

RAMSAY HEALTH CARE LIMITED

REMEDIATION ACTION PLAN

10 HERBERT STREET, ST LEONARDS, NSW

NOVEMBER 2015

REMEDIATION ACTION PLAN

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NSW

Ramsay Health Care Limited

Project no: 2268308A
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QUALITY MANAGEMENT

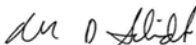
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EXECUTIVE SUMMARY

WSP | Parsons Brinckerhoff (WSP), trading as Parsons Brinckerhoff Australia Pty Ltd was commissioned by Ramsay Health Care Limited to prepare a Remediation Action Plan (RAP) for 10 Herbert Street, St Leonards, NSW (the 'Site').

The preparation of the RAP is a condition of the application for redevelopment of the site to a mental health facility. The objective of the RAP is to comply with the requirements of State Environment Planning Policy No. 55 – Remediation of Land and outline the processes by which the Site can be made suitable for its intended use.

Currently the site consists of two separate commercial buildings, within the western half of the Site and to the eastern boundary. The buildings consist of showrooms, administrations areas, storerooms and a vehicle service centre. External areas consist of access driveways, open air car parking and storage areas.

Previous environmental investigations identified potential sources of contamination that included uncontrolled fill material across the site, fill within former quarry pit, an operational underground storage tank (UST) and fuel bowser, two decommissioned USTs, a wash down bay and an oil store room.

Subsequent investigations were conducted to evaluate the potential sources of contamination. Based on these investigations, the current status of the site is as follows:

- Concentrations of asbestos, total petroleum hydrocarbons (TPH), benzene, toluene, ethyl benzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), volatile organic compound (VOCs), organochlorine pesticides (OCPs) and heavy metals were reported below the laboratory limit of reporting and/or the adopted soil assessment criteria with the exception of benzo(a)pyrene (B(a)P) (commercial/industrial and residential land use). The 95% UCL for this contaminants in fill material was subsequently calculated and reported to be below the adopted soil assessment criteria.
- One existing UST had been removed and the soil validated.
- Two USTs remain on-site and appear to have been decommissioned in place.
- Due to the presence of the current infrastructure, access to soils and fill material below building footprints is limited.
- Asbestos assessment of the Site must be undertaken and an Asbestos Register and Management Plan must be prepared should asbestos or potential asbestos containing materials be identified.

The RAP is designed to provide clear remediation objectives and demonstrate how the site can be made suitable for the proposed use. Specifically, the RAP will document the approach for the removal and validation of USTs and the validation, management and handling of fill material that has been reported across the Site. The RAP scope of works includes the following:

- Removal, disposal and soil validation of two decommissioned USTs.
- Segregation and stockpiling of excavated material on site for waste classification, prior to re-use or off-site disposal to a suitably licenced waste disposal facility.
- Soil validation samples shall be obtained from the excavated areas, analysed for contaminants of potential concern (COPCs) and compared with the adopted validation criteria.
- In locations where site infrastructure is removed, confirmatory validation sampling for COPCs shall be completed in areas where fill material is proposed to remain in-situ.
- The scope of validation sampling shall be developed and documented in a Validation SAQP once plans for the proposed development are finalised.

- Provisions of environmental management and control during remediation works.
- A validation report will be produced documenting the remediation activities at the Site.

The recommended scope of works is considered appropriate to meet stakeholder requirements, minimise human health risks to current and future site occupiers and to render the site suitable for the proposed development.

1

INTRODUCTION

1.1

BACKGROUND

WSP | Parsons Brinckerhoff (WSP), trading as Parsons Brinckerhoff Australia Pty Ltd was commissioned by Ramsay Health Care Limited to prepare a Remediation Action Plan (RAP) for 10 Herbert Street, St Leonards, NSW (the 'Site').

WSP | Parsons Brinckerhoff (then trading as WSP Environmental Pty Ltd) had previously prepared Phase 1 and Phase 2 Contamination Reports for the site (2013). Whilst the previous investigations identified a number of potential sources of Site contamination, sampling and analysis did not identify concentrations of contaminants of potential concern (COPCs) that proposed an unacceptable risk within the context of the Site's proposed commercial / industrial land use.

It is understood that Willoughby Council (Council) has now requested a RAP as part of a development application for the Site's proposed redevelopment into a mental health facility. The objective of the RAP is to comply with the requirements of State Environment Planning Policy No. 55 – Remediation of Land and outline the processes by which the Site can be made suitable for its intended use.

On the basis of our previous findings (2013) and information provided by Council, the RAP is specifically designed to document the approach for the removal and validation of Underground Storage Tanks (USTs) and the management and handling of fill material that has been reported across the Site. This report outlines the proposed remediation strategy, methodology and validation works.

1.2

OBJECTIVES OF THE RAP

The proposed remediation strategy aims to achieve soil quality so that the Site can be deemed suitable for mixed commercial, open space and high density residential land uses.

The key objectives of the RAP are to:

- Comply with the requirements of State Environment Planning Policy No. 55 – Remediation of Land.
- Develop and adopt a remediation strategy which is protective of human health and the environment and will render the site suitable for the proposed development.

1.3

RAP STRUCTURE

The RAP is structured as follows:

- Section 2 – Describes the site characteristics including the site layout and surrounding land uses.
- Section 3 – Describes the site environmental setting including topography, hydrology, soil and geology.

- Section 4 – Presents a summary of previous environmental assessments completed at the site.
- Section 5 – Outlines the current soil and groundwater status, data gaps and areas of concern.
- Section 6 – Outlines the proposed scope of remedial works.
- Section 7 – Outlines the adopted remediation acceptance criteria and proposed sampling and validation program, including Data Quality Objectives (DQO).
- Section 8 – Details the relevant regulatory approvals and licensing requirements for the proposed remediation works.
- Section 9 – Outlines contingency plans for the proposed remediation works.
- Section 10 – Details site operational controls and strategies to address environmental considerations.
- Section 11 – Identifies likely occupational health and safety hazards and considerations.
- Section 12 – Concludes the RAP.
- Section 13 – Outlines the report limitations.
- Section 14 – Lists the references used in compiling the RAP.

2 SITE CHARACTERISTICS

2.1 SITE LOCATION

The site is located at 10 Herbert Street, St Leonards, NSW and is identified as Lot C of DP401303 (refer to Figure 1, **Appendix A**).

2.2 SITE DESCRIPTION

Refer to Table 2.1 for site description details.

Table 2.1 Site description

PARAMETER	SITE DETAILS
Street Address	10 Herbert St, St Leonards, NSW
Lot/DP	Lot C of DP401303
Local Government Area	Willoughby
Zoning	Light industrial
Current Landuse	Commercial / Industrial
Site Area	8,800 m ² (approximate)

2.3 SITE LAYOUT AND ACTIVITIES

At the time of the Site works (WSP, 2013), the Site contained two separate commercial buildings, within the western half of the Site and to the eastern boundary. An open air car park/vehicle holding area separated the two buildings.

The building along the eastern boundary consisted of showrooms and offices to the ground floor and vehicle holding /cleaning area to the lower ground floor. It is understood that this building had been originally constructed between 1956 and 1965 but has been extensively refurbished and extended circa 2008.

The building within the western half of the Site consisted of showrooms and offices, a vehicle service centre, storerooms, wash down bay and undercover access driveway to the centre open air car park.

The Site was bound by Herbert Street to the east, Frederick Street to the north and commercial/industrial properties to the west and south. The site layout is shown in Figure 2, **Appendix A**.

2.4 SURROUNDING LAND USES

According to WSP (2013), the site is surrounded by the following land uses:

- **North:** Frederick Street followed by commercial properties
- **East:** Herbert Street followed by commercial properties
- **South:** Commercial/industrial properties
- **West:** Commercial/industrial properties

3 ENVIRONMENTAL SETTING

3.1 TOPOGRAPHY

Based on a review of local topographical maps and Site observations, the general topography of the Site was found to be relatively flat. This is likely attributed to significant excavations having been undertaken within the eastern half of the Site. The natural topography of the surrounding area was noted to be between 79 meters Australian Height Datum (mAHD) to the western half of the site and 83 mAHD to the northern boundary. The surrounding area was considered to have a slight gradient to the north and north-east.

3.2 HYDROLOGY

Through observation of the NSW Land and Property Information Spatial information Exchange database, the nearest surface water receptor is Lane Cove River, located approximately 1,500m south of the Site.

3.3 SOILS AND GEOLOGY

Based on a review of the Geological Survey NSW (1983) Sydney 1:100,000 Geological sheet 9130, the Site is located over Triassic aged Ashfield Shale, consisting of black to dark grey shale and laminate, which in turn overlies Triassic aged Hawkesbury Sandstone consisting of medium to coarse grained quartz sandstone, very minor shale and laminite lenses.

The Australian Soil Resource Information System (ASRIS) and CSIRO Australia (www.asris.csiro.au), consider that the general soil type of the Site is comprised of Kandosol soils. Kandosols are generally described as having a moderate chemical fertility and water holding capacity.

In addition, a review of the ASRIS - Acid Sulphate Risk map identified that the Site is located within an area of extremely low probability of acid sulphate soil (ASS) occurrence.

The soil lithology encountered during intrusive investigations (WSP, 2013b) identified material comprising of clayey fill to a maximum encountered depth of 3.0 mbgl and fill was underlain by natural shale which was generally encountered at depths of 0.2 - 0.3 metres below ground level (mbgl) across the Site.

3.4 HYDROGEOLOGY

A search of the NSW Natural Resource Atlas website (<http://www.nratlas.nsw.gov.au>) conducted by WSP (2013) identified two groundwater bores of relevance within a 1 km radius of the Site.

The groundwater bores identified indicated that the geology in the vicinity of the Site would consist of clay and sandy clay to approximately 4 meters below ground level (mbgl), followed by relatively deep sandstone bedrock to 25 mbgl (approximately) and shale and sandstone lenses to 35 mbgl (approximately). Both groundwater bores recorded water bearing zones from 29 to 32 mbgl (approx.). On the basis of this information, groundwater beneath the Site is expected to be encountered at depths greater than 20 mbgl.

4

PREVIOUS INVESTIGATIONS

4.1

TANKNOLOGY AUSTRALIA (2011) – VACUTECT TANK & LINE CONDITION REPORT, NORTH SHORE AUTO GROUP

The following summaries general observations and findings made by Tanknology as presented in their report (2011):

- A test was conducted in association within one 22,500 litre underground tank containing unleaded fuel (Note: WSP assumed this to be the tank located adjacent to the western Site boundary).
- The tank showed no signs of air or water ingress or excessive vacuum decay and no audible faults were detected.
- The tank tested tight.
- The Precision Tank Test used during the assessment exceeded the U.S. EPA required leak detection criteria of 0.38 Litres Per Hour (LPH).
- Unleaded suction line #1 off tank #1 passed hydrostatic pressure testing with a Final Leak Rate of -0.026 litres per hour.

No recommendations were put forward within the report.

4.2

WSP (2013A) – PHASE 1 ENVIRONMENTAL DUE DILIGENCE

WSP was engaged by Napier & Blakeley Pty Ltd to conduct a Phase 1 Environmental Due Diligence (EDD) Assessment of the Site.

Findings and observations of the Phase I EDD Assessment are summarised below.

- The Site was occupied by two commercial buildings, consisting of showrooms, administrations areas, storerooms and a vehicle service centre. External areas consisted of access driveways, open air car parking and storage areas.
- The Site has historically been used for residential and industrial purposes, including a former quarry with the south western corner of the Site associated with a brick and tile manufacturer.
- The Site was redeveloped between 1956 and 1965 to include the majority of the current Site buildings and layout, however extensive refurbishment works have been undertaken since this time.
- Historical and current surrounding landuse has included commercial/industrial facilities, including the former quarry with regards to the brick and tile manufacturer.
- The following potential sources of contamination were identified at the Site:
 - Uncontrolled filling associated with former quarrying within the south-western portion of the Site.
 - A UST and fuel bowser (including adjacent pit) located adjacent to the western boundary of the Site.

- A potential UST to the centre of the northern boundary along Frederick Street.
- A wash down bay.
- The oil store room.
- No significant issues were identified in relation to general environmental compliance issues including waste management, emissions to air or environmental noise.

WSP considered that the Site represented a moderate risk of environmental liability for the continued commercial/industrial use of the Site and any future Site redevelopment works. WSP recommend that a targeted investigation be undertaken in relation to the environmental issues noted above to document the potential contamination status of the Site.

- In regards to asbestos containing materials, the following areas of concern were identified:
 - It was reported that the Site does not have a current Asbestos or Hazardous Materials Register.
 - Potential asbestos containing materials identified during the inspection included (note that no samples were obtained):
 - Window mastic to eastern wall of vehicle maintenance workshop.
 - Old brake pads stored within external south western corner.
 - Vinyl floor tiles within Vehicle Maintenance Workshop lunch room.
 - Toilet partition within male amenities of Vehicle Maintenance Workshop.
 - Gaskets to pre-2003 constructed/manufactured pipe work and machinery.
- The various potential asbestos containing materials identified throughout the Site were not considered to pose a significant risk to site workers in their current state, however, as the majority of the Site buildings were constructed prior to 2004. It was recommended that Asbestos Assessment of the Site must be undertaken and an Asbestos Register and Management Plan must be prepared should asbestos or potential asbestos containing materials be identified. It was highlighted that this is the responsibility of the person with management or control of the workplace and is a requirement under the NSW Work Health and Safety Act 2011 and associated Regulation (2011).

4.3 WSP (2013B) – PHASE 2 ENVIRONMENTAL SITE ASSESSMENT

WSP completed a Phase 2 Environmental Site Assessment (ESA) of the Site in September 2013.

The overarching objective of the Phase 2 ESA was to document the environmental status of the site so that any ongoing liabilities and environmental impediments to a proposed property acquisition and potential property redevelopment could be clearly understood.

Findings and observations of this investigation are summarised below:

- A total of 17 borehole locations across the Site were investigated which provided general site coverage and targeted previously identified areas of potential environmental concern (including USTs, fill material and workshops/maintenance areas).
- A layer of concrete between approximately 0.11 – 0.25m thick was encountered at all borehole locations. Underlying fill comprised clayey fill to a maximum encountered depth of 3.0mbgl and fill was underlain by natural shale which was generally encountered at depths of 0.2 - 0.3 metres below ground level (mbgl) across the Site.

- One operational UST was identified in the western portion of the Site. Signage on surrounding infrastructure, including bowsters, suggested the UST contained unleaded petroleum (ULP).
- Evidence of two non-operational USTs was identified in the northern portion of the Site, adjacent Frederick Street. The location of one potential UST was identified by visual evidence of concrete cutting and replacement, in addition to a ground penetrating radar (GPR) confirmed a sub-surface anomaly indicative of back-fill material. No fill or dip points were observed. The second potential UST was identified by the observation of a potential fill/dip point that had been concreted shut. A GPR scan confirmed a sub-surface anomaly which may indicate the UST was decommissioned in-situ or historically removed and back-filled.
- The decommissioning status of the two non-operational USTs was unknown, it was noted that no aboveground infrastructure was observed at the Site and evidence suggested that previous works have been completed in the vicinity, therefore, it was considered reasonable to conclude that the USTs had been decommissioned in-situ.
- Whilst removal of USTs in accordance with the *Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2008* is considered best practice, WSP noted that it was likely that the USTs were decommissioned prior to introduction of the Regulation. Targeted soil boreholes were drilled in the vicinity of each non-operational UST and each borehole refused on hard, natural shale and did not identify any contamination which was considered to pose an unacceptable risk. On the basis of this information, WSP considered that obligations with respect to the non-operational USTs had been met and that the USTs did not pose an unacceptable risk for ongoing commercial/industrial use of the Site.
- Concentrations of asbestos, total petroleum hydrocarbons (TPH), benzene, toluene, ethyl benzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), volatile organic compound (VOCs), organochlorine pesticides (OCPs) and heavy metals were reported below the laboratory limit of reporting and/or the adopted soil assessment criteria with the exception of benzo(a)pyrene (B(a)P) (commercial/industrial and residential land use). The 95% UCL calculation for this contaminant in fill material was subsequently calculated and reported to be below the adopted soil assessment criteria.
- An assessment of site specific risks associated with potential petroleum hydrocarbon contamination was also completed and those risks are considered to be acceptable.
- WSP considered the potential risk to human health and the environment to be low and that the site was suitable for on-going commercial/industrial land use.
- WSP also considered that the site was likely to be suitable for residential landuse with accessible soils or limited access to soils. WSP recommended that a further assessment of site specific risks be completed once the proposed use and site layout for this land use scenario was developed. It was also recommended that all USTs be removed prior to Site redevelopment for residential use.
- During proposed future redevelopment works, if any material requires excavation and off-site disposal, it was considered likely that the material would be classified as General Solid Waste. On the basis of data collected to date further testing, including TCLP analysis, would likely to be required to support this conclusion.

4.4 GREENCAP | NAA (2015) – UNDERGROUND PETROLEUM STORAGE SYSTEM VALIDATION

Greencap-NAA was engaged by The Trust Company (Australia) Limited as Custodian for the AREEP 2 Industrial Trust 1 to undertake validation sampling of an excavation pit following removal of an underground petroleum storage system tank (UPSS) at the Site.

CPA Contracting Pty Ltd was engaged to undertake removal, decommissioning and off-site disposal of the UPSS which was completed on 29 September 2015.

Preparation of a validation report was required to demonstrate that the UPSS had been lawfully removed and disposed of and the surrounding soil was remediated and validated. In addition to completing the validation sampling and preparing the validation report Greencap-NAA were engaged to appropriately assess and manage the excavated material and backfilling of the excavation.

Findings and observations of this investigation are summarised below:

- Concentrations of COPCs (total recoverable hydrocarbons (TRH), BTEX, PAHs and lead) were below the adopted assessment criteria in all validation samples collected from the former UPSS excavation.
- It was considered that soils around the former UPSS are suitable for commercial/industrial use, with no further investigation and/or remediation required in this area of the Site.
- Laboratory analytical results for the soil used to backfill the excavation met the adopted assessment criteria, therefore, the material was considered suitable for re-use on-site. Additional quarry sourced imported crushed sandstone, classified as virgin excavated natural material (VENM) was used to backfill the remainder of the excavation.
- The UPSS tank (20,000L) was decommissioned and lawfully removed and destroyed off-site.
- A portion of soil excavated from the UPSS fuel line trench was sampled for analysis and contained low concentrations of TRH and PAHs. BTEX compounds and TRH (C₆-C₉) hydrocarbons were not detected. This material was assessed against adopted assessment criteria and was considered suitable for re-use on-site.

5

SITE CHARACTERISATION

The environmental status of the site has been characterised based on a historical review and soil samples collected as part of the previous investigations (WSP, 2013a, WSP, 2013b and Greencap-NAA, 2015). Samples have been obtained from a total of seventeen (17) investigation locations, ten (10) validation locations and one (1) stockpile, (Figure 3, **Appendix A**). Soil analytical results from the investigations are presented in **Appendix B**.

A layer of concrete between approximately 0.11 – 0.25m thick was encountered at all borehole locations. Underlying fill material comprised sandy and clayey fill to maximum encountered depth of 3.0mbgl and fill was underlain by natural shale which was generally encountered at depths of 0.2 – 0.3 mbgl across the Site.

Natural shale was encountered at greater depth (1 – 3 mbgl) in BH1, BH2 and BH3 which is consistent with historical cutting from west to east to level the Site. Shale was also encountered at greater depth (1.1 – 1.2 mbgl) in BH9 and BH10 which may be associated with previous UST installation.

No visual or olfactory signs of contamination were identified within the soil profile, with the following exceptions:

- Brick (BH1), ash (BH3) and tile (BH3) was encountered within shallow fill.
- A hydrocarbon odour was observed in BH9 at 1.2 mbgl which was supported by PID readings.

The maximum recorded PID concentration was 6.4ppm at BH9 at 1.1 mbgl. Soil sample BH9_1.1 was submitted for laboratory analysis with concentrations of TPH (C₁₀-C₁₆; F2), 160 mg/kg being above the adopted ESL criteria of 120 mg/kg (Coarse – Urban Residential).

Soil samples taken from fill material at locations BH1 and BH15 were also submitted for laboratory analysis (which did not include metals) to assess the potential impact of construction materials identified in the fill. However, a soil sample from a greater depth at BH3 (ash observed) was analysed to assess potential impacts associated with the adjacent UST. Concentrations of B(a)P in soil sample BH1_0.9 (0.91 mg/kg) was above the adopted ESL criteria of 0.7 mg/kg (Coarse – Urban Residential).

Concentrations of B(a)P in soil sample BH6_0.18 (0.75 mg/kg) was above the adopted ESL criteria of 0.7 mg/kg (Coarse – Urban Residential).

Concentrations of TPH (C₁₆-C₃₄; F3) in soil samples BH4_0.15 (500 mg/kg) and BH5_0.2 (1,100 mg/kg) were reported above the adopted ESL criteria of 300 mg/kg (Coarse – Urban Residential).

The maximum concentrations reported for each TPH fraction are below the individual HSL-A/B guidelines which indicates that residual hydrocarbon contamination in soils are unlikely to present an unacceptable vapour intrusion risk to human health under commercial/industrial and residential landuse scenarios.

The data gaps with respect to the environmental site characterisation is presented in Table 4.

Table 5.1 Summary of data gaps

Item	Description
Two non-operational USTs	The decommissioning status of the two non-operational USTs was unknown. It was noted that no aboveground infrastructure was observed at the Site and evidence suggested that previous works have been completed in the vicinity, therefore, it was considered reasonable to conclude that the USTs had been decommissioned in-situ. Potential soil contamination in these areas (both laterally and vertically) is unknown.
Fill material across the site and under building footprints	The movement of fill material during redevelopment may uncover COPCs in soil due to uncontrolled fill material having been placed across the site. Heavy metals, asbestos and PAH concentrations in site soils (fill) may present a risk to human health and the environment.

Based on the assessment of human health risk, the consideration of ecological risk (noting the Site is located within a commercial/industrial area) and the potential for off-site migration, all ecological exposure pathways were considered to be absent as part of the Phase 2 ESA. Subsequently, ESLs for petroleum hydrocarbons (including B(a)P) are not considered relevant in the context of this site and above mentioned exceedances are not considered to preclude ongoing use of the site.

Although not encountered in samples analysed to date, based on the heterogeneous nature of filling across the site, fill material has the potential to containing Asbestos Containing Materials (ACM).

A search of the NSW Natural Resource Atlas website (<http://www.nratlas.nsw.gov.au>) identified two groundwater bores within a 1 km radius of the Site. These groundwater bores recorded water bearing zones from 29 to 32 mbgl (approx.). Therefore, groundwater beneath the Site is expected to be encountered at depths greater than 20 mbgl, representing a low groundwater migration potential.

6

SCOPE OF REMEDIATION

To remediate the site to achieve the overall project objectives, an outline of the key steps is provided below:

1. Project preliminaries, including notification and permitting;
2. Site preparation, including site set-up site amenities, establishment of environmental controls;
3. Removal of existing USTs and soil validation;
4. Demolition of above ground infrastructure, including hazardous material removal
5. Soil validation of fill material across the site;
6. Site reinstatement;
7. Reporting

6.1 PRELIMINARIES

In accordance with SEPP55, notification of the proposed Category 2 remediation works is required to be submitted to Council a minimum of 30 days prior to the commencement of site works (refer to Section 8.1). Copies of the investigation reports and RAP shall also be provided to Council.

At least 14 days prior to the commencement of the proposed remediation works, Council shall be provided with contact details for the remediation contractor.

Alternatively, the remediation works may be incorporated into the overarching development approval for the site redevelopment.

Underground services shall be located and protected prior to commencing excavation works at the site.

As site structures will be demolished as part of the proposed development, on-site pre-works dilapidation surveys are not considered necessary for the remediation works. The need for dilapidation surveys at adjacent sites should be considered within the overall context of the site redevelopment.

6.2 SAFETY AND ENVIRONMENTAL CONTROLS

Prior to remedial works, safety and environmental controls shall be established in accordance with approved safety and environmental management plans. Safety and environmental controls are likely to include:

- Safety barriers surrounding work areas (excavations in particular).
- Dust and sediment controls.
- Noise controls

- Traffic management

6.3 DEMOLITION WORKS

Demolition works should be undertaken in accordance with National Australian Codes of Practice and Guidelines, in particular Demolition Work 2011, AS2601-2001 (The demolition of structures) and American Petroleum institute (API) Recommended Practices 1604 Closure of Underground Petroleum Storage Tanks. All demolition works should be undertaken by licensed contractors, experienced in the decommissioning and removal of fuel infrastructure and the remediation of contaminated soils

Removal of USTs

Two USTs have been identified along the north property boundary near the middle of the Site. It is understood that these USTs have been decommissioned in place, however, no information is available to document the methods of decommissioning.

As a minimum, the USTs should be removed following Codes of Practice applicable to the works. Standards should be the most recent version available unless otherwise specified:

- AS 4976:200 - The removal of underground storage tanks.
- AS 1940 Section 9 - The storage and handling of flammable and combustible liquids.

A licensed contractor should be engaged and shall submit written procedures to complete the following activities outlined below:

- Draining pipes and pumping out tanks.
- Removal of pipework.
- Removal of tank from ground.
- Labelling of tanks.
- Transporting of tanks.
- Tank destruction.

If the USTs have been previously decommissioned and all liquids have been removed, the removal of the USTs will require the following

- Remove all vent caps from all tank vent risers.
- Remove and demolish concrete tank anchors.
- A crane will be required for the removal of the tanks. After lifting the tank from the excavation, a visual inspection of the tank should be made for evidence of a release and overall condition of the tank and document the results of the inspection.
- The UST's should be removed from the ground with due care to avoid to extent possible rupturing the tank by the excavation equipment.
- The tank will be loaded directly onto a flatbed truck and disposed of at an approved disposal facility off-site.
- All piping and electrical wiring associated with the tank will be removed and disposed of directly into 10 cubic meter truck and disposed of off-site.

The USTs being removed offsite shall be disposed of to an appropriately licensed facility and records of truck/load movements, tipping dockets and landfill licences will be provided in the Validation Report.

An Environmental Scientist should be present during the UST removal works, particularly to assess the contamination status of the soil excavated from around the tanks, and to determine whether further excavation of tank pit walls and floor is required to remove heavily contaminated soil.

Following the tank removal and subsequent excavation, soil samples will be collected from the walls and floor of the excavation. All soil samples will be screened in the field using a handheld photo ionisation detector (PID) to measure indicative concentrations of volatile organic compounds (VOC). Samples will be analysed for the contaminants of potential concern that include TRH, BTEXN, PAHs and metals.

The tank pit characterisation will be undertaken in accordance with the NSW EPA (2014) Technical Note: Investigation of Service Station Sites. Section 2.6 of this technical note states that:

Where a UST is removed, as a guide, sampling should be one sample from beneath the centre of the UST if tank length is less than 4 m and at least one sample from each of the four walls. If the tank is 4–10 m long, at least two samples from each of the four walls and under each end. If the tank is longer than 10 m, at least three samples from each of the four walls and under each end are taken. This applies to each tank in the same tank pit. (Page 11)

The locations of the tanks requiring removal are presented in Figure 3, **Appendix A**.

6.4 MANAGEMENT OF POTENTIALLY IMPACTED SOILS AND VALIDATION

It is anticipated that fill material will be excavated as part of the redevelopment works. Material that is excavated or removed below hard stand areas should be evaluated for waste classification.

To minimise the potential for re-contaminating excavated areas, excavation works shall be staged and where feasible, excavation shall commence at the end of the marked excavation zone which is furthest from the dedicated stockpile area, with the work site retreating toward the stockpile area as works progress.

6.5 MATERIALS SEGREGATION AND STOCKPILING

Excavated material shall be directly loaded in to haulage vehicles (Bogies or similar) for transport to a dedicated stockpiling area. All material transport shall be completed within the site boundaries.

Using field screening techniques (visual, olfactory, PID screening), WSP will direct the stockpiling of excavated material into discrete stockpiles. Excavated material shall be segregated and stockpiled into discrete stockpiles to facilitate waste classification and reuse assessment of fill materials.

The stockpiles shall:

- be placed away from drainage lines, gutters and stormwater pits/inlets;
- be covered and secured;
- be placed on a level area as a low, elongated mound.

6.6 OFF-SITE REMOVAL OF CONTAMINATED SOIL

Material shall be managed, transported and reused on-site or disposed offsite in accordance with the waste classification (Section 7.12).

All material being removed offsite will be disposed of to an appropriately licensed facility and records of truck/load movements, tipping dockets and landfill licences will be provided in the Validation Report.

Where 'clean' material is excavated and stockpiled from the remediation areas, consideration may be given to reusing the material on site. Fill material must meet the site validation criteria (Section 8.11) to be considered suitable for reuse.

6.7 SOIL VALIDATION

Validation sampling and analyses of excavations shall be conducted in accordance with the Validation Plan (Section 7). If validation objectives are not achieved, additional excavation and disposal works may be required in accordance with Sections 6.4–6.6.

In accordance with the provisions of SEPP55, if the works are undertaken as 'Category 2', Council shall be notified of validation within one month of completion of remediation work.

6.8 SITE REINSTATEMENT

The excavations shall be reinstated to a condition which facilitates the proposed development works. Where required, excavations shall be backfilled (after successful soil validation) using validated VENM, ENM imported to the site or validated on-site fill. The backfill material shall be compatible with the existing soil characteristics for site drainage purposes. Council (or the alternative consent authority) shall be consulted regarding approvals related to the importation of ENM.

6.9 SITE DEMOBILISATION

On completion of the remediation works all plant/equipment and safety/environmental controls shall be removed from the site.

6.10 REMEDIATION SCHEDULE

The timing of the remedial program will be dependent on the overall development program and scheduling.

7

VALIDATION PLAN

A detailed Validation Sampling, Analysis and Quality Plan (SAQP) shall be prepared for the remediation and validation works following finalisation of site development plans and integration of the remediation scope.

7.1 DATA QUALITY OBJECTIVES (DQOS)

The data quality objectives (DQO) process is a systematic planning tool based on the scientific method for establishing criteria for data quality and for developing data collection designs. The data quality objectives define the experimental process required to test a hypothesis. The DQO process was developed to ensure that efforts relating to data collection are cost effective, by eliminating unnecessary, duplicative or overly precise data whilst at the same time, ensuring the data collected is of sufficient quality and quantity to support defensible decision making.

It is recognised that the most efficient way to accomplish these goals is to establish criteria for defensible decision making before the data collection begins, and then develop a data collection design based on these criteria. By using the DQO process to plan the investigation, the relevant parties can improve the effectiveness, efficiency and defensibility of a decision in a resource and cost effective manner.

The DQO process consists of seven steps, which are designed to clarify the study objectives, define the appropriate type of data and specify tolerable levels of potential decision errors. The seven-step DQO process that will be adopted for the remedial works will be as follows:

- Step 1 – Defining the Problem. The first step in the DQO process is to ‘define the problem’ that has initiated remedial works.
- Step 2 – Identify the Decision. The second step in the process is to define the decision statement that the works will attempt to resolve.
- Step 3 – Identify Inputs to the Decision. In this step, the different types of information needed to resolve the decision statement are identified.
- Step 4 – Define the Study Boundaries.
- Step 5 – Develop a Decision Rule.
- Step 6 – Specify Limits on Decision Errors.
- Step 7 – Optimise the Design for Obtaining the Data.

7.2 DEFINE THE PROBLEM

The problem under consideration is that the Site contains two decommissioned USTs and uncontrolled fill material. COPCs such as TRH and BTEX may be present below the USTs. Heavy metals, asbestos and PAH concentrations in site soils (fill) may present a risk to human health and the environment.

Where fill material is proposed for excavation, appropriate materials handling and validation is required. Where fill material is proposed to remain at the site, the quality of fill material will require confirmatory validation (due to the limited intrusive investigations completed at the site, particularly beneath warehouse footprints).

7.3 IDENTIFY THE DECISION

The principle decision is *'is the site suitable for its intended mixed commercial, open space and residential uses'* (following remediation and validation).

Requirements of the adopted remediation and validation works must include:

- No unacceptable on or off-site impacts during and after remedial works.
- Provisions to verify that the remedial actions are adequate and will not result in on or off-site impacts (i.e. validation).

7.4 IDENTIFY THE INPUTS TO THE DECISION

The inputs to the decision are as follows:

- Assessment data gathered for the site to date – Site contains two decommissioned USTs and uncontrolled fill material. Validation of these soils is required to eliminate and potential risks to human health and/or the environment.
- Remedial action preferences – The most practicable remedial action has been adopted.
- Materials tracking documentation, including stockpiling, vehicle movements and waste disposal documentation.
- Validation data obtained during the remediation works program, including validated excavations and confirmatory validation of fill materials which will remain at the site.

7.5 DEFINE THE BOUNDARIES OF THE STUDY

The site boundary is shown in Figure 2, **Appendix A** and the identified remediation area(s) is shown in Figure 3, **Appendix A**.

7.6 DEVELOP A DECISION RULE

Based on the available site assessment information and in accordance with DEC (2006), elements of the decision rule can be established as follows:

- Have the identified USTs been removed from the site?
- Have fill materials which will remain at the site been adequately validated?
- Have remedial works adequately reduced the overall risk of the site?
- Is the site rendered suitable for the proposed use?
- Have aesthetic issues been addressed?
- Has validation been reported in accordance with OEH (2011)?

Validation sampling is required to demonstrate that the impacted areas have been remediated/fill materials remaining in-situ have been validated as suitable for the proposed mixed commercial, open space and high density residential land use.

As the site is proposed for mixed commercial, open space and high density residential uses, the National Environment Protection Measure, as amended (2013), HIL – B criteria for low density residential have been adopted as the Validation Criteria.

Any soil imported to the site will be obtained from reputable suppliers and will comprise Virgin Excavated Natural Material (VENM) or Excavated Natural Material (ENM) where appropriate characterisation of the source material has occurred in accordance with the published NSW EPA General Waste Exemption for ENM.

It is intended that site soils be validated to the adopted Validation Criteria to ensure that:

- the remedial works adequately reduce the overall risk of the site; and
- the site be rendered suitable for the proposed landuse.

7.7 SPECIFY TOLERABLE LIMITS ON DECISION ERRORS

Quality Assurance and Quality Control (QA/QC) protocols in accordance with NEPM (2013) guidelines will be applied to the remediation and validation works.

The acceptable limits for data QA are outlined in Section 8.14 (QA/QC).

7.8 OPTIMISE THE DESIGN OF OBTAINING DATA

The purpose of this step is to identify a resource-effective data collection design for generating data to meet the project objectives. This will be achieved by the proposed Sampling and Analysis program for the validation of the excavations at the site, including the number of sample locations, media to be sampled, number of samples retained for analysis, analytical suite and method of sample collection.

7.9 SOIL VALIDATION METHODOLOGY – EXCAVATIONS

Validation sampling will be completed on an approximate 10 m x 10 m grid across the base of any excavation. Soil samples will also be obtained at 10 m intervals along each excavation wall. For excavations greater than 1 m depth, two wall samples shall be obtained per location (shallow and deep). Where remediation areas are smaller than 100 m², validation samples shall be collected from the walls and base of the excavation.

Excavation soil samples will be analysed for heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), PAHs, TRH/BTEX and asbestos. Heavy metals and PAHs are the primary contaminants of concern for the site, elevated concentrations of TRH and BTEX have previously been reported at BH08 and/or DP-BH1 and asbestos has been identified as a potential contaminant of concern within fill material.

Soil samples will be collected from the excavator bucket or directly from the excavation surface by using a stainless steel trowel or hand with nitrile gloves.

Where samples are collected from the excavator bucket, the sample will be obtained from the centre of the bucket to minimise the potential for cross-contamination and to ensure a representative sample is obtained.

If a hand trowel is used for collecting soil validation samples, the equipment shall be rinsed with de-ionised water and phosphate free detergent (Decon 90) between sampling locations. In order to maintain sample integrity, new nitrile gloves will be used to collect each sample.

All sample containers will be clearly labelled with a sample number, sample location, sample depth, sample date and samplers initials. The sample containers will then be transferred into an Esky for shipment to the testing laboratory for analysis. A chain-of-custody (COC) form will be completed, and forwarded with the samples to the testing laboratory. Sample analysis is to be conducted NATA accredited laboratory in accordance with NATA approved methods.

7.10 SOIL VALIDATION METHODOLOGY – IN-SITU FILL MATERIAL

Although the proposed development will result in bulk excavation for basement car park construction across approximately 75% of the site, some fill materials will remain in-situ.

Due to the limited nature of previous intrusive investigations at the site, particularly within the building footprints, the sampling density for soil to remain at the site is not considered to be sufficient to adequately identify potential hotspots of a 'reasonable' size. Confirmatory validation sampling shall be completed in areas where fill material is proposed to remain in-situ.

The scope of the confirmatory validation sampling shall be developed and documented in a Validation SAQP once plans for the proposed development are finalised. The Validation SAQP is required to include:

- Data Quality Objectives
- Grid-based sampling with a validation sample density based on the requirements of NSW EPA (1995) Sampling Design Guidelines. Data evaluation shall consider the existing data for fill material remaining in-situ.
- Validation Criteria as per Section 7.11 and based on the most sensitive land use for the site.
- Analytical suite based on Section 7.9 and including heavy metals, PAHs, TRH/BTEX and asbestos.
- Where fill material remaining at the site does not meet validation criteria, remediation will be required in consultation with the Site Auditor and in accordance with Section 7 of the RAP.
- The results of any additional validation sampling and remediation works shall be included in the Validation Report (Section 7.15).

7.11 SOIL VALIDATION CRITERIA

Based on the findings of the previous investigations, Validation Criteria (VC) are required for heavy metals, PAH, TRH, BTEX and asbestos.

As the site is proposed for mixed commercial, open space and high density residential uses, the most conservative land use criteria has been adopted as the VC – the National Environment Protection Measure, as amended (2013) HIL – B (low density residential)) and HSL A & B for sand (low- high density residential).

The adopted HIL VC are summarised in

Table 7.1 and the adopted HSL VC are summarised in Table 7.2.

Table 7.1 Validation criteria

PARAMETER	GUIDELINE (MG/KG)	SOURCE
Metals		
Arsenic	500	NEPM (2013) HIL 'B'
Cadmium	150	NEPM (2013) HIL 'B'
Chromium (VI)	500	NEPM (2013) HIL 'B'
Copper	30,000	NEPM (2013) HIL 'B'
Lead	1,200	NEPM (2013) HIL 'B'
Nickel	1,200	NEPM (2013) HIL 'B'
Zinc	60,000	NEPM (2013) HIL 'B'
Mercury	120	NEPM (2013) HIL 'B'
PAHs		
Total PAHs	400	NEPM (2013) HIL 'B'
BaP TEQ	4	NEPM (2013) HIL 'B'
Asbestos	Nil detected	-

Table 7.2 Validation criteria

PARAMETER	HSL A & HSL B 0 - <1 M BGL GUIDELINE (MG/KG)	HSL A & HSL B 1 - <2 M BGL GUIDELINE (MG/KG)	HSL A & HSL B 2 - <4 M BGL GUIDELINE (MG/KG)	SOURCE
Total Petroleum Hydrocarbons (TRH)				
TRH F1	45	70	110	NEPM (2013) HSL 'A&B'
TRH F2	110	240	440	NEPM (2013) HSL 'A&B'
BTEX				
Benzene	0.5	0.5	0.5	NEPM (2013) HSL 'A&B'
Toluene	160	220	310	NEPM (2013) HSL 'A&B'
Ethylbenzene	55	NL	NL	NEPM (2013) HSL 'A&B'
Total Xylenes	40	60	95	NEPM (2013) HSL 'A&B'

PARAMETER	HSL A & HSL B 0 - <1 M BGL GUIDELINE (MG/KG)	HSL A & HSL B 1 - <2 M BGL GUIDELINE (MG/KG)	HSL A & HSL B 2 - <4 M BGL GUIDELINE (MG/KG)	SOURCE
Asbestos (bonded)		0.01%		NEPM (2013) HSL 'A'
Asbestos (friable)		0.001%		NEPM (2013) HSL 'A'
Asbestos (all forms)	No visible asbestos for surface soil			NEPM (2013) HSL 'A'

Although some of the of the proposed residential landuse areas do not include 'fully and permanent paving' (as assumed under the HIL – B (residential with minimal access to soils) scenario, the adoption of HIL-B criteria is considered to be appropriate given the nature of the proposed development (aged care facility).

Surface soils (less than 300 mm depth) in areas of residential and open space land use shall also be free from rubble (including bricks, glass and tiles), stained soils and odour such that they are deemed aesthetically suitable for the proposed uses.

The data obtained from the validation program will not be analysed statistically. If an excavation validation sample fails the clean-up criteria, further excavation and subsequent validation of the impacted area will be required.

7.12 STOCKPILE SAMPLING – WASTE CLASSIFICATION

Soil samples shall be obtained from each stockpile at a ratio of 1 sample per 100 m³ to assist with a reuse assessment and/or waste classification. For homogenous stockpiles with a volume greater than 1,000 m³, 1 sample shall be obtained per 250 m³.

Soil samples will be analysed for heavy metals, PAH, TRH and BTEX. Toxicity criteria leaching potential (TCLP) analysis may be required to assist waste classification where off-site disposal of soils is required.

7.13 IMPORTED FILL

Where required, excavations shall be backfilled (after successful soil validation) using validated VENM or ENM imported to the site. The source site should be inspected to confirm suitability of the material.

If the imported fill requires testing to validate it as VENM, samples will require analysis for heavy metals, TRH, BTEX, PAH, OCP, PCB and asbestos. VENM shall be considered suitable for reuse on site where:

- Heavy metals (M8) concentrations are less than representative background concentrations expected for the material.
- TRH, BTEX, PAH, OCP, PCB concentrations are less than the laboratory limit of reporting.
- Asbestos = non-detect.

A minimum of two samples of imported fill will be analysed (per source site). If more than 1,000 m³ is imported to the site, one additional sample shall be obtained per 1,000 m³.

If ENM is to be used to backfill the excavations, the material will be tested in accordance with the NSW EPA General Waste Exemption for Excavated Natural Material, 2014.

7.14 QUALITY ASSURANCE/QUALITY CONTROL

The pre-determined Data Quality Indicators (DQIs) established for the project in relation to precision, accuracy, representativeness, comparability and completeness are presented in Table 7.3.

Table 7.3 Proposed QA/QC

DATA QUALITY OBJECTIVE	FREQUENCY CONDUCTED	DATA QUALITY INDICATOR
Precision		
Inter and Intra-laboratory field duplicates	1/20 samples	< 30 to 100% RPD ¹
Laboratory duplicates	1/20 samples	< 50 to 100% RPD ¹
Laboratory method blanks	1/20 samples	< LOR1
Accuracy		
Matrix inorganic spikes	1/20 samples	70 to 130%
Matrix organic spikes	1/20 samples	60 to 140%
Laboratory control sample – inorganics	1/20 samples	70 to 130%
Laboratory control sample – organics	1/20 samples	60 to 140%
Representativeness		
Sampling appropriate for media and analytes	All Samples	–
Samples extracted and analysed within holding times	All Samples	14 days – organics 6 months – inorganics
Rinsate blanks (sampling trowel – if used)	1 per day	<LOR
Laboratory blanks	1 per sampling event	<LOR
Comparability		
Standard operating procedures used for sample collection and handling	All Samples	–
NATA accredited analytical methods used for all analyses	All Samples	–
Consistent field conditions, sampling staff and laboratory analysis	All Samples	–
Limits of reporting appropriate and consistent	All Samples	–

Completeness

Soil description and COCs completed and appropriate	All Samples	–
Appropriate documentation	All Samples	–
Satisfactory frequency and result for QC samples	All Samples	–

Notes:

1. If the RPD between duplicates is greater than the pre-determined data quality indicator, a judgment will be made as to whether the excess is critical in relation to the validation of the data set or unacceptable sampling error is occurring in the field.
2. The above criteria apply to homogenous material only.

7.15 VALIDATION REPORTING

At the completion of the remedial works a Validation Report will be prepared, documenting the works as completed in accordance with *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites* (NSW OEH 2011). This report will include:

- Scope of remedial works completed including any variations to the RAP during the works.
- Unexpected finds during the remedial works program, including details of management, materials tracking and validation.
- Results of all validation sampling undertaken during the course of the remedial works.
- QA/QC and data acceptance.
- Waste tracking documentation including the volume of soil excavated and stockpiled (including segregation details), the volume of material disposed of offsite, truck/load movements and waste disposal dockets.
- Waste classification and landfill licences.
- Details of any environmental incidents occurring during the course of the remedial works and the actions undertaken in response to these incidents.
- Other information as appropriate.

8

REGULATORY APPROVALS/LICENSING

The remedial program will be undertaken with due regard to legislative requirements and any relevant environment planning instruments that apply to the site, including the City of Sydney Contaminated Land Development Control Plan (DCP, 2004).

8.1

STATE ENVIRONMENT PLANNING POLICY NUMBER 55 (SEPP55)
REMEDICATION OF LAND

SEPP 55 provides the planning framework for the remediation of contaminated land within NSW.

A preliminary review of Clause 9 of SEPP 55, the Section 149 certificate for the site (WSP Phase 1, 2011), the Australian Heritage Database and the State Heritage Register indicates that the proposed remediation works fall under Category 2 of SEPP 55:

- The works are not designated development.
- The site is not declared critical habitat.
- The works are unlikely to have a significant effect on a critical habitat or threatened species, population or ecological community.
- The works do not require development consent under another SEPP or REP.
- The works are not to be carried out in an area or zone to which the following classifications apply:
 - Coastal protection
 - Conservation or heritage conservation
 - Habitat area, habitat protection area, habitat or wildlife corridor
 - Environment protection
 - Escarpment, escarpment protection or escarpment preservation
 - Floodway – the site is classified as a ‘flood control lot’. Consultation with Council is recommended prior to remediation works planning to confirm Council’s acceptance of the works as Category 2 remediation. Where Council deem that the works are Category 1, a separate development consent will be required for the soil remediation works.
 - Littoral rainforest
 - Nature reserve
 - Scenic area or scenic protection
 - Wetland.
- The works will comply with Council’s Contaminated Land DCP.

In accordance with the requirements of SEPP55 and Council’s Contaminated Land DCP for Category 2 Remediation Works:

- Council will be notified in writing not less than 30 days prior to commencement of any site works.
- Documentation provided to Council will include the proposed site activities and RAP, and any other relevant information.

- The works will be carried out in accordance with the submitted information.
- Validation will be obtained from a qualified expert at completion of remediation work.
- Council will be notified of validation within one month of completion of work.

It is noted that Category 2 remediation work that is ancillary to other designated development may be made part of the development application for the designated development, or be treated as a Category 2 remediation work.

Category 1 remediation work must be treated as such even if it is ancillary to development that may be carried out without consent.

It is also noted that the remediation aspects of the works may be incorporated into the overarching development consent for the proposed site redevelopment works.

8.2 PROTECTION OF THE ENVIRONMENT OPERATIONS ACT 1997

Soils classified as Hazardous Waste, Restricted Solid Waste, or Special Waste may require a licence prior to off-site transport.

Soils classified as General Solid Waste do not required a licence for transport.

8.3 PROTECTION OF THE ENVIRONMENT OPERATIONS (WASTE) REGULATION 2014

Part 6 of the Regulations specify that if waste is transported from a premises, the waste generator must ensure that the waste is transported:

- To a waste facility that is licensed under the Act.
- To a person carrying on mobile waste processing that is licensed under the Act.
- To a place that can otherwise lawfully be used as a waste facility for that waste.

Waste disposal and landfill licencing documentation will be provided in the Validation Report prepared following remediation of the Site.

8.4 WASTE CLASSIFICATION GUIDELINES, PART 1: CLASSIFYING WASTE (DECC 2014)

The NSW 2014 Waste Guidelines (EPA 2014) provide guidance to waste generators to classify the wastes they produce and ensure the environmental and human health risks associated with it are managed appropriately and in accordance with the POEO Act 1997.

Waste classification shall be undertaken on all soil proposed for off-site disposal.

In accordance with Tables 1 and 2 of the Guidelines, soils at the Site are likely to be classified as General Solid Waste.

Following stockpile sampling and analysis, a waste classification letter will be required for any soil which is proposed to be removed from the site. The letter shall be used to seek pre-approval for disposal from the selected waste facility.

8.5 WATER MANAGEMENT ACT 2000

The remediation works shall be completed in accordance with the requirements of the *Water Management Act 2000* including (where required):

- Adopting the principles of ecologically sustainable development.
- The protection and enhancement of water quality and associated ecosystems.
- Best practice in the management and use of water.
- Access licencing for water use.
- Aquifer interference approval.

Water management requirements shall be identified and outlined in the Site Management Plan (Section 10).

9 CONTINGENCY PLAN

9.1 UNEXPECTED MATERIAL ENCOUNTERED

During excavation works, potentially contaminated soil materials that have not been identified during previous investigations at the site may be encountered, including:

- Soil or fill that differs from previously identified materials onsite.
- Asbestos or suspected asbestos containing materials.
- Man-made fibrous material.
- Materials with obvious unnatural odours or man-made inclusions throughout.
- Materials exhibiting staining or unusual colouring.

In the event that unexpected material is encountered during redevelopment works at the site, the following control and management actions shall be implemented:

- Works in the 'unexpected finds' area are to temporarily cease.
- Qualified Environmental Scientist to be notified with details of the material description (see above characteristics) and suspected extent.
- Where asbestos materials are suspected, a licensed contractor will be required to coordinate the works and specify appropriate environmental control measures in accordance with existing legislation and guidance.

Where chemical contamination is suspected, the Environmental Scientist will assess the material (visual, olfactory, PID) and specify appropriate environmental control measures in consultation in accordance with existing legislation and guidance.

Once the unexpected find has been safely relocated and contained within a secure temporary storage area, the Environmental Scientist shall conduct laboratory analysis to validate residual soils and to ensure that excavated materials are appropriately classified for re-use or disposal at a suitably licensed waste disposal facility.

9.2 INCLEMENT WEATHER

Where extended periods of inclement weather are anticipated or experienced:

- Excavation and backfilling shall proceed in a staged manner to minimise the volume of excavation which remains 'open'.
- Sediment control measures shall be inspected and maintained to minimise potential for off-site migration of sediment or migration of sediment to stormwater infrastructure.
- Stockpiles should be adequately covered (secured HDPE).
- Ponded water in excavations shall be managed in accordance with the procedures outlined in Section 10.3.

9.3 PONDED WATER

Ponded water shall be managed as follows:

- Analysing for suspended solids, pH and the primary contaminants of concern (heavy metals, PAHs, TRH and BTEX) prior to discharge to the stormwater system with prior approval from Council. The analytical results must comply with relevant standards for water quality.
- Disposal to sewer with prior approval from Sydney Water (Trade Waste Agreement).
- Collection and off-site disposal by a liquid waste transporter for treatment/disposal to an appropriate licenced waste treatment facility. Liquid waste collection, transport and disposal shall be completed in accordance with the requirements of the *Protection of the Environment Operations Act 1997* and relevant NSW Environment Protection Authority guidelines.

10 SITE MANAGEMENT PLAN

10.1 SITE RESPONSIBILITIES

The remediation contractor will be responsible for the preparation and implementation of a remedial works Site Management Plan (Construction Environmental Management Plan) and will be required to comply with the relevant legislative requirements outlined in Section 8 of this RAP.

The Site Management Plan shall also ensure that the remedial works comply with the requirements of Appendix 3 of Council's Contaminated Land Development Control Plan (1994). The principles of this DCP have been incorporated into Sections 10.2–10.10.

10.2 HOURS OF OPERATION

Remediation works shall only be permitted during the following hours:

- Monday to Friday: 7:00 am to 5:00 pm
- Weekends and Public Holidays: No work permitted.

Emergency work is permitted to be completed outside of these hours.

10.3 UNDERGROUND SERVICES

The remediation contractor shall be responsible for the location and protection of underground services which have the potential to be impacted by the remedial works.

10.4 SOIL AND WATER MANAGEMENT

Soil excavation works will be conducted in a manner that minimises the potential migration of impacted soil and water off site. Sediment controls shall be erected downgradient of excavations to assist with sediment control.

Stormwater may be managed through diversion (around excavation and stockpile areas) or detention (prior to controlled release). Detailed soil and water management plans shall be provided in the Site Management Plan for the remedial works.

Work shall be suspended during periods of inclement weather.

10.5 NOISE

The remediation works shall comply with Council's Code of Practice (1992) for Construction Hours, AS2436-1981 Guide to Noise Control on Construction, Maintenance Demolition Sites and the NSW EPA's Environmental Noise Control Manual for the control of noise from construction sites.

Machinery and mechanical equipment shall be in good working order and will be fitted with appropriate silencers when necessary.

10.6 DUST AND ODOUR

Dust emissions shall be confined within the site boundary by implementing the following controls:

- Securely covering all loads entering or exiting the site.
- Wetting down excavated materials/excavations.
- Covering stockpiles.
- Sealing of site ingress/egress points.

Due to the nature of the contaminants, odour is not expected to be a significant environmental hazard.

10.7 MATERIAL TRANSPORTING

The remediation contractor shall ensure that there is no material tracked onto the street and that loads are securely covered. Soil, earth, mud or similar materials must be removed from the roadway by sweeping, shovelling, or a means other than washing, on a daily basis or as required. Soil washings from wheels shall be collected and disposed of in a manner that does not pollute waters.

All road rules shall be observed and the use of local roads shall be minimised.

The transporter of waste must:

- Before transporting the waste, certify that any part of the waste transport certificate for the waste that is required to be removed by the transporter has been completed accurately.
- Before transporting the waste, ensure that there is a consignment authorisation that authorises the transport of the waste.
- Carry in the vehicle transporting the waste the waste transport certificate for the waste.

A record of truck movements shall be kept in order to enable the waste to be tracked to the receiving location. The receiving location shall issue disposal dockets and these shall be reconciled against the truck movement records to ensure accountability for all materials transported from the site.

10.8 VEHICLE TRAFFIC

The remediation works may slightly increase vehicle traffic in the vicinity of the site. Where necessary, details of traffic management will be incorporated into the SMP to control traffic movement associated with the works and mitigate any disruption to local occupants and road users.

10.9 COMMUNITY CONSULTATION

All owners and/or occupants of adjoining and opposite (across roadways) premises shall be notified of the remedial works program at least two days prior to commencement.

10.10 COMPLAINT REPORTING AND RESOLUTION

Complaints received from adjoining sites or the general public shall be directed to the remediation contractor site supervisor. The site supervisor shall maintain a Complaints Register (Date, Complainant Details, Nature of Complaint, Action Required, Responsibility, Due Date) to ensure that any concerns are recorded and addressed.

Within one working day of receiving the complaint, the remediation contractor shall prepare a written report detailing the nature of the complaint and all the actions taken to provide a solution.

11 WORK HEALTH AND SAFETY

A Site Specific Work Health & Safety Plan will be developed by the remediation contractor prior to the commencement of remedial works in order to protect the health and safety of contractor staff.

The plan will include:

- Emergency phone numbers.
- Definition of Roles and Responsibilities for remediation personnel.
- Hazard identification and control.
- Material Safety Data Sheets for known contaminants at the site.
- Handling procedures for contaminated material.
- Use of Personal Protective Equipment.
- Decontamination procedures.
- Incident reporting.

All staff will be made aware of the Site Specific Work Health & Safety Plan and an on-site briefing will be carried out prior to the commencement of remediation activities.

Site specific hazards which require identification and control are likely to include:

- Operating plant and machinery.
- Open excavations.
- Contact with contaminants.
- Site ingress and egress.
- Slips, trips and falls.
- Below ground services.
- Decommissioned in-situ USTs.

The site shall be secured for the duration of the works to restrict unauthorised access.

12 CONCLUSIONS

The strategy presented in this RAP is considered to be the most effective method to:

- Comply with the Environment Protection Authority (EPA) 'Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites'
- Comply with the Managing Land Contamination Planning Guidelines SEPP55 – Remediation of Land
- Minimise potential risks posed to human health and the environment.
- Render the site suitable for the proposed mixed-use development.

13 REPORT LIMITATIONS

13.1 SCOPE OF SERVICES

This remediation action plan (the report) has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the client and WSP | PB (scope of services). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

13.2 RELIANCE ON DATA

In preparing the report, WSP | PB has relied upon data, surveys, analyses, designs, plans and other information provided by the client and other individuals and organisations, most of which are referred to in the report (the data). Except as otherwise stated in the report, WSP | PB has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report (conclusions) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. WSP | PB will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WSP | PB.

13.3 ENVIRONMENTAL CONCLUSIONS

In accordance with the scope of services, WSP | PB has relied upon the data and has not conducted any environmental field monitoring or testing in the preparation of the report. The conclusions are based upon the data and visual observations and are therefore merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of contaminants or emissions.

Within the limitations imposed by the scope of services, the assessment of the site and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

13.4 REPORT FOR BENEFIT OF CLIENT

The report has been prepared for the benefit of the client and no other party. WSP | PB assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of WSP | PB or for any loss or damage suffered by any other party in relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

13.5 OTHER LIMITATIONS

WSP | PB will not be liable to update or revise the report to take into account any events, emergent circumstances or facts occurring or becoming apparent after the date of the report.

The scope of services did not include any assessment of the title to nor ownership of the properties, buildings and structures referred to in the report, nor the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.

14 REFERENCES

Greencap-NAA, 2015, Underground Petroleum Storage System Validation – 10 Herbert Street, St Leonards, NSW

NSW Environment Protection Authority, 1995, Sampling Design Guidelines.

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

NSW EPA, 2014, General Waste Exemption for Excavated Natural Material.

NSW EPA, 2014, Waste Classification Guidelines Part 1: Classifying Waste.

NSW Department of Environment and Conservation, 2006, Guidelines for the Site Auditor Scheme, Second Edition Department of Environment and Conservation.

NSW Office of Environment and Heritage, 2011, Guidelines for Consultants Reporting on Contaminated Sites.

State Environmental Planning Policy No 55 – Remediation of Land.

WSP, 2013a, Phase 1 Environmental Due Diligence Assessment – 10 Herbert Street, St Leonards, NSW

WSP, 2013b, Phase 2 Environmental Site Investigation – 10 Herbert Street, St Leonards, NSW

Appendix A

FIGURES

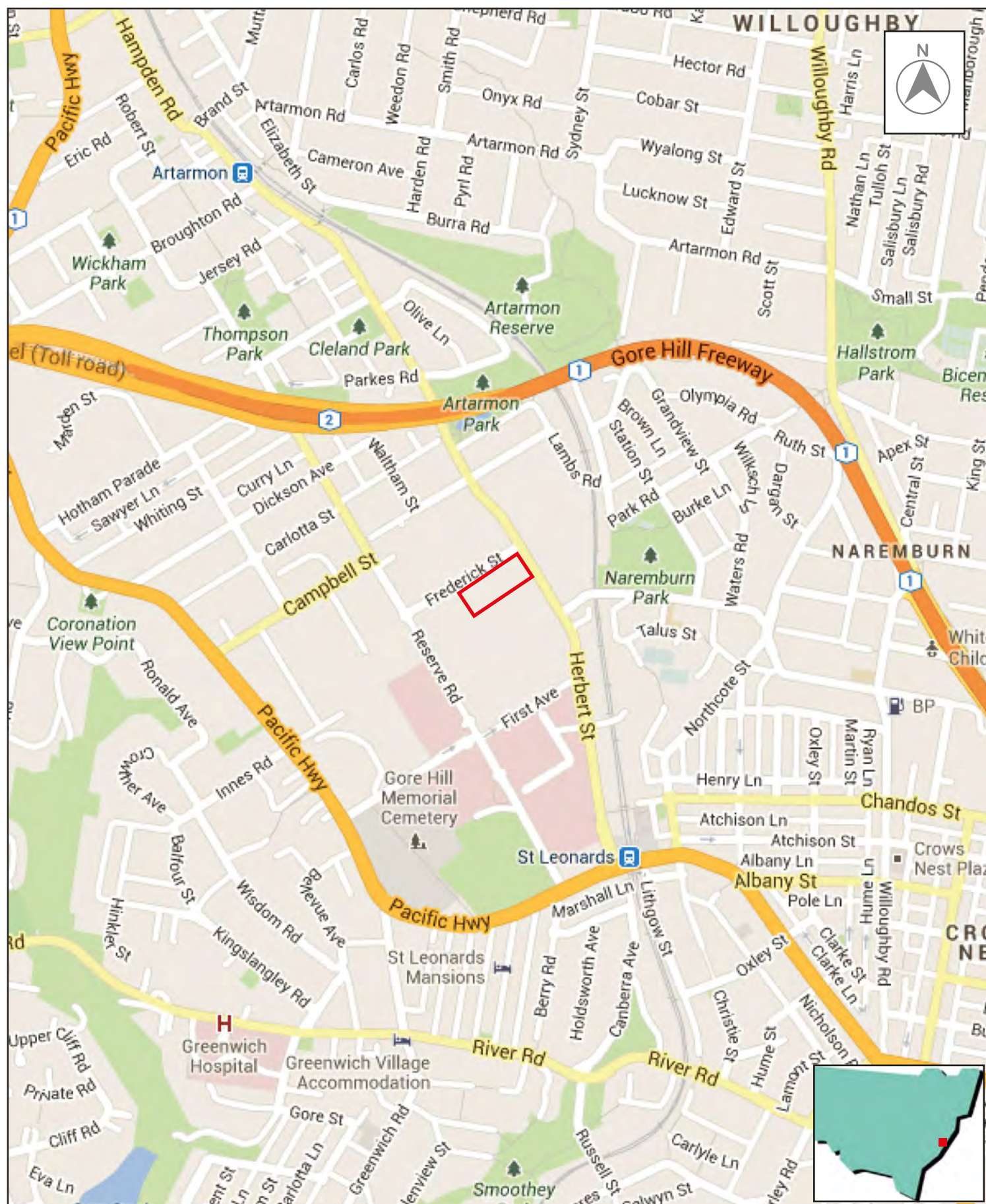
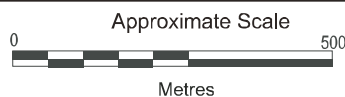


Image Courtesy of Google Maps (2013)



KEY



Approximate Site Boundary

Site Location

10 Herbert Street, St Leonards, NSW
00040387

FIGURE 1



Photo Courtesy of LPI SIXViewer (2013)



Site Boundary



Operational UST

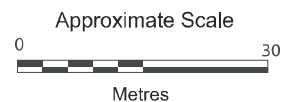


Non-Operational UST



Oil / Water Separator

Approximate Lateral Extent of Former Quarry Area on Property



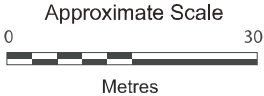
Site Layout
10 Herbert Street, St Leonards, NSW
00040387

FIGURE 2



Photo Courtesy of LPI SIXViewer (2013)

- Site Boundary
- Operational UST
- Non-Operational UST
- Oil / Water Separator
- Approximate Lateral Extent of Former Quarry Area on Property
- BH1 Borehole Location



Investigation Locations
 10 Herbert Street, St Leonards, NSW
 00040387

FIGURE 3



Legend:

Site Boundary

Tank Excavation Pit Location

Fuel Line Excavation

Sample Location

Stockpiled Material

0510

Metres

GREENCAP | NAA

Level 2, 11-17 Khartoum Road

North Ryde, NSW 2113

Ph: 02-9889-1800

Fx: 02-9889-1811

Client Name:		Altis Property Partners	
Client Number:		C105905	
Project Number:		J127829	
Project Description:		Underground Petroleum Storage System Validation	
Prepared:	RM	Address:	10 Herbert Street, St Leonards
Reviewed:	IM	Figure 2	Tank Pit and Stockpile Sample Locations

Disclaimer: Greencap-NAA Pty Ltd has produced this map for the purpose of presenting a summary of relevant spatial information and gives no warranty in relation to the data (including accuracy, reliability, completeness or suitability) and accepts no liability (*including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use or reliance upon the data. Data must not be used for direct marketing or be used in breach of privacy laws. Service Layer Credits © 2015 Google Earth (© Sinclair Knight Merz) and 2015 NSW Land and Property Information (Six Maps)

Appendix B

SUMMARY RESULTS TABLE

Table 1a: Soil Analytical Results (Commercial/Industrial Criteria)

						Asbestos	Moisture	BTEX					TRH				Heavy Metals											
						Asbestos	Moisture	Benzene	Ethylbenzene	Toluene	Xylene (m & p)	Xylene (o)	C6-C10	C10-C16	C16-C24	C24-C40	F1 (C6-C10 less BTEX)	F2 (>C10-C16 less Naphthalene)	Arsenic	Cadmium	Chromium (III+V)	Copper	Lead	Mercury	Nickel	Zinc		
						mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		
EQI						0.2	0.1	0.2	1	0.5	2	1	25	50	100	100	25	50	4	0.4	3000	900	3600	240,000	1500	180	6000	400,000
NEPM 2013 HIL D Soil - Commercial/Industrial																			3000	900	3600	240,000	1500	180	6000	400,000		
NEPM 2013 EIL - Commercial/Industrial																			160									
NEPM 2013 ESL - coarse - Commercial/Industrial								75	165	135	180	180			2000	3300	215	170										
NEPM 2013 Commercial/Industrial - Management limits - coarse															3500	10,000	700	1000										
NEPM 2013 HSL D Soil - Commercial/Industrial, Sand 0-1m						-	-	3			230	230						260										
NEPM 2013 HSL D Soil - Commercial/Industrial, Clay 0-1m						-	-	4										310										
Field_ID	LocCode	Sample_Depth	Sampled_Date/Time	Matrix	Soil Type	SDG																						
BH1	BH1	0.9	10/07/2013	Soil	Gravelly sandy clay	93743	ND	7	<0.2	<1	<0.5	<2	<1	<25	<50	120	<100	<25	<50	-	-	-	-	-	-	-		
BH2	BH2	1	9/07/2013	Soil	Clay	93743	-	7.4	<0.2	<1	<0.5	<2	<1	<25	<50	130	<100	<25	<50	12	<0.4	10	36	58	0.3	25	100	
BH3	BH3	2	9/07/2013	Soil	Clay	93743	-	6.9	<0.2	<1	<0.5	<2	<1	<25	<50	<100	<100	<25	<50	7	<0.4	13	24	21	0.2	20	65	
BH4	BH4	0.15	10/07/2013	Soil	Sand	93743	-	9.9	<0.2	<1	<0.5	<2	<1	<25	66	500	<100	<25	63	<4	<0.4	19	17	390	1	24	100	
BH5	BH5	0.2	11/07/2013	Soil	Sandy clay	93743	-	11	<0.2	<1	<0.5	<2	<1	<25	75	1100	190	<25	75	8	<0.4	22	37	36	0.2	41	100	
BH6	BH6	0.18	10/07/2013	Soil	Silty clay	93743	ND	13	<0.2	<1	<0.5	<2	<1	<25	<50	180	<100	<25	<50	-	-	-	-	-	-	-		
BH7	BH7	0.1	10/07/2013	Soil	Silty clayey sand	93743	ND	17	<0.2	<1	<0.5	<2	<1	<25	<50	<100	<100	<25	<50	-	-	-	-	-	-	-		
BH8	BH8	0.2	11/07/2013	Soil	Clay	93743	-	14	<0.2	<1	<0.5	<2	<1	<25	<50	<100	<100	<25	<50	9	<0.4	11	64	430	0.2	11	130	
BH9	BH9	1.1	9/07/2013	Soil	Clay	93743	-	6.7	<0.2	<1	<0.5	<2	<1	35	160	130	<100	35	160	9	<0.4	7	35	18	0.2	27	85	
BH10	BH10	0.8	9/07/2013	Soil	Clay	93743	-	6.6	<0.2	<1	<0.5	<2	<1	<25	59	220	<100	<25	59	10	<0.4	7	45	18	0.2	26	130	
BH11	BH11	0.15	11/07/2013	Soil	Clayey sand	93743	ND	10	<0.2	<1	<0.5	<2	<1	<25	<50	<100	<100	<25	<50	-	-	-	-	-	-	-		
BH12	BH12	0.15	11/07/2013	Soil	Clayey sand	93743	ND	16	<0.2	<1	<0.5	<2	<1	<25	<50	<100	<100	<25	<50	-	-	-	-	-	-	-		
BH13	BH13	0.2	10/07/2013	Soil	Gravelly sand	93743	ND	6.8	<0.2	<1	<0.5	<2	<1	<25	<50	<100	<100	<25	<50	-	-	-	-	-	-	-		
BH14	BH14	0.2	10/07/2013	Soil	Silty sand	93743	ND	8.8	<0.2	<1	<0.5	<2	<1	<25	<50	<100	<100	<25	<50	-	-	-	-	-	-	-		
BH15	BH15	0.2	10/07/2013	Soil	Clay	93743	ND	14	<0.2	<1	<0.5	<2	<1	<25	<50	<100	<100	<25	<50	-	-	-	-	-	-	-		
BH17	BH17	0.2	10/07/2013	Soil	Silty Clay	93743	ND	32	<0.2	<1	<0.5	<2	<1	<25	<50	<100	<100	<25	<50	<4	<0.4	3	10	5	0.2	9	18	
DUP1	BH17	0.2	10/07/2013	Soil	Silty Clay	93743	ND	32	<0.2	<1	<0.5	<2	<1	<25	<50	<100	<100	<25	<50	<4	<0.4	3	12	6	0.1	8	26	
TRIP1	BH17	0.2	10/07/2013	Soil	Silty Clay	93743	ND	38	<0.2	<1	<0.5	<2	<1	<25	<50	<100	<100	<25	<50	<4	<0.4	3	13	6	<0.1	9	21	
TB	TB	-	10/07/2013	Soil	-	93743	-	4.4	<0.2	<1	<0.5	<2	<1	<25	-	-	-	<25	-	-	-	-	-	-	-	-		
TS	TS	-	10/07/2013	Soil	-	93743	-	-	-	0.99	0.99	1	0.89	0.99	-	-	-	-	-	-	-	-	-	-	-	-		
Statistical Summary																												
Number of Results							20	19	20	20	20	20	20	19	18	18	18	19	18	10	10	10	10	10	10	10		
Number of Detects							9	19	1	1	1	1	1	1	4	7	1	1	4	6	0	10	10	9	10	10		
Minimum Concentration							ND	4.4	<0.2	0.99	<0.5	0.99	0.99	<25	<50	<100	<100	<25	<50	<4	<0.4	3	10	5	<0.1	8	18	
Minimum Detect							ND	4.4	0.99	0.99	1	0.99	0.99	35	120	190	35	160	7	ND	3	10	5	0.1	8	18		
Maximum Concentration							0	38	0.99	<1	1	<2	<1	35	160	1100	190	35	160	12	<0.4	22	64	430	1	41	130	
Maximum Detect							ND	38	0.99	0.99	1	0.99	0.99	35	160	1100	190	35	160	12	ND	22	64	430	1	41	130	
Average Concentration							0	14	0.14	0.52	0.28	1	0.52	14	39	163	58	14	39	6.3	0.2	6.7	29	99	0.27	20	78	
Median Concentration							0	10	0.1	0.5	0.25		0.5	12.5	25	50	50	12.5	25	7.5	0.2	8.5	29.5	19.5	0.2	22	62.5	
Standard Deviation							0	0	0.2	0.11	0.17	0.022	0.11	5.2	34	259	33	5.2	34	3.9	0	6.7	17	169	0.27	11	43	
Number of Guideline Exceedances							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Number of Guideline Exceedances (Detects Only)							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Table 1b: Soil Analytical Results (Commercial/Industrial Criteria)

						PAHs																	OCP	Phenols	VOCs		
						Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Benzo(b)fluoranthene	Chrysene	Fluoranthene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene	Carcinogenic PAHs as B(a)P TEQ	Total PAHs	OCP (sum of detects)	Phenols Total	VOCs (sum of detects)	
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
EQC						0.1	0.1	0.1	0.1	0.05	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	40	4000	0.1	5	1
NEPM 2013 HSL D Soil - Commercial/Industrial																											
NEPM 2013 EIL - Commercial/Industrial																											
NEPM 2013 ESL - coarse - Commercial/Industrial										0.7								370									
NEPM 2013 Commercial/Industrial - Management limits - coarse																											
NEPM 2013 HSL D Soil - Commercial/Industrial, Sand 0-1m																											
NEPM 2013 HSL D Soil - Commercial/Industrial, Clay 0-1m																											
Field ID	LocCode	Sample Depth	Sampled Date/Time	Matrix	Soil Type	SDG	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
BH1	BH1	0.9	10/07/2013	Soil	Gravelly sandy clay	93743	<0.1	0.4	0.2	0.9	0.91	1.1	0.7	1	0.1	1	0.1	0.7	0.1	1.3	1.8	1	10.31	<0.1	-	-	
BH2	BH2	1	9/07/2013	Soil	Clay	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH3	BH3	2	9/07/2013	Soil	Clay	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH4	BH4	0.15	10/07/2013	Soil	Sand	93743	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	3	-	<5	<1		
BH5	BH5	0.2	11/07/2013	Soil	Sandy clay	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<1	
BH6	BH6	0.18	10/07/2013	Soil	Silty clay	93743	<0.1	0.2	0.1	0.7	0.75	1	0.6	0.7	0.1	0.9	<0.1	0.6	<0.1	0.4	1.1	1	7.05	<0.1	-	-	
BH7	BH7	0.1	10/07/2013	Soil	Silty clayey sand	93743	<0.1	<0.1	<0.1	<0.1	0.08	<0.2	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	0.1	0.1	<0.5	0.28	<0.1	-	-	
BH8	BH8	0.2	11/07/2013	Soil	Clay	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<5	<1		
BH9	BH9	1.1	9/07/2013	Soil	Clay	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH10	BH10	0.8	9/07/2013	Soil	Clay	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH11	BH11	0.15	11/07/2013	Soil	Clayey sand	93743	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	-	<0.1	-	-	
BH12	BH12	0.15	11/07/2013	Soil	Clayey sand	93743	<0.1	<0.1	<0.1	<0.1	0.05	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	0.05	<0.1	-	-	
BH13	BH13	0.2	10/07/2013	Soil	Gravelly sand	93743	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	-	<0.1	-	-	
BH14	BH14	0.2	10/07/2013	Soil	Silty sand	93743	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	-	<0.1	-	-	
BH15	BH15	0.2	10/07/2013	Soil	Clay	93743	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	-	<0.1	-	-	
BH17	BH17	0.2	10/07/2013	Soil	Silty Clay	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	
DUP1	BH17	0.2	10/07/2013	Soil	Silty Clay	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	
TRIP1	BH17	0.2	10/07/2013	Soil	Silty Clay	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	
TB	TB	-	10/07/2013	Soil	-	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
TS	TS	-	10/07/2013	Soil	-	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Statistical Summary																											
Number of Results						8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	5	11	3	3	
Number of Detects						0	2	2	2	4	2	2	2	2	2	3	1	2	2	3	2	5	0	0	0		
Minimum Concentration						<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	0.05	<0.1	<5	<1	
Minimum Detect						ND	0.2	0.1	0.7	0.05	1	0.6	0.7	0.1	0.1	0.1	0.1	0.6	0.1	0.4	0.1	1	0.05	ND	<0.1	<5	<1
Maximum Concentration						<0.1	0.4	0.2	0.9	0.91	1.1	0.7	1	0.1	1	0.1	0.1	0.7	3	1.3	1.8	1	10.31	<0.1	<5	<1	<1
Maximum Detect						ND	0.4	0.2	0.9	0.91	1.1	0.7	1	0.1	1	0.1	0.1	0.7	3	1.3	1.8	1	10.31	ND	ND	ND	ND
Average Concentration						0.05	0.11	0.075	0.24	0.24	0.34	0.2	0.25	0.063	0.28	0.056	0.2	0.38	0.26	0.41	0.44	4.1	0.05	2.5	0.5	0.5	
Median Concentration						0.05	0.05	0.05	0.05	0.0375	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.25	3	0.05	2.5	0.5	0.5
Standard Deviation						0	0.13	0.093	0.35	0.37	0.44	0.28	0.38	0.023	0.41	0.018	0.28	0.98	0.44	0.67	0.35	4.5	0	0	0	0	
Number of Guideline Exceedances						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Number of Guideline Exceedances (Detects Only)						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2a: Soil Analytical Results (Residential Criteria)

Table 2a: Soil Analytical Results (Residential Criteria)																										
			Asbestos	Moisture	BTEX						TRH						Heavy Metals									
			Asbestos	Moisture	Benzene	Toluene	Xylene (m & p)	Xylene (o)	ChC10	1-C10C16	1-C16C34	1-C34C40	1-C6C10 less BTEX	1-C10C16 less Naphthalene	Arsenic	Cadmium	Bromine (II+VI)	Copper	Lead	Mercury	Nickel	Zinc				
			mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg				
EOL			0.2	0.1	0.2	1	0.5	2	1	25	50	100	100	25	50	4	0.4	1	1	1	0.1	1				
NEPM 2013 HIL A Soil - Residential, Access to Soil															100	20	100	6000	300	10	400	7400				
NEPM 2013 HIL B Soil - Residential, Limited Access to Soil															500	150	500	30,000	1200	30	1200	60,000				
NEPM 2013 EIL - Urban Residential & Public Open Space															100											
NEPM 2013 ESL - coarse - Urban Residential & Public Open Space					50	70	85	105	105		300	2800	180	120												
NEPM 2013 Residential - Management Limits - coarse										2500	10,000	700	1000													
NEPM 2013 HSL A/B Soil - Residential, Sand 0<1m					0.5	55	160	40	40					45	110											
NEPM 2013 HSL A/B Soil - Residential, Clay 0<1m					0.7		480	110	110					50	280											
Field ID	LocCode	Sample Depth Range	Sampled Date/Time	Matrix	Soil	SDG																				
BH1	BH1	0.2	10/07/2013	Soil	Gravelly sandy clay	93743	ND	7	<0.2	<1	<0.5	<2	<1	<25	<50	120	<100	<25	<50	-	-	-	-	-		
BH2	BH2	1	9/07/2013	Soil	Clay	93743	-	7.4	<0.2	<1	<0.5	<2	<1	<25	<50	130	<100	<25	<50	12	<0.4	10	36	58	0.3	25
BH3	BH3	2	9/07/2013	Soil	Clay	93743	-	6.9	<0.2	<1	<0.5	<2	<1	<25	<50	<100	<100	<25	<50	7	<0.4	13	24	21	0.2	20
BH4	BH4	0.15	10/07/2013	Soil	Sand	93743	-	9.9	<0.2	<1	<0.5	<2	<1	<25	66	900	<100	<25	63	<0.4	19	17	390	1	24	
BH5	BH5	0.2	11/07/2013	Soil	Sandy clay	93743	-	11	<0.2	<1	<0.5	<2	<1	<25	75	1100	190	<25	75	8	<0.4	22	37	36	0.2	41
BH6	BH6	0.18	10/07/2013	Soil	Silty clay	93743	ND	13	<0.2	<1	<0.5	<2	<1	<25	<50	180	<100	<25	<50	-	-	-	-	-	-	-
BH7	BH7	0.1	10/07/2013	Soil	Silty clayey sand	93743	ND	17	<0.2	<1	<0.5	<2	<1	<25	<50	<100	<100	<25	<50	-	-	-	-	-	-	-
BH8	BH8	0.2	11/07/2013	Soil	Clay	93743	-	14	<0.2	<1	<0.5	<2	<1	<25	<50	<100	<100	<25	<50	9	<0.4	10	64	430	0.2	11
BH9	BH9	1.1	9/07/2013	Soil	Clay	93743	-	6.7	<0.2	<1	<0.5	<2	<1	35	160	130	<100	35	160	9	<0.4	7	35	19	0.2	27
BH10	BH10	0.8	9/07/2013	Soil	Clay	93743	-	6.6	<0.2	<1	<0.5	<2	<1	<25	89	220	<100	<25	89	10	<0.4	7	45	19	0.2	26
BH11	BH11	0.15	11/07/2013	Soil	Clayey sand	93743	ND	10	<0.2	<1	<0.5	<2	<1	<25	<50	<100	<100	<25	<50	-	-	-	-	-	-	-
BH12	BH12	0.15	11/07/2013	Soil	Clayey sand	93743	ND	16	<0.2	<1	<0.5	<2	<1	<25	<50	<100	<100	<25	<50	-	-	-	-	-	-	-
BH13	BH13	0.2	10/07/2013	Soil	Gravelly sand	93743	ND	6.8	<0.2	<1	<0.5	<2	<1	<25	<50	<100	<100	<25	<50	-	-	-	-	-	-	-
BH14	BH14	0.2	10/07/2013	Soil	Silty sand	93743	ND	6.8	<0.2	<1	<0.5	<2	<1	<25	<50	<100	<100	<25	<50	-	-	-	-	-	-	-
BH15	BH15	0.2	10/07/2013	Soil	Clay	93743	ND	14	<0.2	<1	<0.5	<2	<1	<25	<50	<100	<100	<25	<50	-	-	-	-	-	-	-
BH17	BH17	0.2	10/07/2013	Soil	Silty Clay	93743	ND	32	<0.2	<1	<0.5	<2	<1	<25	<50	<100	<100	<25	<50	<4	<0.4	3	10	5	0.2	9
DUP1	BH17	0.2	10/07/2013	Soil	Silty Clay	93743	ND	32	<0.2	<1	<0.5	<2	<1	<25	<50	<100	<100	<25	<50	<4	<0.4	3	12	6	0.1	8
TRP1	BH17	0.2	10/07/2013	Soil	Silty Clay	93743	ND	38	<0.2	<1	<0.5	<2	<1	<25	<50	<100	<100	<25	<50	<4	<0.4	3	13	8	<0.1	9
TB	TB	-	10/07/2013	Soil	-	93743	-	4.4	<0.2	<1	<0.5	<2	<1	<25	-	-	-	-	-	-	-	-	-	-	-	-
TS	TS	-	10/07/2013	Soil	-	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Statistical Summary																										
Number of Results							20	19	20	20	20	20	20	19	18	18	18	19	18	10	10	10	10	10		
Number of Detects							9	19	1	1	1	1	1	4	7	1	1	4	6	0	10	10	10	10	10	
Minimum Concentration							0	4.4	<0.2	0.99	<0.5	0.99	0.99	<25	<50	<100	<100	<25	<50	<4	<0.4	3	10	5	<0.1	8
Minimum Detect							ND	4.4	0.99	0.99	1	0.99	0.99	35	59	120	190	35	59	7	ND	3	10	5	0.1	8
Maximum Concentration							0	38	0.99	<1	1	<2	<1	35	160	1100	190	35	160	12	<0.4	22	64	430	1	<1
Maximum Detect							ND	38	0.99	0.99	1	0.99	0.99	35	160	1100	190	35	160	12	ND	22	64	430	1	<1
Average Concentration							0	14	0.14	0.52	0.29	1	0.52	14	39	163	98	14	39	6.3	0.2	9.7	29	99	0.27	20
Median Concentration							0	0	0	0.5	0.25	1	0.5	12.5	25	59	90	12.5	25	7.3	0.2	8.5	29.5	19.3	0.2	22
Standard Deviation							0	0	0.2	0.11	0.17	0.0022	0.11	5.2	34	259	33	5.2	34	3.9	0	6.7	17	165	0.27	11
Number of Guideline Exceedances							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances (Detects Only)							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2a: Soil Analytical Results (Residential Criteria)

Table 2a: Soil Analytical Results (Residential Criteria)						PAHs																			OCs		Phenols	VOCs
						Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Carcinogenic PAHs as B[a]P TEQ	Total PAHs	OCs (sum of detects)	Phenols Total	VOCs (sum of detects)				
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg				
COL						0.1	0.1	0.1	0.1	0.05	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.8	0.5	5	1				
NEPM 2013 HIL A Soil - Residential, Access to Soil																				3	300							
NEPM 2013 HIL B Soil - Residential, Limited Access to Soil																												
NEPM 2013 EIL - Urban Residential & Public Open Space																												
NEPM 2013 ESL - coarse - Urban Residential & Public Open Space																												
NEPM 2013 Residential - Management limits - coarse																												
NEPM 2013 HSL A/B Soil - Residential, Sand 0<1m																												
NEPM 2013 HSL A/B Soil - Residential, Clay 0<1m																												
Field ID	LocCode	Sample Depth Range	Sampled Date/Time	Matrix	Soil	SDG																						
BH1	BH1	0.0	10/07/2013	Soil	Gravelly sandy clay	93743	<0.1	0.4	0.2	0.9	0.91	1.1	0.7	1	0.1	1	0.1	0.7	0.1	1.3	1.8	1	10.31	<0.1	-			
BH2	BH2	1	9/07/2013	Soil	Clay	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
BH3	BH3	2	9/07/2013	Soil	Clay	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
BH4	BH4	0.15	10/07/2013	Soil	Sand	93743	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-				
BH5	BH5	0.2	11/07/2013	Soil	Sandy clay	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
BH6	BH6	0.18	10/07/2013	Soil	Silty clay	93743	<0.1	0.2	0.1	0.7	0.75	1	0.6	0.7	0.4	0.9	<0.1	0.6	<0.1	0.4	1.1	1	7.05	<0.1	-			
BH7	BH7	0.1	10/07/2013	Soil	Silty clayey sand	93743	<0.1	<0.1	<0.1	0.08	<0.2	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.5	0.28	<0.1	-				
BH8	BH8	0.2	11/07/2013	Soil	Clay	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
BH9	BH9	1.1	9/07/2013	Soil	Clay	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
BH10	BH10	0.8	9/07/2013	Soil	Clay	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
BH11	BH11	0.15	11/07/2013	Soil	Clayey sand	93743	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	-	<0.1	-				
BH12	BH12	0.15	11/07/2013	Soil	Clayey sand	93743	<0.1	<0.1	<0.1	<0.1	0.05	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	0.05	<0.1	-				
BH13	BH13	0.2	10/07/2013	Soil	Gravelly sand	93743	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	-	<0.1	-				
BH14	BH14	0.2	10/07/2013	Soil	Silty sand	93743	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	-	<0.1	-				
BH15	BH15	0.2	10/07/2013	Soil	Clay	93743	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	-	<0.1	-				
BH17	BH17	0.2	10/07/2013	Soil	Silty Clay	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-				
DUP1	BH17	0.2	10/07/2013	Soil	Silty clay	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-				
TRIP1	BH17	0.2	10/07/2013	Soil	Silty Clay	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-				
TS	TS	-	10/07/2013	Soil	-	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Statistical Summary																												
Number of Results						8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	11	3	3					
Number of Detects						0	2	2	2	4	2	2	2	2	3	1	2	2	2	3	2	5	0	0				
Minimum Concentration						<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	0.05	<0.1	<5	<1			
Maximum Concentration						ND	0.2	0.1	0.7	0.05	1	0.6	0.7	0.1	0.1	0.1	0.6	0.1	0.4	0.1	1	0.05	ND	ND	ND			
Median Concentration						ND	0.4	0.2	0.9	0.91	1.1	0.7	1	0.1	1	0.1	0.7	3	1.3	1.8	1	10.31	ND	ND	ND			
Average Concentration						0.05	0.11	0.075	0.24	0.24	0.34	0.2	0.25	0.063	0.28	0.066	0.2	0.38	0.25	0.41	0.44	4.1	0.05	2.5	0.5			
Median Concentration						0.05	0.05	0.05	0.05	0.0375	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.25	3	0.05	2.5	0.5		
Standard Deviation						0	0.13	0.053	0.35	0.37	0.44	0.26	0.38	0.023	0.41	0.018	0.28	0.98	0.44	0.97	0.35	4.5	0	0	0			
Number of Guideline Exceedances						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Number of Guideline Exceedances (Detects Only)						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			

Table 3a: Waste Classification Results

[illegible]

Assessment levels taken from:
National Environmental Protection Measure (NEPM) Waste Classification Guidelines

Notes:

- There are currently no guidelines for Chromium (III + VI). The Chromium VI criteria was therefore adopted for total Chromium.
- ND - Not Detected
- Not tested / analysed
- <0.001 Grey text indicates concentration is below the laboratory limit of reporting

Asbestos results : asbestos detected at reporting limit of 0.1g/tg and/or respirable fibres
NRES - Not Enough Sample to conduct the test
TCLP = Toxicity Characteristic Leaching Procedure

Table 1b: Waste Classification Results

						PAHs																	OCs		Phenols	VOCs	
						Acenaphthene	Acenaphthylene	Anthracene	Benz[a]anthracene	Benz[b]pyrene	Benz[k]fluoranthene	Benz[ghi]perylene	Chrysene	Dibenz[a,h]anthracene	Fluoranthene	Fluorene	Indene[1,2,3-c,d]pyrene	Naphthalene	Phenanthrene	Pyrene	Carcinogenic PAHs as B[a]P TEQ	Total PAHs	OCs (sum of detects)	Phenolics Total	VOCs (sum of detects)		
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
ECL						0.1	0.1	0.1	0.1	0.05	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	200	0.1	5	1		
NSW DECC Waste Classification - General Solid Waste - No Leaching (CT1)										0.8																	
NSW DECC Waste Classification - Restricted Solid Waste - No Leaching (CT2)										3.2												800					
NSW DECC Waste Classification - General Solid Waste - With Leaching (TCLP1/SCC1)										0.04 / 10																	
NSW DECC Waste Classification - Restricted Solid Waste - With Leaching (TCLP2/SCC2)										0.16 / 23																	
Field ID	LocCode	Sample Depth	Range	Sampled Date-Time	Waste Classification	SDG	<0.1	0.4	0.2	0.9	0.01	1.1	0.7	1	0.1	1	0.1	0.7	0.1	1.3	1.8	1	10.31	<0.1	-	-	
BH1	BH1	0.9		10/07/2013	Restricted Solid Waste	93743	<0.1	0.4	0.2	0.9	0.01	1.1	0.7	1	0.1	1	0.1	0.7	0.1	1.3	1.8	1	10.31	<0.1	-	-	
BH2	BH2	1		9/07/2013	General Solid Waste	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH3	BH3	2		9/07/2013	General Solid Waste	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH4	BH4	0.15		10/07/2013	Restricted Solid Waste	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH5	BH5	0.2		11/07/2013	Restricted Solid Waste	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH6	BH6	0.18		10/07/2013	General Solid Waste	93743	<0.1	0.2	0.1	0.7	0.75	1	0.6	0.7	0.1	0.9	<0.1	0.6	<0.1	0.4	1.1	1	7.05	<0.1	-	-	
BH7	BH7	0.1		10/07/2013	General Solid Waste	93743	<0.1	<0.1	<0.1	<0.1	0.08	<0.2	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.5	0.28	<0.1	-	-	
BH8	BH8	0.2		11/07/2013	Hazardous Waste	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH9	BH9	1.1		9/07/2013	General Solid Waste	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH10	BH10	0.8		9/07/2013	General Solid Waste	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
BH11	BH11	0.15		11/07/2013	General Solid Waste	93743	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	-	-	-	
BH12	BH12	0.15		11/07/2013	General Solid Waste	93743	<0.1	<0.1	<0.1	<0.1	0.05	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	0.05	<0.1	-	-	
BH13	BH13	0.2		10/07/2013	General Solid Waste	93743	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	-	<0.1	-	-	
BH14	BH14	0.2		10/07/2013	General Solid Waste	93743	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	-	<0.1	-	-	
BH15	BH15	0.2		10/07/2013	General Solid Waste	93743	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	-	<0.1	-	-	-	
BH17	BH17	0.2		10/07/2013	General Solid Waste	93743	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	
Statistical Summary																											
Number of Results						8	8	8	8	8	8	8	8	8	8	8	8	8	9	8	8	8	5	8	3	3	
Number of Detects						0	2	2	2	4	2	2	2	2	3	1	2	2	2	3	2	5	0	0	0	0	
Minimum Concentration						<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	0.05	<0.1	<5	<1	<1	
Minimum Detect						ND	0.2	0.1	0.7	0.05	1	0.5	0.7	0.1	0.1	0.1	0.6	0.1	0.4	0.1	1	0.05	ND	ND	ND	ND	ND
Maximum Concentration						<0.1	0.4	0.2	0.9	0.91	1.1	0.7	1	0.1	1	0.1	0.7	3	1.3	1.8	1	10.31	<0.1	<5	<1	<1	<1
Maximum Detect						ND	0.4	0.2	0.9	0.91	1.1	0.7	1	0.1	0.1	0.7	3	1.3	1.8	1	10.31	ND	ND	ND	ND	ND	ND
Average Concentration						0.05	0.11	0.075	0.24	0.24	0.34	0.2	0.25	0.063	0.28	0.058	0.2	0.38	0.28	0.41	0.44	0.1	0.05	2.5	0.5	0.5	
Median Concentration						0.05	0.05	0.05	0.05	0.0375	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.25	3	0.05	2.5	0.5	0.5	
Standard Deviation						0	0.13	0.063	0.35	0.37	0.44	0.28	0.38	0.023	0.41	0.018	0.28	0.98	0.44	0.67	0.35	4.5	0	0	0	0	
Number of Guideline Exceedances						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Number of Guideline Exceedances (Detects Only)						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Assessment levels taken from:

National Environmental Protection Measure (NEM) Waste Classification Guidelines

- Notes:**
- There are currently no guidelines for Chromium (III + VI). The Chromium VI criteria was therefore adopted for total Chromium
 - ND Non-Detect
 - Not tested / analysed
 - <0.001 Grey text indicates concentration is below the laboratory limit of reporting
 - Asbestos results - asbestos detected at reporting limit of 0.1g/kg and/or respirable fibres
 - NES Not Enough Sample to conduct the test
 - TCLP = Toxicity Characteristic Leaching Procedure

Table 4: RPD Calculations

SDG	93743	93743		93743	93743	
Field_ID	BH17	DUP1	RPD	BH17	TRIP1	RPD
Sampled	10/07/2013	10/07/2013		10/07/2013	10/07/2013	

Method_Type	ChemName	Units	EQL						
8 metals in soil	Arsenic	mg/kg	4	<4.0	<4.0	0	<4.0	<4.0	0
	Cadmium	mg/kg	0.4	<0.4	<0.4	0	<0.4	<0.4	0
	Chromium (III+VI)	mg/kg	1	3.0	3.0	0	3.0	3.0	0
	Copper	mg/kg	1	10.0	12.0	18	10.0	13.0	26
	Lead	mg/kg	1	5.0	6.0	18	5.0	6.0	18
	Mercury	mg/kg	0.1	0.2	0.1	67	0.2	<0.1	67
	Nickel	mg/kg	1	9.0	8.0	12	9.0	9.0	0
	Zinc	mg/kg	1	18.0	26.0	36	18.0	21.0	15
Moisture	Moisture	%	0.1	32.0	32.0	0	32.0	38.0	17
Organochlorine Pesticides	4,4-DDE	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	a-BHC	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	Aldrin	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	b-BHC	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	Chlordane (cis)	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	Chlordane (trans)	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	d-BHC	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	DDD	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	DDT	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	Dieldrin	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	Endosulfan I	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	Endosulfan II	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	Endrin	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	Endrin aldehyde	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	g-BHC (Lindane)	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	Heptachlor	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	Hexachlorobenzene	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
	Methoxychlor	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
TRH Soil C10-C40 NEPM draft	C10 - C14	mg/kg	50	<50.0	<50.0	0	<50.0	<50.0	0
	C15 - C28	mg/kg	100	<100.0	<100.0	0	<100.0	<100.0	0
	C29-C36	mg/kg	100	<100.0	<100.0	0	<100.0	<100.0	0
	>C10-C16	mg/kg	50	<50.0	<50.0	0	<50.0	<50.0	0
	>C16-C34	mg/kg	100	<100.0	<100.0	0	<100.0	<100.0	0
	>C34-C40	mg/kg	100	<100.0	<100.0	0	<100.0	<100.0	0
	F2 (>C10-C16 less Naphtha	mg/kg	50	<50.0	<50.0	0	<50.0	<50.0	0
VTRH & BTEXN in Soil NEPM	Benzene	mg/kg	0.2	<0.2	<0.2	0	<0.2	<0.2	0
	Ethylbenzene	mg/kg	1	<1.0	<1.0	0	<1.0	<1.0	0
	Naphthalene	mg/kg	1	<1.0	<1.0	0	<1.0	<1.0	0
	Toluene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0
	C6 - C9	mg/kg	25	<25.0	<25.0	0	<25.0	<25.0	0
	Xylene (m & p)	mg/kg	2	<2.0	<2.0	0	<2.0	<2.0	0
	Xylene (o)	mg/kg	1	<1.0	<1.0	0	<1.0	<1.0	0
	C6-C10	mg/kg	25	<25.0	<25.0	0	<25.0	<25.0	0
	F1 (C6-C10 less BTEX)	mg/kg	25	<25.0	<25.0	0	<25.0	<25.0	0

*RPDs have only been considered where a concentration is greater than 0 times the EQL

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 100 (0-5 x EQL); 75 (5-10 x EQL); 30 (> 10 x EQL)

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Table 5: UCL Calculations - B(a)P

General UCL Statistics for Data Sets with Non-Detects			
User Selected Options			
From File	WorkSheet.wst		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
BaP			
General Statistics			
Number of Valid Data	8	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	4
		Percent Non-Detects	50.00%
Raw Statistics			
Minimum Detected	0.05	Minimum Detected	-2.996
Maximum Detected	0.91	Maximum Detected	-0.0943
Mean of Detected	0.448	Mean of Detected	-1.476
SD of Detected	0.447	SD of Detected	1.498
Minimum Non-Detect	0.05	Minimum Non-Detect	-2.996
Maximum Non-Detect	0.05	Maximum Non-Detect	-2.996
Log-transformed Statistics			
Warning: There are only 4 Distinct Detected Values in this data			
Note: It should be noted that even though bootstrap may be performed on this data set the resulting calculations may not be reliable enough to draw conclusions			
It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.			
UCL Statistics			
Normal Distribution Test with Detected Values Only	Lognormal Distribution Test with Detected Values Only		
Shapiro Wilk Test Statistic	0.827	Shapiro Wilk Test Statistic	0.834
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level	Data appear Lognormal at 5% Significance Level		
Assuming Normal Distribution			
Assuming Lognormal Distribution			
DL/2 Substitution Method	DL/2 Substitution Method		
Mean	0.236	Mean	-2.582
SD	0.369	SD	1.537
95% DL/2 (t) UCL	0.484	95% H-Stat (DL/2) UCL	4.095
Maximum Likelihood Estimate(MLE) Method			
Log ROS Method			
Mean	0.0166	Mean in Log Scale	-3.747
SD	0.566	SD in Log Scale	2.77
95% MLE (t) UCL	0.396	Mean in Original Scale	0.226
95% MLE (Tiku) UCL	0.485	SD in Original Scale	0.376
		95% t UCL	0.478
		95% Percentile Bootstrap UCL	0.442
		95% BCA Bootstrap UCL	0.509
Gamma Distribution Test with Detected Values Only			
Data Distribution Test with Detected Values Only			
k star (bias corrected)	0.385	Data appear Normal at 5% Significance Level	
Theta Star	1.162		
nu star	3.08		
A-D Test			
Statistic	0.518	Nonparametric Statistics	
5% A-D Critical Value	0.668	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.668	Mean	0.249
5% K-S Critical Value	0.404	SD	0.338
Data appear Gamma Distributed at 5% Significance Level	SE of Mean		
		95% KM (t) UCL	0.51
Assuming Gamma Distribution		95% KM (z) UCL	0.476
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.484
Minimum	0.05	95% KM (bootstrap t) UCL	0.412
Maximum	1.006	95% KM (BCA) UCL	0.79
Mean	0.448	95% KM (Percentile Bootstrap) UCL	0.77
Median	0.355	95% KM (Chebyshev) UCL	0.85
SD	0.398	97.5% KM (Chebyshev) UCL	1.111
k star	0.747	99% KM (Chebyshev) UCL	1.622
Theta star	0.599		
Nu star	11.95	Potential UCLs to Use	
AppChi2	5.197	95% KM (t) UCL	0.51
95% Gamma Approximate UCL	1.029	95% KM (Percentile Bootstrap) UCL	0.77
95% Adjusted Gamma UCL	N/A		
Note: DL/2 is not a recommended method.			
		Mean =	0.64

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006). For additional insight, the user may want to consult a statistician.

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Table 6: UCL Calculations (Lead)

General UCL Statistics for Full Data Sets			
User Selected Options			
From File	WorkSheet_b.wst		
Full Precision	OFF		
Confidence Coefficient	95%		
Number of Bootstrap Operations	2000		
C0			
General Statistics			
Number of Valid Observations	20	Number of Distinct Observations	9
Raw Statistics		Log-transformed Statistics	
Minimum	1	Minimum of Log Data	0
Maximum	430	Maximum of Log Data	6.064
Mean	49.9	Mean of log Data	1.685
Median	3	SD of log Data	2.051
SD	124.2		
Coefficient of Variation	2.489		
Skewness	2.831		
Relevant UCL Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.437	Shapiro Wilk Test Statistic	0.799
Shapiro Wilk Critical Value	0.905	Shapiro Wilk Critical Value	0.905
Data not Normal at 5% Significance Level	Data not Lognormal at 5% Significance Level		
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	97.92	95% H-UCL	349.8
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	118
95% Adjusted-CLT UCL (Chen-1995)	114.4	97.5% Chebyshev (MVUE) UCL	154.3
95% Modified-t UCL (Johnson-1978)	100.8	99% Chebyshev (MVUE) UCL	225.7
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.296	Data do not follow a Discernable Distribution (0.05)	
Theta Star	168.9		
MLE of Mean	49.9		
MLE of Standard Deviation	91.79		
nu star	11.82		
Approximate Chi Square Value (.05)	5.109	Nonparametric Statistics	
Adjusted Level of Significance	0.038	95% CLT UCL	95.58
Adjusted Chi Square Value	4.764	95% Jackknife UCL	97.92
		95% Standard Bootstrap UCL	96.65
Anderson-Darling Test Statistic	2.437	95% Bootstrap-t UCL	433.3
Anderson-Darling 5% Critical Value	0.843	95% Hall's Bootstrap UCL	351.1
Kolmogorov-Smirnov Test Statistic	0.268	95% Percentile Bootstrap UCL	94.15
Kolmogorov-Smirnov 5% Critical Value	0.21	95% BCA Bootstrap UCL	109.1
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	170.9
		97.5% Chebyshev(Mean, Sd) UCL	223.3
		99% Chebyshev(Mean, Sd) UCL	326.2
Assuming Gamma Distribution			
95% Approximate Gamma UCL	115.4		
95% Adjusted Gamma UCL	123.8		
Potential UCL to Use	Use 97.5% Chebyshev (Mean, Sd) UCL		223.3

UPSS Validation Results Summary Table				Total Recoverable Hydrocarbons				BTEX				Heavy Metal	PAH	
Adopted Site Criteria				C ₆ -C ₁₀ (F1)	C ₁₀ -C ₁₆ (F2)	>C ₁₆ -C ₃₄ (F3)	>C ₃₄ -C ₄₀ (F4)	Benzene	Toluene	Ethylbenzene	Xylene (total)	Lead	BaP (TEQ)	Total
				(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
CRC CARE Direct Contact HSL-D Commercial Industrial (2011)				26,000	20,000	27,000	38,000	430	99,000	27,000	81,000	-	-	-
NEPM 1999 (2013 amendment) - Soil HSL for Vapour Intrusion (Table 1A(3)) (mg/kg)		1m- <2m	370	NL	-	-	3	NL	NL	NL	-	-	-	
		2m - <4m	630											
NEPM 1999 (2013 amendment) - Commercial/Industrial HIL-D Criteria (Table 1A(1)) (mg/kg)				-	-	-	-	-	-	-	-	1,500	40	4,000
NEPM 1999 (2013 amendment) - Management Limits for TPH (F1-F4) in Soil (Table 1B(7)) (mg/kg)				700	1,000	3,500	10,000	-	-	-	-	-	-	-
Sample I.D	Sample Date	Location*	PID (ppm)											
TPA/2.7-2.9	29/09/2015	North-west wall	5.4	<10	<50	<50	<100	<0.2	<0.5	<0.5	<0.5	9	ND	ND
TPB1/1.6-1.8	29/09/2015	North-east wall	0.5	<10	<50	<50	<100	<0.2	<0.5	<0.5	<0.5	48	ND	ND
TPB2/1.7-1.9	29/09/2015	North-east wall	1.4	<10	<50	<50	<100	<0.2	<0.5	<0.5	<0.5	<5	ND	ND
TPC/0.5-0.7	29/09/2015	South-east wall	2	<10	<50	<50	<100	<0.2	<0.5	<0.5	<0.5	23	ND	ND
TPD1/2.3-2.5	29/09/2015	South-west wall	21	<10	<50	<50	<100	<0.2	<0.5	<0.5	<0.5	6	ND	ND
TPD2/1.4-1.6	29/09/2015	South-west wall	33.7	<10	<50	<50	<100	<0.2	<0.5	<0.5	<0.5	15	ND	ND
TPE1	29/09/2015	Base	1.3	<10	<50	<50	<100	<0.2	<0.5	<0.5	<0.5	20	ND	ND
TPE2	29/09/2015	Base	0.9	<10	<50	<50	<100	<0.2	<0.5	<0.5	<0.5	16	ND	ND
TL1	29/09/2015	Fuel line trench stockpile	22	<10	<50	210	<100	<0.2	<0.5	<0.5	<0.5	48	1.0	11.8
FD1	29/09/2015	North-east wall	1.4	<10	<50	<50	<100	<0.2	<0.5	<0.5	<0.5	<5	ND	ND
SP1-A	29/09/2015	Tank pit stockpile	30.5	<10	<50	<50	<100	<0.2	<0.5	<0.5	<0.5	9	0.6	7.1
Note:														
* refer to attached figures for sample locations														
ND = non-detect														
NL = non-limiting														

Appendix C

PROPOSED DEVELOPMENT



Perspective View - Looking South/West down Frederick Street

ALL WORKS TO BE IN ACCORDANCE WITH THE BUILDING CODE OF AUSTRALIA AND TO THE SATISFACTION OF THE PRINCIPLE CERTIFYING AUTHORITY

NOTES

TO BE READ IN CONJUNCTION WITH THE FOLLOWING DRAWINGS:

KEY TO ARCHITECTURAL DRAWINGS.

DRAWING STATUS:

Sketch

Rev	Revision Description	Date
A	Planning Approval	19/12/2014



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Frederick Street, Artarmon

Project
Ramsay Healthcare - Proposed
Mental Health Facility

Title
Cover Sheet

Project No	590	
Drawing No	PA-000Rev A	
Scale	@ A2	