pH, pH(FOX)
PID	Photo-ionisation Detector (ppm)
PP	Pocket Penetrometer (kPa)
XRF	X-ray Fluorescence
Groundwater	
GW	Groundwater
SWL	Standing Water Level
bgl	Below ground level
Moisture	
D	Dry
M	Moist
W	Wet
w<PL	Moist, dry of Plastic Limit
w=PL	Moist, near Plastic Limit
w>PL	Moist, wet of Plastic Limit
w=LL	Wet, near Liquid Limit
w>LL	Wet, wet of Liquid Limit
Sample Types	
J	Jar sample
B	Bulk Sample
Bag	Small bag sample
SV	Soil vapour implant
ASB	Asbestos

Definition of Particle Shapes



Atma Environmental

Soil Bore: BH01

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: HB
Easting: - **Northing:** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface		0.0				
0.1	**Sandy SILT** Dark brown, non plastic, soft, damp	▥		┳	BH01/0.1	0.2	
0.5	**Silty SAND** Grey, fine grained, loose, dry	▥					
0.6	**Silty CLAY** Orange brown and brown, high plasticity, firm, dry	▨		┳	BH01/0.5		
	End of Log						
			1.0				
			2.0				
			3.0				

Sample Type

┳ Hand Auger
▙ Solid Stem Auger
|| Push Tube
‖ Split Spoon
◧ Testpit Wall

Atma Environmental

Soil Bore: BH02

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: KO
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface						
	FILL Clayey SAND, minor fine to medium gravel, brown, medium dnese, damp	▨	0.0	⊤	BH02/0.1		
0.4	**SAND** Minor silt, dark grey, fine grained, loose, dense	░		⊤	BH02/0.5		
			1.0	⊤	BH02/1.0		
1.1	End of Log						
			2.0				
			3.0				

Sample Type

⊤ Hand Auger ┃ Solid Stem Auger ‖ Push Tube ‖ Split Spoon ◧ Testpit Wall

Atma Environmental

Soil Bore: BH03

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: KO
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface						
	FILL Sandy CLAY, minor fine to medium gravel, trace brick and concrete, brown,high plastcity, hard, damp	▨	0.0	⊤	BH03/0.1		
0.45	**SAND** Grey, medium dense, dry	░		⊤	BH03/0.5		
		░	1.0	⊤	BH03/1.0		
1.1	End of Log						
			2.0				
			3.0				

Sample Type

⊤ Hand Auger ⌇ Solid Stem Auger ‖ Push Tube ‖ Split Spoon ◧ Testpit Wall

Atma Environmental

Soil Bore: BH04

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: HB
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface		0.0				
0.15	**FILL** Silty GRAVEL, dark brown, corasre grained, dense, dry	▨		┳	BH04/0.1	0.5	
0.65	**FILL** Gravelly SILT, brown, fine to coarse grained, medium dense, dry	▨		┳	BH04/0.5		Refusal on Gravel
	End of Log		1.0 2.0 3.0				

Sample Type

┳ Hand Auger ┫ Solid Stem Auger ‖ Push Tube ‖ Split Spoon ▌ Testpit Wall

Atma Environmental

Soil Bore: BH05

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: KO
Easting: - **Northing:** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface						
	FILL Clayey SAND, minor fine to medium gravel, trace brick fragments, dark brown,very dense, damp	▩	0.0				
		▩		⊥	BH05/0.1	0.3	
		▩		⊥	BH05/0.5	0.8	
		▩	1.0	⊥	BH05/1.0	0.3	
1.1	**SAND** Dark brown, fine grained, loose, damp	░					
1.2	**Silty CLAY** Greyish brown, high plasticity, very stiff, damp	▨					
		▨		⊥	BH05/1.5	0.8	
1.6	End of Log						
			2.0				

Sample Type

⊥ Hand Auger ▌ Solid Stem Auger ‖ Push Tube ‖ Split Spoon ◧ Testpit Wall

Atma Environmental

Soil Bore: BH06

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: HB
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	~~Ground Surface~~						
	Sandy CLAY Dark brown, high plasiticity, soft, damp	▨	0.0	⊤	BH06/0.1	1.0	DUP-140720B & SPLIT-140720B taken
	dark grey, firm	▨		⊤	BH06/0.5		
0.6	End of Log						
			1.0				
			2.0				
			3.0				

Sample Type

⊤ Hand Auger ⌇ Solid Stem Auger || Push Tube || Split Spoon ◧ Testpit Wall

Atma Environmental

Soil Bore: BH07

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: KO
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface						
	FILL Fine SAND, trace gravel, trace brick, grey, medium dense, damp	▩	0.0	⊥	BH07/0.1		
0.45	**SAND** Dark grey, fine grained, medium dense, damp	░	1.0	⊥ ⊥	BH07/0.5 BH07/1.0		
1.1	End of Log		2.0 3.0				

Sample Type

⊥ Hand Auger
▌ Solid Stem Auger
|| Push Tube
‖ Split Spoon
◧ Testpit Wall

Atma Environmental

Soil Bore: BH08

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: HB
Easting: - **Northing:** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface						
	SANDY SILT Minor clay, dark brown, low plasticity, stiff, dry	▨	0.0	⊥	BH08/0.1	1.4	
		▨		⊥	BH08/0.5		
0.6	End of Log						
			1.0				
			2.0				

Sample Type

⊥ Hand Auger
Solid Stem Auger
|| Push Tube
|| Split Spoon
◧ Testpit Wall

Atma Environmental

Soil Bore: BH09

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: HB
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface		0.0				
	FILL Dark brown, non plastic, soft, damp	▨		▄	BH09/0.1	0.5	
	tile fragments	▨					
0.4	**FILL** Clayey SILT, trace gravel, dark brown, medium plasticity, soft, dry	▨		▄	BH09/0.5		Refusal on Gravel
0.6	End of Log						
			1.0				
			2.0				
			3.0				

Sample Type

▄ Hand Auger ▌ Solid Stem Auger || Push Tube ‖ Split Spoon ◧ Testpit Wall

Atma Environmental

Soil Bore: BH10

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: KO
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface		0.0				
0.1	**FILL** Sandy GRAVEL, grey ,loose, damp			Hand Auger	BH10/0.1		
	SAND Minor silt, dark grey, loose, dry			Hand Auger	BH10/0.5		
0.6	End of Log		1.0 2.0				

Sample Type

Hand Auger Solid Stem Auger Push Tube Split Spoon Testpit Wall

Atma *Environmental*

Soil Bore: BH11

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: HB
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface						
0.1	**FILL** Sandy SILT, minor gravel, dark brown, fine to medium grained, non plastic, soft, damp	▨	0.0	┳	BH11/0.1	0.3	
	Sandy SILT Dark brown, non plastic, soft, damp	▥		┳	BH11/0.5		
0.6	End of Log		1.0 2.0 3.0				

Sample Type

┳ Hand Auger ▌ Solid Stem Auger || Push Tube || Split Spoon ◧ Testpit Wall

Atma Environmental

Soil Bore: BH12

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: HB
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	~~Ground Surface~~		0.0				
	FILL Silty GRAVEL, dark brown, coarse grained, dense, dry	▨		┳	BH12/0.1	0.8	
0.2	**FILL** Gravelly SILT, brown, fine to coarse grained, stiff, dry	▨					Refusal on Gravel
0.3	End of Log						
			1.0				
			2.0				
			3.0				

Sample Type

┳	Hand Auger
┫	Solid Stem Auger
‖	Push Tube
‖	Split Spoon
◧	Testpit Wall

Atma Environmental

Soil Bore: BH13

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: KO
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	**Soil Description**	**Graphic Symbol**	**Depth (m)**	**Sample Type**	**Sample ID**	**OVA (ppm)**	**Additional Observations**
	Ground Surface		0.0				
	FILL Fine SAND, minor silt, trace fine gravel, grey, med dense, damp	▨		┳	BH13/0.1		
		▨		┳	BH13/0.5		
0.8	**FILL** Clayey SILT, trace siltstone, trace gravel, very stiff, moderate plasticity, damp	▨	1.0	┳	BH13/1.0		
1.1	**Silty CLAY** Light grey and grey, high plasticity, very stiff, damp	▨		┳	BH13/1.5		
1.6	End of Log		2.0				

Sample Type

┳ Hand Auger
Solid Stem Auger
|| Push Tube
|| Split Spoon
◧ Testpit Wall

Atma Environmental

Soil Bore: BH14

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: HB
Easting: - **Northing:** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface		0.0				
	FILL Sandy SILT, dark brown, non plasitic, soft, damp	▩		┳	BH14/0.1	0.9	
0.2	**FILL** Sandy GRAVEL, dark brown, loose, damp	▩					
0.4	**FILL** Sandy SILT, dark brown, non plastic, firm, damp	▩		┳	BH14/0.5		
	clinker inclusion	▩					
1.0	**Sandy CLAY** Dark brown, high plasticity, firm, damp	▨	1.0	┳	BH14/1.0		
	minor sand	▨		┳	BH14/1.5		
1.6	End of Log						
			2.0				
			3.0				

Sample Type

┳ Hand Auger ▌ Solid Stem Auger || Push Tube ‖ Split Spoon ◧ Testpit Wall

Atma Environmental

Soil Bore: BH15

Project Ref. No: 1865B

Project Name: Elwood

Bore Diameter (mm): 75

OVA Type: PID

Date: 14/07/20

Page Number: 1 of 1

Logged By: KO

Easting: - ***Northing:*** -

Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface						
	FILL Fine SAND, minor silt, trae fine gravel, grey, med dense, damp	▨	0.0	┳	BH15/0.1		
				┳	BH15/0.5		
0.8	**FILL** Clayey SILT, trace siltsotne, trace gravel, very stiff, moderate plasticity, damp	▨	1.0	┳	BH15/1.0		
1.1	**Silty CLAY** Light grey and grey, high plasticity, very stiff, damp	▨		┳	BH15/1.5		
1.6	End of Log		2.0				

Sample Type

┳ Hand Auger ▌ Solid Stem Auger ‖ Push Tube ‖ Split Spoon ◧ Testpit Wall

Atma Environmental

Soil Bore: BH16

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: HB
Easting: - **Northing:** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface						
	FILL Sandy SILT, brown, non plastic, soft, dry	▨	0.0	⊥	BH16/0.1	1.4	Refusal from Gravel
0.4	End of Log		1.0 2.0				

Sample Type

⊥ Hand Auger Solid Stem Auger || Push Tube || Split Spoon ◧ Testpit Wall

Atma Environmental

Soil Bore: BH17

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: KO
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface						
	FILL Gravelly SILT, minor sand, dark brown, fine to coarse grained, non plastic, soft, damp	▩	0.0	⊥	BH17/0.1	0.8	
0.4	**Sandy SILT** Dark brown, fine grained, soft, damp	▥		⊥	BH17/0.5		
0.9	**Clayey SILT** Yellow brown and brown, medium plasticity, soft, damp	▨	1.0	⊥	BH17/1.0		
1.1	End of Log						
			2.0				

Sample Type

⊥ Hand Auger ┃ Solid Stem Auger ‖ Push Tube ‖ Split Spoon ◧ Testpit Wall

Atma Environmental

Soil Bore: BH18

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: KO
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface						
	FILL Fine SAND, trace fine to medium gravel, dark brown, dense	▨	0.0	⊤	BH18/0.1		Surfical landscaping gravel on surface
0.25	**SAND** Yellow brown, fine to medium grained, loose, damp	░		⊤	BH18/0.5		
		░	1.0	⊤	BH18/1.0		
1.1	End of Log						
			2.0				

Sample Type

⊤ Hand Auger
Solid Stem Auger
|| Push Tube
|| Split Spoon
◧ Testpit Wall

Atma Environmental

Soil Bore: BH19

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: KO
Easting: - **Northing:** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface						
	FILL Sandy SILT, dark brown, non plastic, soft, damp	▨	0.0	⊥	BH19/0.1	0.8	
0.3	dark grey	▨		⊥	BH19/0.5		
		▨	1.0	⊥	BH19/1.0		
1.1	End of Log						
			2.0				

Sample Type

⊥ Hand Auger
Solid Stem Auger
‖ Push Tube
‖ Split Spoon
◧ Testpit Wall

Soil Bore: BH20

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: HB
Easting: - **Northing:** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface		0.0				
	FILL Silty GRAVEL, brown, coarse grained, very dense, dry	▨		Hand Auger	BH20/0.1		
0.2	**FILL** Gravelly SILT, dark brown, fine to coarse grained, loose, damp	▨					Refusal Due to Gravel
0.4	End of Log						
			1.0				
			2.0				

Sample Type

Hand Auger
Solid Stem Auger
Push Tube
Split Spoon
Testpit Wall

Atma Environmental

Soil Bore: BH21

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: KO
Easting: - **Northing:** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface						
0.25	**FILL** Fine to medium GRAVEL, minor sand, grey, loose ,damp	▨	0.0	┳	BH21/0.1		Surfical landscaping gravel on surface
	FILL Yellow brown, fine to medium grained, loose, damp	▨		┳	BH21/0.5		
0.6	**SAND** Minor silt, dark grey, fine grained, loose, moist to wet	░	1.0	┳	BH21/1.0		
1.1	End of Log						
			2.0				
			3.0				

Sample Type

┳ Hand Auger ⌇ Solid Stem Auger ‖ Push Tube ‖ Split Spoon ◧ Testpit Wall

Soil Bore: BH22

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: HB
Easting: - **Northing:** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface						
	Sandy SILT Dark brown, non plasitic, soft, damp trace plastic and metal fragmets	▥	0.0	⊥	BH22/0.1	1.6	
				⊥	BH22/0.5		
0.6	**Sandy CLAY** Dark brown, high plasticity, firm, damp	▨					
			1.0	⊥	BH22/1.0		
1.1	End of Log						
			2.0				
			3.0				

Sample Type

⊥ Hand Auger   Solid Stem Auger   ‖ Push Tube   ‖ Split Spoon   ◧ Testpit Wall

Atma Environmental

Soil Bore: BH23

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: KO
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface						
	FILL Fine SAND, trace gravel and brick, brown, medium dense, damp	▨	0.0	┳	BH23/0.1		
0.3	**SAND** Minor silt , grey , fine grained, loose, damp	░		┳	BH23/0.5		
		░	1.0	┳	BH23/1.0		
1.1	End of Log		2.0				
			3.0				

Sample Type

┳ Hand Auger ▌ Solid Stem Auger || Push Tube ||| Split Spoon ◧ Testpit Wall

Atma Environmental

Soil Bore: BH24

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: HB
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	**Soil Description**	**Graphic Symbol**	**Depth (m)**	**Sample Type**	**Sample ID**	**OVA (ppm)**	**Additional Observations**
	Ground Surface						
	FILL Silty SAND, light brown, fine grained, loose, dry	▩	0.0	⊤	BH024/0.1		
0.3	**FILL** Sandy SILT, trace gravel, non plastic, stiff, dry	▨		⊤	BH024/0.5		Refusal Due To Gravel
0.7	End of Log		1.0 2.0 3.0				

Sample Type

⊤ Hand Auger ▮ Solid Stem Auger ‖ Push Tube ‖ Split Spoon ◧ Testpit Wall

Atma Environmental

Soil Bore: BH25

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: HB
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	**Soil Description**	**Graphic Symbol**	**Depth (m)**	**Sample Type**	**Sample ID**	**OVA (ppm)**	**Additional Observations**
	Ground Surface						
	FILL Sandy SILT, dark brown, non plasitic, soft, damp	▩	0.0	┻	BH25/0.1	1.3	
0.3	**FILL** Silty CLAY, dark brown, medium plasticity, stiff, damp clinker inclusion	▩		┻	BH25/0.5		
0.7	**Sandy CLAY** Dark brown, high plasticity, firm, damp	▨	1.0	┻	BH25/1.0		
1.1	End of Log		2.0 3.0				

Sample Type

┻ Hand Auger
▮ Solid Stem Auger
|| Push Tube
|| Split Spoon
◧ Testpit Wall

Atma Environmental

Soil Bore: BH26

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: KO
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	~~Ground Surface~~		0.0				
0.1	**FILL** Clayey SAND, minor fine to medium gravel, grey, medium dense, dry	▨		⊤	BH07/0.1		DUP-140720C & SPLIT-140720C Taken
	SAND Yellow brown, fine to medium grained, medium dense, damp	░		⊤	BH07/0.5		
0.6	End of Log		1.0 2.0				

Sample Type

⊤ Hand Auger   Solid Stem Auger   ‖ Push Tube   ‖ Split Spoon   ◧ Testpit Wall

Soil Bore: BH27

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: HB
Easting: - **Northing:** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface						
	FILL Sandy CLAY, trace shells, trace gravel, brown, fine grained, loose, dry	▨	0.0	⊤	BH27/0.1	0.6	
		▨		⊤	BH27/0.5		Refusal Due To Gravel
0.65	End of Log						
			1.0				
			2.0				
			3.0				

Sample Type

- ⊤ Hand Auger
- ┃ Solid Stem Auger
- ‖ Push Tube
- ‖ Split Spoon
- ◧ Testpit Wall

Atma Environmental

Soil Bore: BH28

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: KO
Easting: - **Northing:** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface						
0.1	**FILL** Fine SAND, trace shells, brown, medium dense, damp	▨	0.0	⊤	BH28/0.1		
	SAND Minor silt, yellow brown, fine grained, loose, damp	▒		⊤	BH28/0.5		
0.6	End of Log		1.0 2.0 3.0				

Sample Type

⊤ Hand Auger Solid Stem Auger ‖ Push Tube ‖ Split Spoon ◧ Testpit Wall

Atma Environmental

Soil Bore: BH29

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: HB
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface						
	FILL Silty SAND, trace plastic, tiles, and metal fragments, yellow brown, fine grained, loose, dry	▨	0.0	⊤	BH29/0.1		
		▨		⊤	BH29/0.5		
0.8	**FILL** Sandy CLAY, yellow brown, high plasticity, firm, dry	▨	1.0	⊤	BH29/1.5		
1.1	End of Log		2.0				
			3.0				

Sample Type

⊤ Hand Auger ▌ Solid Stem Auger ‖ Push Tube ‖ Split Spoon ◧ Testpit Wall

Atma *Environmental*

Soil Bore: BH30

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: HB
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface		0.0				
	Sandy SILT Dark brown, non plastic, very soft, dry			Hand Auger	BH30/0.1	2.8	
				Hand Auger	BH30/0.5		
0.6	End of Log						
			1.0				
			2.0				
			3.0				

Sample Type

Hand Auger Solid Stem Auger Push Tube Split Spoon Testpit Wall

Atma Environmental

Soil Bore: BH31

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: KO
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	**Soil Description**	**Graphic Symbol**	**Depth (m)**	**Sample Type**	**Sample ID**	**OVA (ppm)**	**Additional Observations**
	Ground Surface		0.0				
	FILL Clayey SILT, light grey and orange, very stiff, moderate plasticity, damp	▨		⊥	BH31/0.1		
0.4	**FILL** Fine SAND, grey, loose, damp	▨		⊥	BH31/0.5		
0.6	**SAND** Yellow brown, fine grained, looe, damp	░	1.0	⊥	BH31/1.0		
1.1	End of Log		2.0				

Sample Type

⊥	Hand Auger	▌	Solid Stem Auger	‖	Push Tube	‖	Split Spoon	◧	Testpit Wall

Atma Environmental

Soil Bore: BH32

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: KO
Easting: - **Northing:** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface		0.0				
	FILL Fine SAND, trace gravel, brown, loose, damp	▨		⊥	BH32/0.1	0.6	
		▨		⊥	BH32/0.5	0.4	
0.7	**FILL** Clayey SILT, trace gravel, brown, moderate plastic, damp	▨	1.0	⊥	BH32/1.0	0.4	
1.1	**CLAYEY SILT** Light grey and orange, moderate plasticity, very stiff, damp	▥		⊥	BH32/1.5	1.2	
1.6	End of Log		2.0				

Sample Type

⊥ Hand Auger
▙ Solid Stem Auger
|| Push Tube
‖ Split Spoon
◧ Testpit Wall

Atma Environmental

Soil Bore: BH33

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: KO
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface						
	FILL Fine SAND, trace plastic inclusions, brown	▨	0.0	⊥	BH33/0.1		DUP-140720D & SPLIT-140720D taken
	no plastic	▨		⊥	BH33/0.5		Solid Obstruction
0.6	End of Log						
			1.0				
			2.0				

Sample Type

⊥ Hand Auger   ⌇ Solid Stem Auger || Push Tube || Split Spoon   ◧ Testpit Wall

Soil Bore: BH34

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: KO
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface						
	FILL Clayey SILT, brown, very stiff, moderate plasticity, damp	▨	0.0	┻	BH34/0.1		
0.1	**SAND** Yellow brown, fine grained, loose, damp	░		┻	BH34/0.5		
0.6	End of Log		1.0 2.0 3.0				

Sample Type

┻ Hand Auger ▚ Solid Stem Auger || Push Tube ‖ Split Spoon ◧ Testpit Wall

Atma Environmental

Soil Bore: BH35

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: HB
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface		0.0				
	FILL Silty SAND, grey, fine grained, loose, damp	▨		⊥	BH35/0.1	1.9	DUP-140720E & SPILT-140720E taken
0.2	**FILL** Silty CLAY, brown, high plasticity, stiff, damp	▨					
0.4	**FILL** Sandy SILT, dark brown low plasticity, damp	▨		⊥	BH35/0.5		Refusal on Concrete
0.7	End of Log						
			1.0				
			2.0				

Sample Type

⊥ Hand Auger ⌇ Solid Stem Auger || Push Tube || Split Spoon ◧ Testpit Wall

Atma Environmental

Soil Bore: BH36

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: HB
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface						
	Sandy SILT Dark brown, low plasticity, soft, dry	▥	0.0				
				⊤	BH36/0.1	1.1	
				⊤	BH36/0.5		
0.7	End of Log						
			1.0				
			2.0				

Sample Type

⊤ Hand Auger ▮ Solid Stem Auger ‖ Push Tube ‖ Split Spoon ◧ Testpit Wall

Atma Environmental

Soil Bore: BH37

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: HB
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface		0.0				
0.1	**FILL** Sandy SILT, grey and light brown, non plastic, soft, damp	▩		⊥	BH37/0.1		
	Sandy SILT Dark brown, fine grained, soft, damp	▒		⊥	BH37/0.5		
0.6	End of Log						
			1.0				
			2.0				

Sample Type

⊥ Hand Auger ▮ Solid Stem Auger || Push Tube || Split Spoon ◧ Testpit Wall

Atma Environmental

Soil Bore: T1

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: HB
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	Soil Description	Graphic Symbol	Depth (m)	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface		0.0				
	FILL SAND, yellow brown, fine grained, stiff, dry trace plastic and metal fragmets	▨		⊥	T1/0.1	1.8	
0.3	**Sandy SILT** Yellow grey, fine, loose, damp	▨		⊥	T1/0.5		
0.8	**SAND** Minor silt, dark grey, fine grained, loose, dry	░	1.0	⊥	T1/1.0		
1.1	End of Log		2.0 3.0				

Sample Type

⊥ Hand Auger ▌ Solid Stem Auger || Push Tube || Split Spoon ◧ Testpit Wall

Atma Environmental

Soil Bore: T2

Project Ref. No: 1865B
Project Name: Elwood
Bore Diameter (mm): 75
OVA Type: PID

Date: 14/07/20
Page Number: 1 of 1
Logged By: KO
Easting: - ***Northing:*** -
Datum: -

Location Description: -

Depth (m bgl)	**Soil Description**	**Graphic Symbol**	**Depth (m)**	**Sample Type**	**Sample ID**	**OVA (ppm)**	**Additional Observations**
	Ground Surface						
0.05	**FILL** Fine SAND, grey, loose, damp	▨	0.0	⊥	T2/0.1	0.6	
0.15	**FILL** GRAVEL, medium to coarse grained, grey, dense, dry	▨					
	FILL Sandy GRAVEL, grey, dense, dry bitumen gravel inclusion, black	▨		⊥	T2/0.5	0.7	hydrocarbon odour Gravel Obstruction
0.6	End of Log						
			1.0				
			2.0				

Sample Type

⊥ Hand Auger ▌ Solid Stem Auger || Push Tube || Split Spoon ◧ Testpit Wall

Atma Environmental

Monitoring Well: MW01

Project Ref. No: 1865B
Project Name: Elwood
Completion Date: 15/07/20
BCL No: WLE078245
Drilling Contractor: Horizon Pty Ltd
Page Number: 1 of 1
Drilling Method: Flight Auger
Drillers Licence No: 0731
Logged By: KO
Bore Diameter (mm): 100
Well Depth (m): 6.5
OVA Type: PID
Well Diameter (mm): 50
Well Material: PVC
Easting: 0
Casing Stickup (m): -0.09
TOC Elevation (AHD): 0
Northing: 0
Location Description: Beside Boating Club
Datum:

Depth (m bgl)	Geological Description	Graphic Symbol	Depth	Sample Type	Sample ID	OVA (ppm)	Well Construction Details	Additional Observations
	Ground Surface							
0.1	FILL Fine SAND, dark grey, loose, damp		0.0		MW01/0.1			Hand Cleared to 0.7m
	SAND Grey, fine grained, loose, damp		1.0		MW01/0.5			
1.9	Clayey SAND Light grey, medium plasticity, stiff, damp		2.0 3.0		MW01/2.5			
4.0	Silty CLAY Light orange, high plasticity, very stiff, damp moist to wet		4.0 5.0 6.0					
6.5	End of Log		7.0					

Groundwater Observations -

▼ **Depth Water Encountered During Drilling (mbNS):** 5.0

▼ **Post Install Water Level (mbNS):** 2.89

Sample Type -

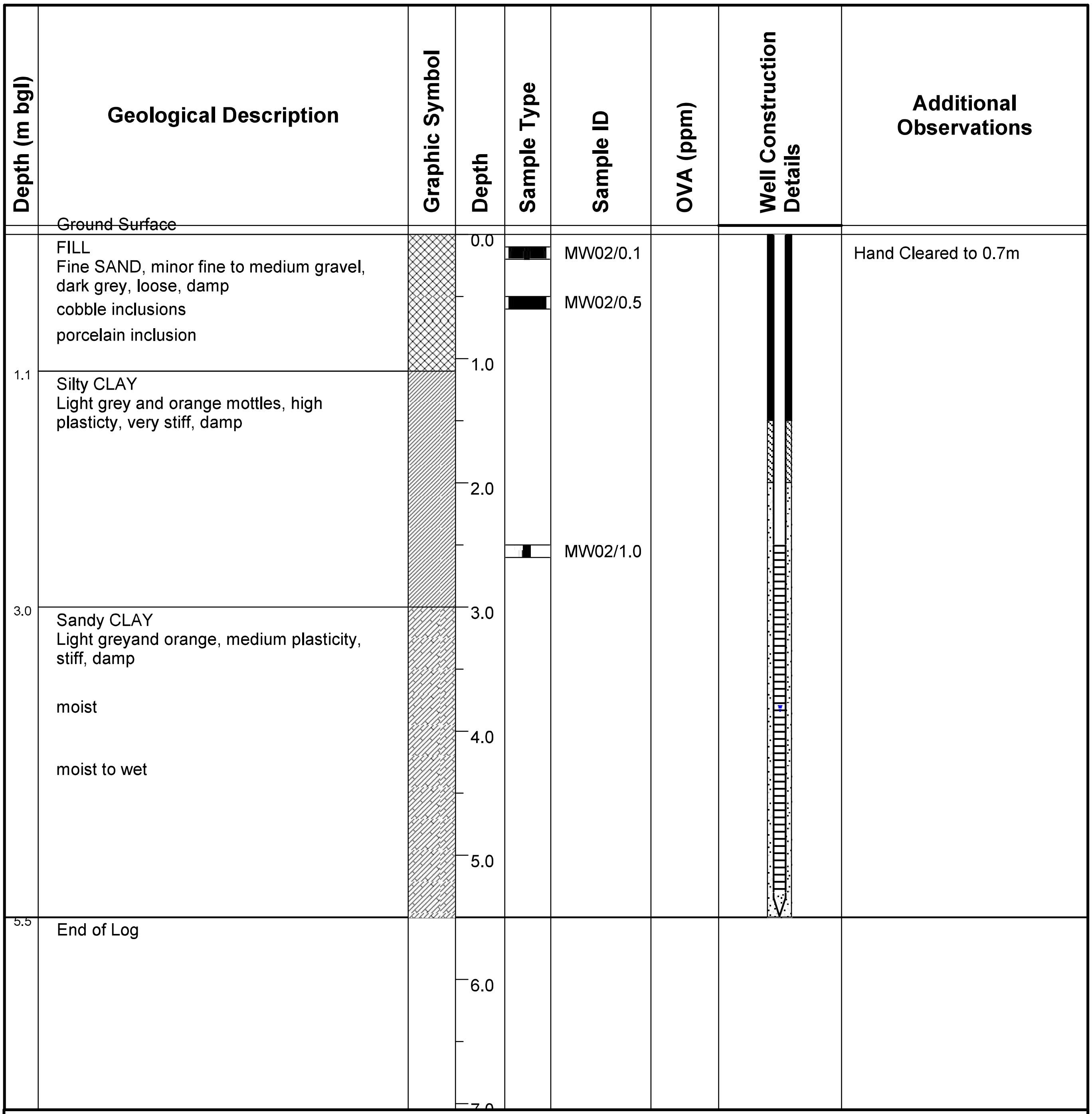
- **Hand Auger**
- **Solid Stem Auger**
- **Push Tube**
- **Split Spoon**
- **R.A.B**

Monitoring Well Construction Key -

- ▤ **Screen**
- ■ **Bentonite**
- ░ **Filter Pack**
- ▩ **Grout**
- ▨ **Backfill**

Monitoring Well: MW02

Project Ref. No: 1865B
Project Name: Elwood
Completion Date: 15/07/20
BCL No: WLE078245
Drilling Contractor: Horizon Pty Ltd
Page Number: 1 of 1
Drilling Method: Flight Auger
Drillers Licence No: 0731
Logged By: KO
Bore Diameter (mm): 100
Well Depth (m): 5.5
OVA Type: PID
Well Diameter (mm): 50
Well Material: PVC
Easting: 0
Casing Stickup (m): -0.09
TOC Elevation (AHD): 0
Northing: 0
Location Description: Beside Boating Club
Datum:



Depth (m bgl)	Geological Description	Depth	Sample Type	Sample ID	OVA (ppm)	Additional Observations
	Ground Surface					
	FILL Fine SAND, minor fine to medium gravel, dark grey, loose, damp cobble inclusions porcelain inclusion	0.0		MW02/0.1 MW02/0.5		Hand Cleared to 0.7m
1.1	Silty CLAY Light grey and orange mottles, high plasticty, very stiff, damp	1.0 2.0		MW02/1.0		
3.0	Sandy CLAY Light greyand orange, medium plasticity, stiff, damp moist moist to wet	3.0 4.0 5.0				
5.5	End of Log	6.0 7.0				

Groundwater Observations -

▾ **Depth Water Encountered During Drilling (mbNS):** 3.5

▾ **Post Install Water Level (mbNS):** 3.81

Sample Type -

- **Hand Auger**
- **Solid Stem Auger**
- **Push Tube**
- **Split Spoon**
- **R.A.B**

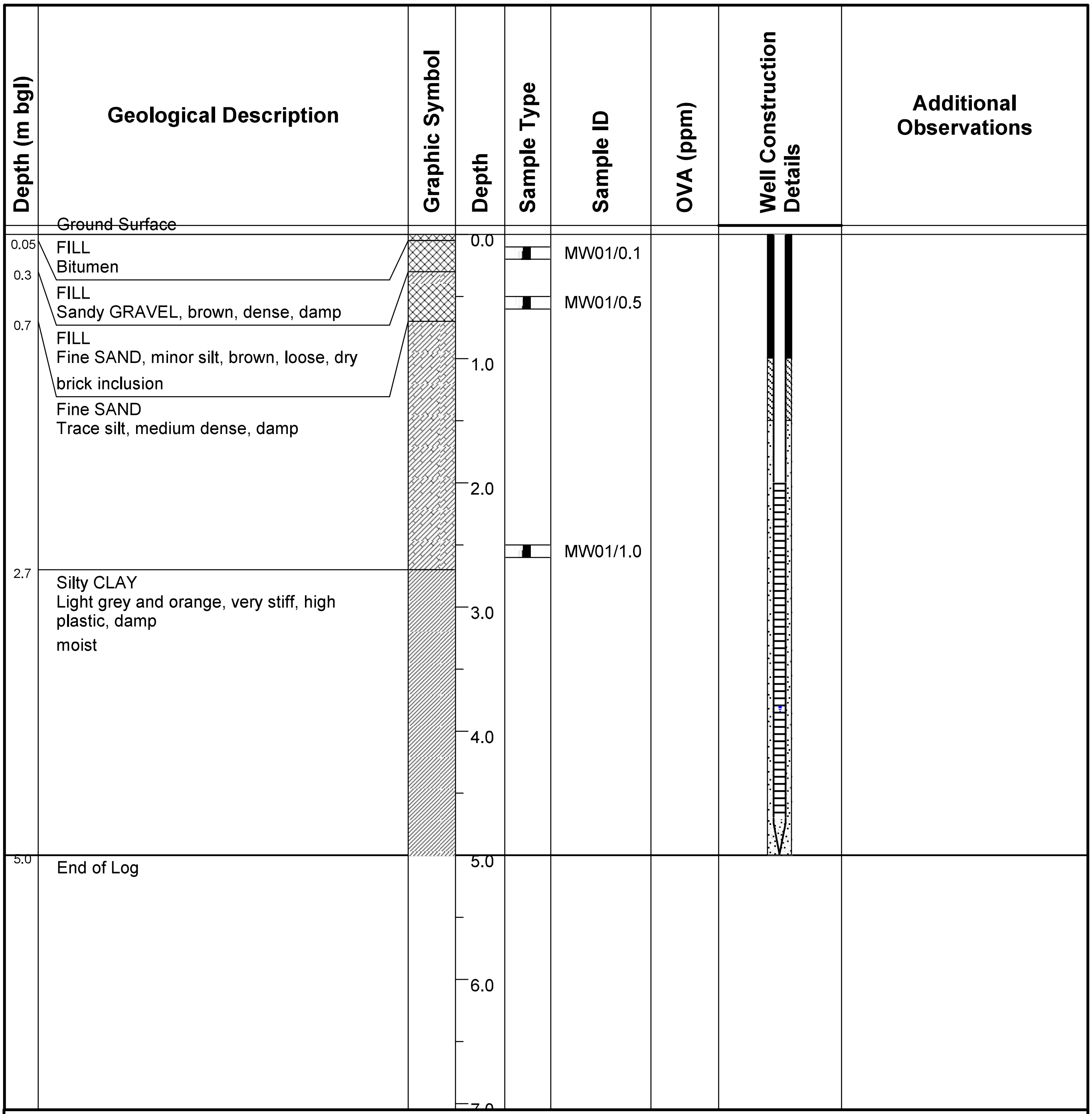
Monitoring Well Construction Key -

- ▤ **Screen**
- ■ **Bentonite**
- ⬚ **Filter Pack**
- ▩ **Grout**
- ▨ **Backfill**

Atma Environmental

Monitoring Well: MW03

Project Ref. No: 1865B
Project Name: Elwood
Completion Date: 15/07/20
BCL No: WLE078245
Drilling Contractor: Horizon Pty Ltd
Page Number: 1 of 1
Drilling Method: Flight Auger
Drillers Licence No: 0731
Logged By: KO
Bore Diameter (mm): 100
Well Depth (m): 5.0
OVA Type: PID
Well Diameter (mm): 50
Well Material: PVC
Easting: 0
Casing Stickup (m): -0.08
TOC Elevation (AHD): 0
Northing: 0
Location Description: Carpark
Datum:



Depth (m bgl)	Geological Description	Graphic Symbol	Depth	Sample Type	Sample ID	OVA (ppm)	Well Construction Details	Additional Observations
	Ground Surface							
0.05	FILL Bitumen		0.0		MW01/0.1			
0.3	FILL Sandy GRAVEL, brown, dense, damp				MW01/0.5			
0.7	FILL Fine SAND, minor silt, brown, loose, dry brick inclusion		1.0					
	Fine SAND Trace silt, medium dense, damp		2.0		MW01/1.0			
2.7	Silty CLAY Light grey and orange, very stiff, high plastic, damp moist		3.0 4.0					
5.0	End of Log		5.0 6.0					

Groundwater Observations -

Depth Water Encountered During Drilling (mbNS): 2.2
Post Install Water Level (mbNS): 3.81

Sample Type -

- **Hand Auger**
- **Solid Stem Auger**
- **Push Tube**
- **Split Spoon**
- **R.A.B**

Monitoring Well Construction Key -

- ▤ **Screen**
- ■ **Bentonite**
- ⬚ **Filter Pack**
- ▩ **Grout**
- ▨ **Backfill**

GREENCAP
Going Further in Managing Risk

ENVIRONMENTAL BOREHOLE

BOREHOLE ID: BH01
CLIENT NO.: C106854
JOB NO.: J169564
CLIENT NAME: City of Port Phillip
PROJECT NAME: PSI

DATE: 18/09/2020
LOCATION: Elwood

LOGGED BY: LWR
APPROVED BY: BK

TOTAL HOLE DEPTH: 1.5
DRILL METHOD: Hand auger
DRILLING CONTRACTOR:

COMMENTS Not for geotechnical purposes

Depth (m)	Method	PID (ppm)	Sample ID	Graphic Log	Moisture	Consistency/ Density	Description (Plasticity, colour, particle size and shape, odours/ staining, inclusions and comments)
				▨	Dry	Loose	FILL: SAND. Brown, fine grained, sub rounded. No odour, no staining
0.05				▨			
0.1			BH01_0.2, QC01, QC02	▨		Stiff	FILL: Clayey SILT. Brown, low plasticity, basalt fragments 5mm to 15mm. No odour, no staining.
0.15				▨			
0.2				▨			
0.25				▨			
0.3				▨			
0.35				▨			
0.4				▨			FILL: SILT. Brown, low plasticity, asphalt layer. Trace hydrocarbon odour, no staining
0.45			BH01_0.5	▨			
0.5	Hand auger			▨			
0.55				▨			
0.6				▨			
0.65				▨			
0.7				▨			FILL: SILT. Light brown with black mottles. low plasticity. No odour, no staining.
0.75				▨			
0.8				▨			
0.85				▨			
0.9				▨			
0.95			BH01_1.0	▨			
1							

GREENCAP
Going Further in Managing Risk

ENVIRONMENTAL BOREHOLE

Depth (m)	Method	PID (ppm)	Sample ID	Graphic Log	Moisture	Consistency/ Density	Description (Plasticity, colour, particle size and shape, odours/ staining, inclusions and comments)
1	Hand auger			▨			
1.05				▨			
1.1				▨			FILL: Sandy SILT. Light brown, low plasticity, coarse grained sand, subangular to subrounded. No odour, no staining
1.15				▨			
1.2				▨			
1.25				▨			
1.3				▨			
1.35				▨			
1.4				⁘		M Dense	NATURAL: SAND. Brown, fine grained, subrounded to rounded. No odour, no staining.
1.45			BH01_1.5	⁘			
1.5							End of hole at 1.5 m
1.55							
1.6							
1.65							
1.7							
1.75							
1.8							
1.85							
1.9							
1.95							
2							
2.05							
2.1							
2.15							
2.2							

GREENCAP
Going Further in Managing Risk

ENVIRONMENTAL BOREHOLE

BOREHOLE ID: BH02
CLIENT NO.: C106854
JOB NO.: J169564
CLIENT NAME: City of Port Phillip
PROJECT NAME: SCA

DATE: 18/08/2020
LOCATION: Elwood
LOGGED BY: LWR
APPROVED BY: BK

TOTAL HOLE DEPTH: 0.9
DRILL METHOD: Hand auger
DRILLING CONTRACTOR:

COMMENTS Not for geotechnical purposes

Depth (m)	Method	PID (ppm)	Sample ID	Graphic Log	Moisture	Consistency/ Density	Description (Plasticity, colour, particle size and shape, odours/ staining, inclusions and comments)
				▨	Dry	Soft	FILL: SAND. Brown, fine grained, sub rounded. No odour, no staining.
0.05							
0.1			BH02_0.1				
0.15							
0.2						Stiff	FILL: Clayey SILT. Brown, low plasticity, basalt fragments 5mm to 15mm. No odour, no staining.
0.25							
0.3							
0.35							
0.4							
0.45	Hand auger		BH02_0.5				
0.5							FILL: SILT. Red brown, low plasticity, basalt fragments 5mm to 15mm. No odour, no staining.
0.55							
0.6						V Stiff	
0.65							
0.7							
0.75							
0.8							
0.85			BH02_0.9				
0.9							End of hole at 0.9 m. Refusal on rock.
0.95							

ENVIRONMENTAL BOREHOLE

BOREHOLE ID: BH03
CLIENT NO.: C106854
JOB NO.: J169564
CLIENT NAME: City of Port Phillip
PROJECT NAME: SCA

DATE: 18/08/2020
LOCATION: Elwood

LOGGED BY: LWR
APPROVED BY: BK

TOTAL HOLE DEPTH: 1.0
DRILL METHOD: Hand auger
DRILLING CONTRACTOR:

COMMENTS Not for geotechnical purposes

Depth (m)	Method	PID (ppm)	Sample ID	Graphic Log	Moisture	Consistency/ Density	Description (Plasticity, colour, particle size and shape, odours/ staining, inclusions and comments)
	Hand auger			▨	Dry	Soft	FILL: SAND. Brown, fine grained, sub rounded. No odour, no staining.
0.05				▨			
0.1			BH03_0.1	▨			
0.15				▨			
0.2				▨			FILL: Clayey SILT. Brown, low plasticity, basalt fragments 5mm to 15mm. No odour, no staining.
0.25				▨			
0.3				▨		Stiff	
0.35				▨			
0.4				▨			
0.45			BH03_0.5	▨			
0.5				▨			
0.55				▨			
0.6				▨			
0.65				▨			
0.7				▨		V Stiff	FILL: SILT. Red brown, low plasticity, basalt fragments 5mm to 15mm. No odour, no staining.
0.75				▨			
0.8				▨			
0.85				▨			
0.9				▨			
0.95			BH03_1.0	▨			
1							End of hole at 1.0 m. Refusal on rock.

ENVIRONMENTAL BOREHOLE

BOREHOLE ID: BH04
CLIENT NO.: C106854
JOB NO.: J169564
CLIENT NAME: City of Port Phillip
PROJECT NAME: SCA

DATE: 18/08/2020
LOCATION: Elwood
LOGGED BY: LWR
APPROVED BY: BK

TOTAL HOLE DEPTH: 0.5
DRILL METHOD: Hand auger
DRILLING CONTRACTOR:

COMMENTS Not for geotechnical purposes

Depth (m)	Method	PID (ppm)	Sample ID	Graphic Log	Moisture	Consistency/ Density	Description (Plasticity, colour, particle size and shape, odours/ staining, inclusions and comments)
0	Hand auger			▨	Dry	Soft	FILL: SAND. White to yellow, coarse grained, subangular to angular. No odour, no staining.
0.05				▨			
0.1			BH04_0.1	▨			
0.15				▨		Stiff	FILL: SILT. Brown to light brown, low plasticity, basalt fragments 5mm to 15mm. No odour, no staining.
0.2				▨			
0.25				▨			
0.3				▨			
0.35				▨			
0.4				▨		V Stiff	
0.45			BH04_0.5	▨			
0.5				▨		V stiff to hard	
0.55				▨			
0.6							End of hole at 0.6 m. Refusal on rock.
0.65							
0.7							
0.75							
0.8							
0.85							
0.9							
0.95							

GREENCAP
Going Further in Managing Risk

ENVIRONMENTAL BOREHOLE

BOREHOLE ID: BH05
CLIENT NO.: C106854
JOB NO.: J169564
CLIENT NAME: City of Port Phillip
PROJECT NAME: SCA

DATE: 18/08/2020
LOCATION: Elwood
LOGGED BY: LWR
APPROVED BY: BK

TOTAL HOLE DEPTH: 0.5
DRILL METHOD: Hand auger
DRILLING CONTRACTOR:

COMMENTS Not for geotechnical purposes

Depth (m)	Method	PID (ppm)	Sample ID	Graphic Log	Moisture	Consistency/ Density	Description (Plasticity, colour, particle size and shape, odours/ staining, inclusions and comments)
	Hand auger			▨	Dry	Firm	FILL: SAND. White to yellow, coarse grained, subangular to angular. No odour, no staining.
0.05							
0.1			BH05_0.1			Stiff	FILL: Gravelly SILT. Brown, low plasticity. Sub angular basalt, 5mm to 15mm, trace brick and building material. No odour, no staining.
0.15							
0.2							
0.25							
0.3						V stiff to hard	
0.35							
0.4							
0.45			BH05_0.5				
0.5							End of hole at 0.5 m. Refusal on rock.
0.55							
0.6							
0.65							
0.7							
0.75							
0.8							
0.85							
0.9							
0.95							

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Landserv Environment

BH02

CLIENT: CoPP
LANDSERV JOB #: M0790
SITE LOCATION: Wattie Watson Oval

OPERATOR: Drillworx
PLANT EQUIPMENT: Hand Auger
BORE DEPTH: 1.5m

DATE: 24/08/2020
LOGGED BY: AR
CHECKED BY: RE

Depth (m)	Graphic Log	Soil Description	Sample ID	PID	Drilling Method
		FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, root fibres, moist	BH02/0-0.05	0.8	Hand auger
0.1 0.2		FILL (topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, trace root fibres, moist	BH02/0.15-0.25	0.8	
0.3 0.4 0.5 0.6		FILL: sandy clay, brown, medium plasticity, soft to medium stiff, trace fine to medium angular gravels, brick fragments, wood, ceramic, seashells and charcoal, moist	BH02/0.4-0.5 BH02/0.6-0.7	1.0 1.5	
0.7 0.8 0.9 1		FILL: clayey sand, light brown, medium to coarse grained sand, trace cobbles and brick, dry to moist	BH02/0.9-1.0	0.9	
1.1 1.2 1.3 1.4		sandy CLAY: grey orange brown, medium to high plasticity, soft to medium stiff, dry to moist	BH02/1.4-1.5	0.4	
1.5		BH02 terminated at 1.5 m depth			

Disclaimer This log is intended for environmental not geotechnical purposes.

Landserv
Environment

BH03

CLIENT: CoPP
LANDSERV JOB #: M0790
SITE LOCATION: Wattie Watson Oval

OPERATOR: Drillworx
PLANT EQUIPMENT: Hand Auger
BORE DEPTH: 0.7m

DATE: 24/08/2020
LOGGED BY: EM
CHECKED BY: RE

Depth (m)	Graphic Log	Soil Description	Sample ID	PID	Drilling Method
	▨	FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, root fibres, moist to wet	BH03/0-0.05	3.6	Hand auger
0.1 0.2	▨	FILL: clayey sand, dark brown, loose, medium to coarse grained sand, trace root fibres, moist	BH03/0.15-0.25	1.3	
0.3 0.4	▨	FILL: sandy clay, light brown with orange mottling, low to medium plasticity, medium stiff, trace root fibres, moist	BH03/0.4-0.5	1.3	
0.5	▨	FILL: clay, grey with light brown mottling, medium to high plasticity, stiff, moist			
0.6	▨	FILL: sand, dark brown, loose, fine to medium grained sand, trace root fibres, dry to moist	BH03/0.6-0.7 BH503/0.6-0.7 BH603/0.6-0.7		
0.7 0.8 0.9 1 1.1 1.2 1.3 1.4		BH03 terminated at 0.7 m depth			

BH04

CLIENT: CoPP
LANDSERV JOB #: M0790
SITE LOCATION: Wattie Watson Oval

OPERATOR: Drillworx
PLANT EQUIPMENT: Hand Auger
BORE DEPTH: 0.7m

DATE: 24/08/2020
LOGGED BY: EM
CHECKED BY: RE

Depth (m)	Graphic Log	Soil Description	Sample ID	PID	Drilling Method
		FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, root fibres, moist to wet	BH04/0-0.05	2.4	Hand auger
0.1 0.2		FILL: clayey sand, dark brown, loose, medium to coarse grained sand, root fibres, moist	BH04/0.15-0.25	1.7	
0.3		FILL: clayey sand, dark brown, loose, medium to coarse grained sand, trace brick and root fibres, moist			
0.4		FILL: sandy clay, dark brown with light brown mottling, low plasticity, soft, trace root fibres and slag, moist	BH04/0.4-0.5	1.6	
0.5		FILL: sandy clay, dark brown with green mottling, low plasticity, soft, trace pvc fragments and cobbles, moist			
0.6		FILL: clayey sand, loose, fine to coarse grained sand, trace glass, brick, porcelain, ceramic and medium angular gravels, dry to moist	BH04/0.6-0.7	1.7	
0.7 0.8 0.9 1 1.1 1.2 1.3 1.4		BH04 terminated at 0.7 m depth			

Landserv
Environment

BH05

CLIENT: CoPP
LANDSERV JOB #: M0790
SITE LOCATION: Wattie Watson Oval

OPERATOR: Drillworx
PLANT EQUIPMENT: Hand Auger
BORE DEPTH: 0.7m

DATE: 24/08/2020
LOGGED BY: EM
CHECKED BY: RE

Depth (m)	Graphic Log	Soil Description	Sample ID	PID	Drilling Method
0.1	▨	FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, root fibres, moist to wet	BH05/0-0.05	0.8	Hand auger
0.2	▨	FILL: clayey sand, dark brown, loose, medium to coarse grained sand, trace root fibres, concrete, ceramic, porcelain, glass and bitumen, moist	BH05/0.15-0.25	0.7	
0.3 0.4	▨	FILL: clayey sand, dark brown, loose, medium to coarse grained sand, trace glass, brick, cobbles and ceramic, moist	BH05/0.4-0.5	1.2	
0.5	▨	FILL: clayey sand, dark brown, loose, medium to coarse grained sand, trace brick, moist to wet			
0.6	▨	FILL: gravelly, clayey sand, dark brown, trace fine to medium angular gravels, concrete, brick and glass, moist to wet	BH05/0.6-0.7	4.3	
0.7 0.8 0.9 1 1.1 1.2 1.3 1.4		BH05 terminated at 0.7 m depth			

BH06

CLIENT: CoPP
LANDSERV JOB #: M0790
SITE LOCATION: Wattie Watson Oval

OPERATOR: Drillworx
PLANT EQUIPMENT: Hand Auger
BORE DEPTH: 0.7m

DATE: 24/08/2020
LOGGED BY: EM
CHECKED BY: RE

Depth (m)	**Graphic Log**	**Soil Description**	**Sample ID**	**PID**	**Drilling Method**
0.1		FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, root fibres, moist to wet	BH06/0-0.05	1.3	Hand auger
0.2 0.3		FILL: clayey sand, dark brown loose, medium to coarse grained sand, trace root fibres, moist	BH06/0.15-0.25	0.4	
0.4 0.5		FILL: sandy clay, dark brown with light brown mottling, low to medium plasticity, medium stiff, trace root fibres, cobbles, concrete, brick and small angular gravels, moist	BH06/0.4-0.5	0.7	
0.6		FILL: sand, dark brown, loose, coarse to medium grained sand, moist	BH06/0.6-0.7	0.8	
0.7 0.8 0.9 1 1.1 1.2 1.3 1.4		BH06 terminated at 0.7 m depth			

Disclaimer This log is intended for environmental not geotechnical purposes.

BH07

CLIENT: CoPP
LANDSERV JOB #: M0790
SITE LOCATION: Wattie Watson Oval

OPERATOR: Drillworx
PLANT EQUIPMENT: Hand Auger
BORE DEPTH: 0.7m

DATE: 24/08/2020
LOGGED BY: EM
CHECKED BY: RE

Depth (m)	Graphic Log	Soil Description	Sample ID	PID	Drilling Method
0.1	▨	FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, root fibres, moist to wet	BH07/0-0.05	2.1	Hand auger
0.2	▨		BH07/0.15-0.25	2.8	
0.3 0.4 0.5	▨	FILL: sandy clay, dark brown, low plasticity, soft, trace root fibres, moist	BH07/0.4-0.5	2.0	
0.6	▨	FILL: sandy clay, dark brown with light brown mottling, low plasticity, soft, trace root fibres and ceramic, moist	BH07/0.6-0.7	0.6	
0.7 0.8 0.9 1 1.1 1.2 1.3 1.4		BH07 terminated at 0.7 m depth			

Landserv
Environment

BH08

CLIENT: CoPP
LANDSERV JOB #: M0790
SITE LOCATION: Wattie Watson Oval

OPERATOR: Drillworx
PLANT EQUIPMENT: Hand Auger
BORE DEPTH: 0.7m

DATE: 24/08/2020
LOGGED BY: EM
CHECKED BY: RE

Depth (m)	**Graphic Log**	**Soil Description**	**Sample ID**	**PID**	**Drilling Method**
	▨	FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, root fibres, moist to wet	BH08/0-0.05	2.8	Hand auger
0.1 0.2	▨	FILL: clayey sand, dark brown, loose, medium to coarse grained sand, trace root fibres, moist	BH08/0.15-0.25	3.5	
0.3 0.4 0.5	▨	FILL: clay, dark brown, low to medium plasticity, soft, trace brick and root fibres, dry	BH08/0.4-0.5	1.8	
0.6	▨	FILL: clayey sand, dark brown with orange mottling, loose, low plasticity, soft, trace concrete, dry to moist	BH08/0.6-0.7	1.7	
0.7 0.8 0.9 1 1.1 1.2 1.3 1.4		BH08 terminated at 0.7 m depth			

Disclaimer This log is intended for environmental not geotechnical purposes.

BH09

CLIENT: CoPP
LANDSERV JOB #: M0790
SITE LOCATION: Wattie Watson Oval

OPERATOR: Drillworx
PLANT EQUIPMENT: Hand Auger
BORE DEPTH: 0.7m

DATE: 24/08/2020
LOGGED BY: EM
CHECKED BY: RE

Depth (m)	Graphic Log	Soil Description	Sample ID	PID	Drilling Method
	▨	FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, some root fibres, moist to wet	BH09/0-0.05	0.3	Hand auger
0.1	▨				
0.2	▨		BH09/0.15-0.25	0.7	
0.3	▨	FILL: sandy clay, dark brown, low plasticity, soft, trace smooth rounded pebbles, concrete and root fibres, moist			
0.4	▨		BH09/0.4-0.5	1.1	
0.5	▨	FILL: sandy clay, dark brown with light brown mottling, medium to high plasticity, soft, trace brick and seashells, moist			
0.6	▨		BH09/0.6-0.7	1.0	
0.7		BH09 terminated at 0.7 m depth			
0.8					
0.9					
1					
1.1					
1.2					
1.3					
1.4					

Disclaimer This log is intended for environmental not geotechnical purposes.

Landserv Environment

BH10

CLIENT: CoPP
LANDSERV JOB #: M0790
SITE LOCATION: Wattie Watson Oval

OPERATOR: Drillworx
PLANT EQUIPMENT: Hand Auger
BORE DEPTH: 0.7m

DATE: 24/08/2020
LOGGED BY: EM
CHECKED BY: RE

Depth (m)	Graphic Log	Soil Description	Sample ID	PID	Drilling Method
0.1	▨	FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, root fibres, moist to wet	BH10/0-0.05	0.7	Hand auger
0.2	▨	FILL: clayey sand, dark brown, loose, medium to coarse grained sand, trace root fibres, cobbles and fine angular gravels, moist	BH10/0.15-0.25	0.4	
0.3	▨				
0.4	▨		BH10/0.4-0.5	0.5	
0.5	▨				
0.6	▨		BH10/0.6-0.7	0.4	
0.7 0.8 0.9 1 1.1 1.2 1.3 1.4		BH10 terminated at 0.7 m depth			

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Landserv
Environment

BH11

CLIENT: CoPP
LANDSERV JOB #: M0790
SITE LOCATION: Wattie Watson Oval

OPERATOR: Drillworx
PLANT EQUIPMENT: Hand Auger
BORE DEPTH: 0.7m

DATE: 24/08/2020
LOGGED BY: EM
CHECKED BY: RE

Depth (m)	Graphic Log	Soil Description	Sample ID	PID	Drilling Method
0.1 0.2 0.3	▨	FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, some root fibres, moist to wet	BH11/0-0.05 BH11/0.15-0.25	0.5 1.0	Hand auger
0.4 0.5	▨	FILL: sandy clay, dark brown, medium plasticity, medium stiff, trace root fibres, cobbles and metal, moist	BH11/0.4-0.5	0.5	
0.6	▨	FILL: sandy clay, dark brown with light brown mottling, medium plasticity, medium stiff, trace root fibres and brick, moist	BH11/0.6-0.7	0.5	
0.7 0.8 0.9 1 1.1 1.2 1.3 1.4		BH11 terminated at 0.7 m depth			

Landserv
Environment

BH12

CLIENT: CoPP
LANDSERV JOB #: M0790
SITE LOCATION: Wattie Watson Oval

OPERATOR: Drillworx
PLANT EQUIPMENT: Hand Auger
BORE DEPTH: 0.7m

DATE: 24/08/2020
LOGGED BY: EM
CHECKED BY: RE

Depth (m)	Graphic Log	Soil Description	Sample ID	PID	Drilling Method
	▨	FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, root fibres, moist to wet	BH12/0-0.05	0.5	Hand auger
0.1	▨				
0.2	▨		BH12/0.15-0.25	1.2	
0.3	▨	FILL: sandy clay, dark brown with light orange and brown mottling, low to medium plasticity, medium stiff, trace root fibres, moist			
0.4	▨		BH12/0.4-0.5	0.9	
0.5	▨				
0.6	▨	FILL: sandy clay, dark brown with light orange and brown mottling, low to medium plasticity, medium stiff, trace root fibres, cobbles and glass, moist	BH12/0.6-0.7	0.8	
0.7		BH12 terminated at 0.7 m depth			
0.8					
0.9					
1					
1.1					
1.2					
1.3					
1.4					

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Landserv
Environment

BH13

CLIENT: CoPP
LANDSERV JOB #: M0790
SITE LOCATION: Wattie Watson Oval

OPERATOR: Drillworx
PLANT EQUIPMENT: Hand Auger
BORE DEPTH: 0.7m

DATE: 24/08/2020
LOGGED BY: EM
CHECKED BY: RE

Depth (m)	**Graphic Log**	**Soil Description**	**Sample ID**	**PID**	**Drilling Method**
	▨	FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, some root fibres, moist to wet	BH13/0-0.05	1.2	Hand auger
0.1 0.2	▨	FILL: clayey sand, light brown, loose, medium to coarse grained sand, trace root fibres, moist	BH13/0.15-0.25	2.2	
0.3	▨	FILL: sandy clay, dark brown with light brown mottling, low plasticity, meidum stiff, trace root fibres, moist			
0.4 0.5	▨	FILL: sandy clay, dark brown with light brown mottling, medium plasticity, medium stiff, trace root fibres and glass, moist	BH13/0.4-0.5	1.0	
0.6	▨	FILL: sandy clay, dark brown with light brown mottling, medium to high plasticity, stiff, trace root fibres and glass, moist	BH13/0.6-0.7	1.2	
0.7 0.8 0.9 1 1.1 1.2 1.3 1.4		BH13 terminated at 0.7 m depth			

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Landserv
Environment

BH14

CLIENT: CoPP
LANDSERV JOB #: M0790
SITE LOCATION: Wattie Watson Oval

OPERATOR: Drillworx
PLANT EQUIPMENT: Hand Auger
BORE DEPTH: 0.7m

DATE: 24/08/2020
LOGGED BY: EM
CHECKED BY: RE

Depth (m)	Graphic Log	Soil Description	Sample ID	PID	Drilling Method
0.1	▨	FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, some root fibres, moist to wet	BH14/0-0.05	0.5	Hand auger
0.2 0.3 0.4	▨	FILL: clayey sand, dark brown, loose, medium to coarse grained sand, trace root fibres and rock fragments, moist	BH14/0.15-0.25 BH14/0.4-0.5	0.7 0.7	
0.5 0.6	▨	FILL: sandy clay, dark brown with light brown and red mottling, medium to high plasticity, soft trace root fibres, moist	BH14/0.6-0.7	1.0	
0.7 0.8 0.9 1 1.1 1.2 1.3 1.4		BH14 terminated at 0.7 m depth			

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Landserv
Environment

BH15

CLIENT: CoPP	**OPERATOR:** Drillworx	**DATE:** 24/08/2020
LANDSERV JOB #: M0790	**PLANT EQUIPMENT:** Hand Auger	**LOGGED BY:** AR
SITE LOCATION: Wattie Watson Oval	**BORE DEPTH:** 0.7m	**CHECKED BY:** RE

Depth (m)	Graphic Log	Soil Description	Sample ID	PID	Drilling Method
	▨	FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, some root fibres, moist to wet	BH15/0-0.05	1.8	Hand auger
0.1	▨	FILL (topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, trace root fibres, moist to wet			
0.2	▨		BH15/0.15-0.25	1.8	
0.3	▨	FILL: sandy clay, brown, low to medium plasticity, soft to medium stiff, trace angular gravels, brick, glass and ceramic, moist			
0.4	▨		BH15/0.4-0.5	2.0	
0.5	▨	FILL: sandy clay, brown, low to medium plasticity, soft to medium stiff, trace angular gravels, brick, glass and ceramic, dry to moist			
0.6	▨		BH15/0.6-0.7	2.0	
0.7		BH15 terminated at 0.7 m depth			
0.8					
0.9					
1					
1.1					
1.2					
1.3					
1.4					

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Landserv Environment

BH16

CLIENT: CoPP
LANDSERV JOB #: M0790
SITE LOCATION: Wattie Watson Oval

OPERATOR: Drillworx
PLANT EQUIPMENT: Hand Auger
BORE DEPTH: 0.7m

DATE: 24/08/2020
LOGGED BY: AR
CHECKED BY: RE

Depth (m)	Graphic Log	Soil Description	Sample ID	PID	Drilling Method
	▨	FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, some root fibres, moist to wet	BH16/0-0.05	1.4	Hand auger
0.1	▨	FILL (topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, trace root fibres, moist to wet			
0.2	▨		BH16/0.15-0.25	1.7	
0.3	▨	FILL: sandy, gravelly clay, brown, low to medium plasticity, soft, trace ceramic, cobbles and charcoal, dry to moist			
0.4	▨		BH16/0.4-0.5	1.9	
0.5	▨				
0.6	▨		BH16/0.6-0.7		
0.7		BH16 terminated at 0.7 m depth			
0.8					
0.9					
1					
1.1					
1.2					
1.3					
1.4					

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BH17

CLIENT: CoPP
LANDSERV JOB #: M0790
SITE LOCATION: Wattie Watson Oval

OPERATOR: Drillworx
PLANT EQUIPMENT: Hand Auger
BORE DEPTH: 0.7m

DATE: 24/08/2020
LOGGED BY: AR
CHECKED BY: RE

Depth (m)	Graphic Log	Soil Description	Sample ID	PID	Drilling Method
	▨	FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, some root fibres, moist to wet	BH17/0-0.05	1.3	Hand auger
0.1 0.2	▨	FILL (topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, trace root fibres, moist	BH17/0.15-0.25	2.2	
0.3 0.4 0.5 0.6	▨	FILL: sandy clay, brown, low to medium plasticity, soft, trace angular gravels, wood, brick and charcoal, moist	BH17/0.4-0.5 BH17/0.6-0.7	2.0	
0.7 0.8 0.9 1 1.1 1.2 1.3 1.4		BH17 terminated at 0.7 m depth			

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BH18

CLIENT: CoPP
LANDSERV JOB #: M0790
SITE LOCATION: Wattie Watson Oval

OPERATOR: Drillworx
PLANT EQUIPMENT: Hand Auger
BORE DEPTH: 0.7m

DATE: 24/08/2020
LOGGED BY: AR
CHECKED BY: RE

Depth (m)	Graphic Log	Soil Description	Sample ID	PID	Drilling Method
	▨	FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, trace root fibres, moist to wet	BH18/0-0.05	2.1	Hand auger
0.1	▨	FILL (topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, trace root fibres, moist			
0.2	▨	FILL: sandy clay, dark brown, low to medium plasticity, soft to medium stiff, trace brick, root fibres, seashells and ceramic, moist	BH18/0.15-0.25	2.3	
0.3 0.4	▨	FILL: gravelly sand, brown, medium to coarse grained sand, fine to coarse angular gravels, some charcoal, slag/coke and cobbles approx. 40-100 mm, moist	BH18/0.4-0.5	2.6	
0.5 0.6	▨	FILL: sandy gravel, brown, medium to coarse grained sand, fine to coarse angular gravels, some charcoal, slag/coke and cobbles approx. 40-100 mm, moist	BH18/0.6-0.7	1.9	
0.7 0.8 0.9 1 1.1 1.2 1.3 1.4		BH18 terminated at 0.7 m depth			

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Environment

BH19

CLIENT: CoPP	**OPERATOR:** Drillworx	**DATE:** 24/08/2020
LANDSERV JOB #: M0790	**PLANT EQUIPMENT:** Hand Auger	**LOGGED BY:** AR
SITE LOCATION: Wattie Watson Oval	**BORE DEPTH:** 0.7m	**CHECKED BY:** RE

Depth (m)	Graphic Log	Soil Description	Sample ID	PID	Drilling Method
	▨	FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, some root fibres, moist	BH19/0-0.05	2.2	Hand auger
0.1 0.2	▨	FILL (topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, trace root fibres, moist	BH19/0.15-0.25	2.8	
0.3 0.4	▨	FILL: sandy clay, dark brown, low to medium plasticity, trace glass, brick and fine to medium angular gravels, moist	BH19/0.4-0.5	2.3	
0.5 0.6	▨	FILL: sandy clay, dark brown with trace orange mottling, low to medium plasticity, trace seashells, moist	BH19/0.6-0.7	2.2	
0.7 0.8 0.9 1 1.1 1.2 1.3 1.4		BH19 terminated at 0.7 m depth			

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BH20

CLIENT: CoPP
LANDSERV JOB #: M0790
SITE LOCATION: Wattie Watson Oval

OPERATOR: Drillworx
PLANT EQUIPMENT: Hand Auger
BORE DEPTH: 0.7m

DATE: 24/08/2020
LOGGED BY: AR
CHECKED BY: RE

Depth (m)	**Graphic Log**	**Soil Description**	**Sample ID**	**PID**	**Drilling Method**
	▨	FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, some root fibres, moist	BH20/0-0.05	2.2	Hand auger
0.1 0.2	▨	FILL (topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, trace root fibres, moist	BH20/0.15-0.25	2.2	
0.3 0.4	▨	FILL: sandy clay, brown, low to medium plasticity, soft to medium stiff, trace glass, brick, seashells, charcoal and fine to medium angular gravels, moist	BH20/0.4-0.5 ACM (0.4-0.5)	1.9	
0.5 0.6	▨	FILL: sandy clay, grey orange brown, low to medium plasticity, medium stiff, trace charcoal, seashells, fine to coarse angular gravels and cobbles, moist	BH20/0.6-0.7	1.8	
0.7 0.8 0.9 1 1.1 1.2 1.3 1.4		BH20 terminated at 0.7 m depth			

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Landserv
Environment

BH21

CLIENT: CoPP
LANDSERV JOB #: M0790
SITE LOCATION: Wattie Watson Oval

OPERATOR: Drillworx
PLANT EQUIPMENT: Hand Auger
BORE DEPTH: 0.7m

DATE: 24/08/2020
LOGGED BY: AR
CHECKED BY: RE

Depth (m)	**Graphic Log**	**Soil Description**	**Sample ID**	**PID**	**Drilling Method**
	▨	FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, some root fibres, moist to wet	BH21/0-0.05	2.4	Hand auger
0.1 0.2	▨	FILL (topsoil): sandy clay, dark brown, low to medium plasticity, soft, trace root fibres, brick fragments and fine to medium angular and rounded gravels, moist	BH21/0.15-0.25	1.4	
0.3 0.4	▨	FILL: sandy clay, dark brown low to medium plasticity, soft, trace root fibres, fine to medium angular and rounded gravels and brick fragments, moist	BH21/0.4-0.5	2.6	
0.5	▨	FILL: sandy clay, orange brown, low to medium plasticity, soft to medium stiff, trace brick, glass, ceramic and fine to medium angular gravels, moist	BH21/0.5-0.6		
0.6	▨	FILL: sandy clay, orange brown, low to medium plasticity, soft to medium stiff, trace brick, glass, ceramic, charcoal fragments and fine to medium angular gravels, moist	BH21/0.6-0.7	2.1	
0.7 0.8 0.9 1 1.1 1.2 1.3 1.4		BH21 terminated at 0.7 m depth			

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Landserv
Environment

BH22

CLIENT: CoPP
LANDSERV JOB #: M0790
SITE LOCATION: Wattie Watson Oval

OPERATOR: Drillworx
PLANT EQUIPMENT: Hand Auger
BORE DEPTH: 0.7m

DATE: 24/08/2020
LOGGED BY: AR
CHECKED BY: RE

Depth (m)	Graphic Log	Soil Description	Sample ID	PID	Drilling Method
	▨	FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, some root fibres, moist to wet	BH22/0-0.05	1.5	Hand auger
0.1 0.2	▨	FILL (topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, trace root fibres, moist to wet	 BH22/0.15-0.25	1.7	
0.3 0.4 0.5	▨	FILL (topsoil): sandy clay, dark brown, low to medium plasticity, soft, trace fine to medium angular gravels, ceramic and root fibres, moist	 BH22/0.4-0.5	1.3	
0.6	▨	FILL: clayey sand, orange brown, loose, medium to coarse grained sand, trace brick and fine to medium angular gravels, moist			
0.7	▨	FILL: clayey sand, brown, loose, medium to coarse grained sand, trace fine to medium angular gravels, moist	BH22/0.6-0.7	1.6	
0.8 0.9 1 1.1 1.2 1.3 1.4		BH22 terminated at 0.7 m depth			

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BH23

CLIENT: CoPP
LANDSERV JOB #: M0790
SITE LOCATION: Wattie Watson Oval

OPERATOR: Drillworx
PLANT EQUIPMENT: Hand Auger
BORE DEPTH: 0.7m

DATE: 24/08/2020
LOGGED BY: AR
CHECKED BY: RE

Depth (m)	Graphic Log	Soil Description	Sample ID	PID	Drilling Method
	▨	FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, some root fibres, moist to wet	BH23/0-0.05	1.4	Hand auger
0.1	▨	FILL (topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, trace root fibres, moist to wet			
0.2	▨		BH23/0.15-0.25	1.4	
0.3	▨	FILL: sandy clay, brown, low to medium plasticity, soft, trace to some angular gravels, trace brick fragments, glass and charcoal, dry to moist			
0.4	▨		BH23/0.4-0.5	0.7	
0.5	▨				
0.6	▨		BH23/0.6-0.7	1.4	
0.7		BH23 terminated at 0.7 m depth			
0.8					
0.9					
1					
1.1					
1.2					
1.3					
1.4					

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Landserv
Environment

BH24

CLIENT: CoPP
LANDSERV JOB #: M0790
SITE LOCATION: Wattie Watson Oval

OPERATOR: Drillworx
PLANT EQUIPMENT: Hand Auger
BORE DEPTH: 0.7m

DATE: 24/08/2020
LOGGED BY: AR
CHECKED BY: RE

Depth (m)	Graphic Log	Soil Description	Sample ID	PID	Drilling Method
	▨	FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, some root fibres, moist to wet	BH24/0-0.05	1.5	Hand auger
0.1 0.2 0.3	▨	FILL (topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, trace root fibres and brick, moist to wet Note: ACM (cement sheeting approx. 2.5 x 7 cm)	BH24/0.15-0.25 ACM (0.2)	1.5	
0.4 0.5	▨	FILL: sandy clay, dark brown, medium plasticity, soft to medium stiff, trace fine to medium angular gravels, brick and wood, moist	BH24/0.4-0.5	2.0	
0.6 0.7	▨	FILL: clayey sand, light brown, loose, medium to coarse grained sand, trace fine to coarse angular gravels, moist	BH24/0.6-0.7	1.4	
0.8 0.9 1 1.1 1.2 1.3 1.4		BH24 terminated at 0.7 m depth			

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BH25

CLIENT: CoPP
LANDSERV JOB #: M0790
SITE LOCATION: Wattie Watson Oval

OPERATOR: Drillworx
PLANT EQUIPMENT: Hand Auger
BORE DEPTH: 0.7m

DATE: 24/08/2020
LOGGED BY: AR
CHECKED BY: RE

Depth (m)	**Graphic Log**	**Soil Description**	**Sample ID**	**PID**	**Drilling Method**
0.1	▨	FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, some root fibres, moist to wet	BH25/0-0.05	0.8	Hand auger
0.2	▨	FILL (topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, trace root fibres, moist to wet	BH25/0.15-0.25	1.3	
0.3 0.4 0.5	▨	FILL: sandy clay, dark brown, low to medium plasticity, soft, trace root fibres and fine to medium angular gravels, moist	BH25/0.4-0.5 BH525/0.4-0.5 BH625/0.4-0.5	1.3	
0.6	▨	FILL: clayey sand, orange brown, loose, medium to coarse grained sand, trace fine to medium angular gravels, moist	BH25/0.5-0.6		
0.7	▨	FILL: clayey sand, brown, loose, medium to coarse grained sand, trace fine to medium angular gravels, moist	BH25/0.6-0.7	2.0	
0.8 0.9 1 1.1 1.2 1.3 1.4		BH25 terminated at 0.7 m depth			

BH26

CLIENT: CoPP
LANDSERV JOB #: M0790
SITE LOCATION: Wattie Watson Oval

OPERATOR: Drillworx
PLANT EQUIPMENT: Hand Auger
BORE DEPTH: 0.7m

DATE: 24/08/2020
LOGGED BY: AR
CHECKED BY: RE

Depth (m)	Graphic Log	Soil Description	Sample ID	PID	Drilling Method
0.1	▨	FILL (grass and topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, some root fibres, moist to wet	BH26/0-0.05	2.2	Hand auger
0.2	▨	FILL (topsoil): clayey sand, dark brown, loose, medium to coarse grained sand, trace root fibres and fine to medium angular gravels, moist to wet	BH26/0.15-0.25	1.3	
0.3 0.4 0.5	▨	FILL: sandy clay, brown, low to medium plasticity, soft, trace foot fibres, charcoal, brick and fine to medium angular gravels, moist	BH26/0.4-0.5	1.4	
0.6 0.7	▨	FILL: clayey sand, orange brown, loose, medium to coarse grained sand, trace fine to medium angular gravels and brick fragments, moist	BH26/0.6-0.7	0.7	
0.8 0.9 1 1.1 1.2 1.3 1.4		BH26 terminated at 0.7 m depth			

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Appendix C: Site Photographs

Photo 1. SB01, bioaccessibility sample in western portion of Elwood Foreshore, looking north.

Photo 2. SB02, Bioaccessibility sample in western portion of Elwood Foreshore, looking towards eastern portion.

Photo 3. Location SB07, looking north east across Wattie Watson Oval.

Photo 4. Location SB11, looking south across soccer fields.

Photo 5. Soil profile at location SB14 with shallower soils on the left.

Photo 6. Location SB16, looking west toward west portion of the site.

Photo 7. Example of FILL: Silty SAND with gravel and glass fragments at location SB16.

Photo 8. Location SB17, looking west across Wattie Watson Oval.

Photo 9. Location SB23, looking south east toward Head St.

Photo 10. Location SB27, looking north across soccer fields.

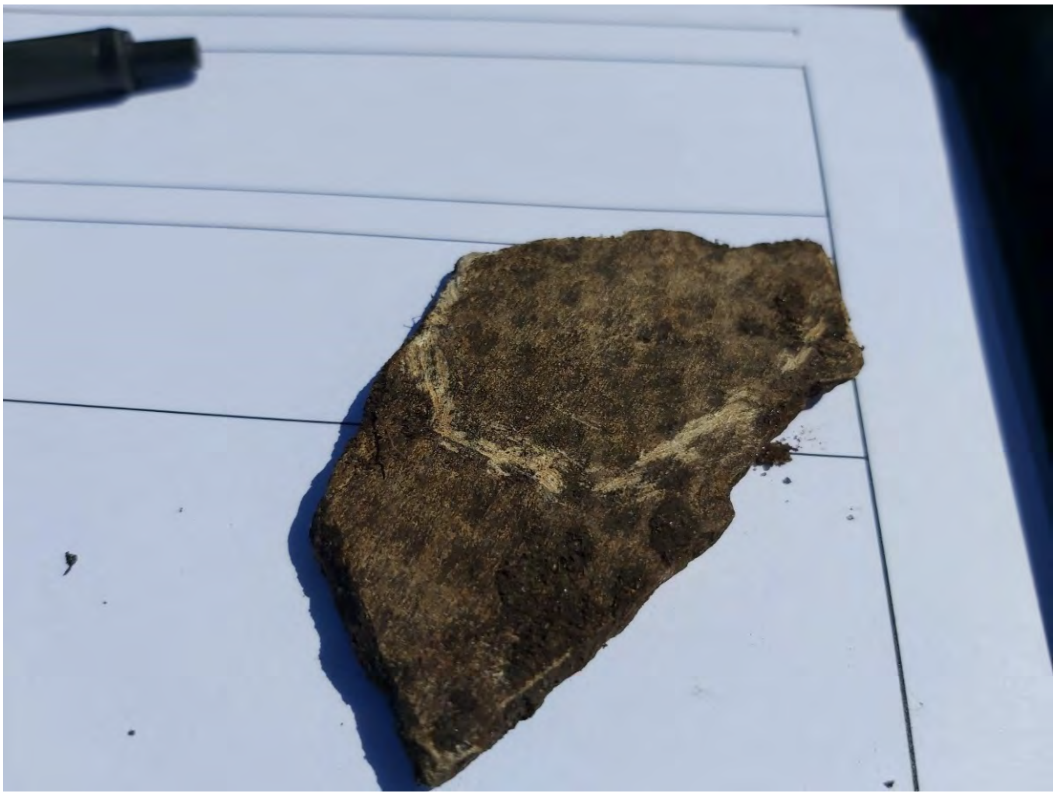

Photo 11. Asbestos cement sheet encountered within borehole SB29.

Photo 12. Location SB30, looking east towards Elwood Croquet Club.

Photo 13. Water encountered in SB33 within the Elwood Croquet Club.

Photo 14. Location SB34 on top of stockpiles from soccer field resurfacing, looking east.

Photo 15. Bioaccessibility sample at location SB38, looking east toward the intersection of St Kilda St and Head St.