SITE AUDIT REPORT

10 Nelson Short Street, Potts Hill NSW 2143

Mushan Group Pty Ltd
27 August 2018

18140 SAR KJL196 SctB

NSW Site Auditor Scheme

Site Audit Statement

A site audit statement summarises the findings of a site audit. For full details of the site auditor's findings, evaluations and conclusions, refer to the associated site audit report.

This form was approved under the *Contaminated Land Management Act 1997* on 12 October 2017.

For information about completing this form, go to Part IV.

Part : Site audit identification

Site audit statement no. KJL196 SctB

This site audit is a:

☐ ~~statutory audit~~

☑ non-statutory audit

within the meaning of the *Contaminated Land Management Act 1997*.

Site auditor details

(As accredited under the *Contaminated Land Management Act 1997*)

Name	Kylie Lloyd
Company	Zoic Environmental Pty Ltd
Address	Suite 1, Level 9, 189 Kent St SYDNEY NSW
	Postcode 2000
Phone	02 9251 8070
Email	kylie.lloyd@zoic.com.au

Site details

Address	10 Nelson Short Street Potts Hill
	Postcode 2143

Property description

(Attach a separate list if several properties are included in the site audit.)

Lot 104 DP1149790

Local government area City of Canterbury Bankstown

Area of site (include units, e.g. hectares) 1.9ha

Current zoning B7 – Business Park

Regulation and notification

To the best of my knowledge:

☐ ~~**the site is** the subject of a declaration, order, agreement, proposal or notice under the *Contaminated Land Management Act 1997* or the *Environmentally Hazardous Chemicals Act 1985,* as follows: (provide the no. if applicable)~~

- ☐ ~~Declaration no.~~
- ☐ ~~Order no.~~
- ☐ ~~Proposal no.~~
- ☐ ~~Notice no.~~

☑ **the site is not** the subject of a declaration, order, proposal or notice under the *Contaminated Land Management Act 1997* or the *Environmentally Hazardous Chemicals Act 1985*.

To the best of my knowledge:

☐ ~~the site **has** been notified to the EPA under section 60 of the *Contaminated Land Management Act 1997*~~

☑ the site **has not** been notified to the EPA under section 60 of the *Contaminated Land Management Act 1997*.

Site audit commissioned by

Name Shener Dursan

Company Mushan Project Management

Address 17 Blackfriars Street, Chippendale

Postcode 2008

Phone 0450 968 931

Email shener.dursan@mushan.com.au

ontact details for contact person (if different from above)

Name

Phone

Email

Nature of statutory re uirements (not applicable for non-statutory audits)

☐ Requirements under the *Contaminated Land Management Act* 1997 (e.g. management order; please specify, including date of issue)

☐ Requirements imposed by an environmental planning instrument (please specify, including date of issue)

☐ Development consent requirements under the *Environmental Planning and Assessment Act 1979* (please specify consent authority and date of issue)

☐ Requirements under other legislation (please specify, including date of issue)

Purpose of site audit

☐ **A1** To determine land use suitability

Intended uses of the land:

OR

☐ **A2** To determine land use suitability subject to compliance with either an active or passive environmental management plan

Intended uses of the land:

OR

(Tick all that apply)

☐ **B1** To determine the nature and extent of contamination

☑ **B2** To determine the appropriateness of:

☐ an investigation plan

☑ a remediation plan

☐ a management plan

☐ **B3** To determine the appropriateness of a **site testing plan** to determine if groundwater is safe and suitable for its intended use as required by the *Temporary Water Restrictions Order for the Botany Sands Groundwater Resource 2017*

☐ **B** To determine the compliance with an approved:

☐ **voluntary management proposal** or

☐ **management order** under the *Contaminated Land Management Act 1997*

☑ **B5** To determine if the land can be made suitable for a particular use (or uses) if the site is remediated or managed in accordance with a specified plan.

Intended uses of the land: Residential with minimal access to soils (Aged care)

nformation sources for site audit

Consultancies which conducted the site investigations and/or remediation:

AECOM and Consulting Earth Scientist (CES)

Titles of reports reviewed:

- CES (16 August 2017) Stage I – Preliminary Site Investigation 10 Nelson Short Street, Potts Hill, New South Wales (Ref: CES170303-SD-AB).

- CES (17 August 2018a) Stage 1 Preliminary Site Investigation 10 Nelson Short Street, Potts Hill, New South Wales (Ref: CES170303-SD-AD Revision 1.0).
- CES (17 August 2018b) Remedial Action Plan 10 Nelson Short Street, Potts Hill, New South Wales (Ref: CES170303-SD-AE Revision 1).

Other information reviewed, including previous site audit reports and statements relating to the site:

- AECOM (2010) Lot 104, Environmental Management Plan, (Ref: S4089128, 20 May 2010).
- Environ (2010) Site Audit Statement & Site Audit Report, Proposed Lot 104, Potts Hill NSW (Ref: AS120712, GN221-7, May 2010).

Site audit report details

Title	Site Audit Report 10 nelson Short Street Potts Hill NSW 2143
Report no. 18140 SAR KJL196 SctB 27Aug18 Final	Date 27 August 2018

Part : Auditor s findings

Please complete either Section A1, Section A2 or Section B, not more than one section. (Strike out the irrelevant sections.)

- Use **Section A1** where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land uses **without the implementation** of an environmental management plan.
- Use **Section A2** where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land uses **with the implementation** of an active or passive environmental management plan.
- Use **Section B** where the audit is to determine:
  - (B1) the nature and extent of contamination, and/or
  - (B2) the appropriateness of an investigation, remediation or management plan[1], and/or
  - (B3) the appropriateness of a site testing plan in accordance with the *Temporary Water Restrictions Order for the Botany Sands Groundwater Source 2017*, and/or
  - (B4) whether the terms of the approved voluntary management proposal or management order have been complied with, and/or
  - (B5) whether the site can be made suitable for a specified land use (or uses) if the site is remediated or managed in accordance with the implementation of a specified plan.

[1] For simplicity, this statement uses the term ‘plan’ to refer to both plans and reports.

Section A1

certify that, in my opinion:

The **site is suitable** for the following uses:

(Tick all appropriate uses and strike out those not applicable.)

☐ Residential, including substantial vegetable garden and poultry

☐ Residential, including substantial vegetable garden, excluding poultry

☐ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry

☐ Day care centre, preschool, primary school

☐ Residential with minimal opportunity for soil access, including units

☐ Secondary school

☐ Park, recreational open space, playing field

☐ Commercial/industrial

☐ Other (please specify):

_____

R

☐ I certify that, in my opinion, the **site is not suitable** for any use due to the risk of harm from contamination.

Overall comments:

_____

_____

_____

_____

_____

Section A2

certify that, in my opinion:

Subject to compliance with the **attached** environmental management plan[2] (EMP), the site is suitable for the following uses:

(Tick all appropriate uses and strike out those not applicable.)

☐ Residential, including substantial vegetable garden and poultry

☐ Residential, including substantial vegetable garden, excluding poultry

☐ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry

☐ Day care centre, preschool, primary school

☐ Residential with minimal opportunity for soil access, including units

☐ Secondary school

☐ Park, recreational open space, playing field

☐ Commercial/industrial

☐ Other (please specify):

_____

P details

Title _____

Author _____

Date _____ No. of pages _____

P summary

This EMP (attached) is required to be implemented to address residual contamination on the site.

The EMP: (Tick appropriate box and strike out the other option.)

☐ requires operation and/or maintenance of **active** control systems[3]

☐ requires maintenance of **passive** control systems only[3].

[2] Refer to Part IV for an explanation of an environmental management plan.
[3] Refer to Part IV for definitions of active and passive control systems.

~~Purpose of the EMP:~~

~~Description of the nature of the residual contamination:~~

~~Summary of the actions required by the EMP:~~

~~How the EMP can reasonably be made to be legally enforceable:~~

~~How there will be appropriate public notification:~~

~~Overall comments:~~

Section B

Purpose of the plan[4] which is the subject of this audit:

Section 7.1 of the RAP states that the purpose of the RAP is to provide sufficient engineering and management controls to make the site suitable (with respect to soil contamination) for the proposed development with accessible soils.

It is noted that the development is for residential land use with minimal access to soils and additional conditions imposed within this SAS are placed to include suitability of groundwater.

certify that, in my opinion:

(B1)

☐ ~~The nature and extent of the contamination **has** been appropriately determined~~

☐ ~~The nature and extent of the contamination **has not** been appropriately determined~~

AND/OR (B2)

☑ The investigation, remediation or management plan **is** appropriate for the purpose stated above

☐ ~~The investigation, remediation or management plan **is not** appropriate for the purpose stated above~~

~~AND/OR (B3)~~

☐ ~~The site testing plan:~~

- ☐ ~~**is** appropriate to determine~~
- ☐ ~~**is not** appropriate to determine~~

~~if groundwater is safe and suitable for its intended use as required by the *Temporary Water Restrictions Order for the Botany Sands Groundwater Resource 2017*~~

~~AND/OR (B4)~~

☐ ~~The terms of the approved voluntary management proposal* or management order** (strike out as appropriate):~~

- ☐ ~~**have** been complied with~~
- ☐ ~~**have not** been complied with.~~

~~*voluntary management proposal no.~~

~~**management order no.~~

AND/OR (B5)

[4] For simplicity, this statement uses the term ‘plan’ to refer to both plans and reports.

☑ The site **can be made suitable** for the following uses:

(Tick all appropriate uses and strike out those not applicable.)

~~☐ Residential, including substantial vegetable garden and poultry~~

~~☐ Residential, including substantial vegetable garden, excluding poultry~~

~~☐ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry~~

~~☐ Day care centre, preschool, primary school~~

☑ Residential with minimal opportunity for soil access, including units

~~☐ Secondary school~~

~~☐ Park, recreational open space, playing field~~

~~☐ Commercial/industrial~~

~~☐ Other (please specify):~~

IF the site is remediated/managed* in accordance with the following plan (**attached**):

*Strike out as appropriate

Plan title	Remediation Action Plan 10 Nelson Short Street, Potts Hill NSW	
Plan author	Consulting Earth Scientists	
Plan date	17 August 2018	No. of pages 77

SUBJECT to compliance with the following condition(s):

1 Additional investigation is conducted within the Embankment and Apron to confirm the previous results. A sampling, analytical and quality plan for the additional investigation is to be provided to and endorsed by the Auditor prior to sampling.

2 Fill to be retained shall be assessed for asbestos as per NEPM (2013) requirements and as per Section 5 of the RAP. The Auditor requires sampling be conducted to the base of the fill with adequate samples to characterise the fill. The consultant shall demonstrate that any impact has not impacted the underlying natural material.

3 Pending consultation with Council, the location of any tree that will be retained is to be confirmed. Any tree to be retained will require adequate assessment. The proposed assessment around any tree to be retained shall be provided to and endorsed by the Auditor prior to sampling.

Remaining impacts in the fill (if any) shall be assessed for potential leaching to groundwater.

5 Should contamination be retained onsite, details of proposed capping and capping validation strategy (quality and extent) are to be provided in a revised RAP. The revised RAP shall be provided to the Auditor for endorsement prior to the capping placement.

6 Should friable asbestos be identified at the site, or should significant asbestos containing fragments are identified, the need for air monitoring shall be assessed by a licenced asbestos assessor or a competent person in accordance with the SafeWork NSW (2016) Code of Practice How to Manage and Control Asbestos in the Workplace and SafeWork NSW (2016) Code of Practice How to Safely Remove Asbestos. Asbestos removal and validation shall be conducted as per these Code of Practices.

7 Material tracking be conducted for material remaining onsite and material disposed of offsite as per the RAP and NSW EPA (2017) requirements.

~~Overall comments:~~

Part : Auditor s declaration

I am accredited as a site auditor by the NSW Environment Protection Authority (EPA) under the *Contaminated Land Management Act 1997.*

Accreditation no. 0302

certify that:

- I have completed the site audit free of any conflicts of interest as defined in the *Contaminated Land Management Act 1997,* and
- with due regard to relevant laws and guidelines, I have examined and am familiar with the reports and information referred to in Part I of this site audit, and
- on the basis of inquiries I have made of those individuals immediately responsible for making those reports and obtaining the information referred to in this statement, those reports and that information are, to the best of my knowledge, true, accurate and complete, and
- this statement is, to the best of my knowledge, true, accurate and complete.

I am aware that there are penalties under the *Contaminated Land Management Act 1997* for wilfully making false or misleading statements.

Signed 

Date 27 August 2018

Part : xplanatory notes

To be complete, a site audit statement form must be issued with all four parts.

How to complete this form

Part

Part I identifies the auditor, the site, the purpose of the audit and the information used by the auditor in making the site audit findings.

Part

Part II contains the auditor's opinion of the suitability of the site for specified uses or of the appropriateness of an investigation, or remediation plan or management plan which may enable a particular use. It sets out succinct and definitive information to assist decision-making about the use or uses of the site or a plan or proposal to manage or remediate the site.

The auditor is to complete either Section A1 or Section A2 or Section B of Part II, **not** more than one section.

Section A1

In Section A1 the auditor may conclude that the land is *suitable* for a specified use or uses OR *not suitable* for any beneficial use due to the risk of harm from contamination.

By certifying that the site is *suitable*, an auditor declares that, at the time of completion of the site audit, no further investigation or remediation or management of the site was needed to render the site fit for the specified use(s). **onditions must not be** imposed on a Section A1 site audit statement. Auditors may include **comments** which are key observations in light of the audit which are not directly related to the suitability of the site for the use(s). These observations may cover aspects relating to the broader environmental context to aid decision-making in relation to the site.

Section A2

In Section A2 the auditor may conclude that the land is *suitable* for a specified use(s) subject to a condition for implementation of an environmental management plan (EMP).

Environmental management plan

Within the context of contaminated sites management, an EMP (sometimes also called a 'site management plan') means a plan which addresses the integration of environmental mitigation and monitoring measures for soil, groundwater and/or hazardous ground gases throughout an existing or proposed land use. An EMP succinctly describes the nature and location of contamination remaining on site and states what the objectives of the plan are, how contaminants will be managed, who will be responsible for the plan's implementation and over what time frame actions specified in the plan will take place.

By certifying that the site is suitable subject to implementation of an EMP, an auditor declares that, at the time of completion of the site audit, there was sufficient information satisfying guidelines made or approved under the *Contaminated Land Management Act 1997*

(CLM Act) to determine that implementation of the EMP was feasible and would enable the specified use(s) of the site and no further investigation or remediation of the site was needed to render the site fit for the specified use(s).

Implementation of an EMP is required to ensure the site remains suitable for the specified use(s). The plan should be legally enforceable: for example, a requirement of a notice under the CLM Act or a development consent condition issued by a planning authority. There should also be appropriate public notification of the plan, e.g. on a certificate issued under s.149 of *the Environmental Planning and Assessment Act 1979*.

Active or passive control systems

Auditors must specify whether the EMP requires operation and/or maintenance of active control systems or requires maintenance of passive control systems only. Active management systems usually incorporate mechanical components and/or require monitoring and, because of this, regular maintenance and inspection are necessary. Most active management systems are applied at sites where if the systems are not implemented an unacceptable risk may occur. Passive management systems usually require minimal management and maintenance and do not usually incorporate mechanical components.

Auditor's comments

Auditors may also include **comments** which are key observations in light of the audit which are not directly related to the suitability of the site for the use(s). These observations may cover aspects relating to the broader environmental context to aid decision-making in relation to the site.

Section B

In Section B the auditor draws conclusions on the nature and extent of contamination, and/or suitability of plans relating to the investigation, remediation or management of the land, and/or the appropriateness of a site testing plan in accordance with the *Temporary Water Restrictions Order for the Botany Sands Groundwater Source 2017*, and/or whether the terms of an approved voluntary management proposal or management order made under the CLM Act have been complied with, and/or whether the site can be made suitable for a specified land use or uses if the site is remediated or managed in accordance with the implementation of a specified plan.

By certifying that a site *can be made suitable* for a use or uses if remediated or managed in accordance with a specified plan, the auditor declares that, at the time the audit was completed, there was sufficient information satisfying guidelines made or approved under the CLM Act to determine that implementation of the plan was feasible and would enable the specified use(s) of the site in the future.

For a site that *can be made suitable*, any **conditions** specified by the auditor in Section B should be limited to minor modifications or additions to the specified plan. However, if the auditor considers that further audits of the site (e.g. to validate remediation) are required, the auditor must note this as a condition in the site audit statement. The condition must not specify an individual auditor, only that further audits are required.

Auditors may also include **comments** which are observations in light of the audit which provide a more complete understanding of the environmental context to aid decision-making in relation to the site.

Part

In **Part** the auditor certifies their standing as an accredited auditor under the CLM Act and makes other relevant declarations.

Where to send completed forms

In addition to furnishing a copy of the audit statement to the person(s) who commissioned the site audit, statutory site audit statements must be sent to

- the **NSW nvironment Protection Authority**: nswauditors@epa.nsw.gov.au or as specified by the EPA

  AND

- the **local council** for the land which is the subject of the audit.

Quality Management

Document Distribution

Issue/Revision	Issue 1	Revision 1	Revision 2
Remarks	DRAFT	FINAL	
Date	24 August 2018	27 August 2018	
Prepared by	Kylie Lloyd with assistance from: • Cheryl Halim	Kylie Lloyd with assistance from: Cheryl Halim	
Signature	DRAFT		
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This report was prepared in accordance with the scope of services set out in the contract between Zoic Environmental Pty Ltd, ABN 23 154 745 525, and the client.

Zoic Environmental Pty Ltd
ABN 23 154 745 525
Suite 1, Level 9
189 Kent Street, Sydney 2000
Phone: +61 2 9251 8070
www.zoic.com.au

Executive Summary

This Audit was commissioned by Mushan Group Pty Ltd (Mushan) to provide an independent review of the appropriateness of environmental works completed at 10 Nelson Short Street, Potts Hill, NSW ('the site').

The site occupies approximately 1.9ha and is identified as Lot 104 DP1149790 and is proposed to be developed as high density residential development for seniors living comprising a four-storey apartment block above a single-level underground car park

This Site Audit Report (SAR) and associated Site Audit Statement (SAS) considers investigation, conducted by CES to form an opinion on whether the site can be made suitable with the implementation of a Remedial Action Plan for the proposed high-density residential development for seniors living comprising a four-storey apartment block above a single-level underground car park.

It is understood that the Audit is currently non-statutory in nature and has been prepared to accompany documents for development application (DA) submission.

The site was subject to the previous site audit (Environ, 2010). Work conducted during previous site audit were as follows:

- Potentially contaminating activities at the site included a former underground storage tank (UST) in the south-western portion of the site, storage of shipping containers and drums, above ground fuel storage area in the north-western corner of the site, the presence of drums on the middle of the eastern boundary of the Main area, equipment wash down area, potential building waste materials in the embankment, distribution of excavated spoil which could potentially contain ash waste, fly ash, waste associated with the removal of bitumen-based pipe linings (including within the embankment).
- Previous investigations indicated elevated heavy metals (primarily arsenic, lead, zinc), TPH C_{10}-C_{36} within the Main area and a fragment of asbestos containing cement bonded sheeting within the embankment.
- Remediation works previously conducted at the site included re-excavation and validation of the UST pit area, the excavation and offsite disposal of the PAH impacted fill from five locations, the screening and removal of the top one metre of surface material from a portion of the Main Area with the screened soil validated for re-use to backfill remediation excavations at the site and adjoining sites, and the excavation, screening and re-emplacement of soils for the stabilisation of the Embankment.
- The previous Environ (2010) site audit report and site audit statement concluded that the remedial works and validation sampling was adequate to demonstrate the Main Area of the site suitable for commercial/industrial use. The Embankment area, however, was not considered suitable for unrestricted commercial/industrial use but could be maintained in a condition suitable for commercial/ industrial use with the provision of an Environmental Management Plan (EMP) to manage PAH contaminated fill at the site.

The investigation conducted by CES indicated:

- Soil results in fill in the main area of the site were below criteria nominated for residential use with minimal access to soils, with the exception of one sample exceeding ESL for benzo(a)pyrene (at 1.4mg/kg), noting this location is located in an area likely to be excavated for basement excavation. Noting that that no investigation was conducted within the embankment (where the EMP applies) or the apron.

- Groundwater samples from the recent investigation indicated results were below criteria with the exception of copper, nickel and zinc exceeding marine and/or freshwater GILs, which were considered to be associated with background concentrations.

The investigation reviewed are generally considered to have met the requirements of NSW EPA (2017), other relevant guidelines endorsed under s.105 of the CLM Act and the objectives of the Audit. Where the consultant's work deviated from the guidelines, the Auditor has discussed this within the SAR and is satisfied that these omissions do not affect the conclusions of the Audit.

CES (17 August 2018b) remedial action plan provides a strategy to confirm the historical results in the embankment and apron and validate the site following basement excavation.

The investigation reviewed are generally considered to have met the requirements of EPA (2017), other relevant guidelines endorsed under s.105 of the CLM Act and the objectives of the Site Audit. Where the consultant's work deviated from the guidelines, the Auditor has discussed this within this SAR and is satisfied that these omissions do not affect the conclusions of the Audit.

On this basis a Section B SAS will be issued certifying that, in the opinion of the Auditor, the site is suitable for residential with minimal opportunity for soil access, including units, provided that the CES (17 August 2018b) Remedial Action Plan 10 Nelson Short Street, Potts Hill, New South Wales (Ref: CES170303-SD-AE, Revision 1.0) is implemented together with the following conditions:

1. Additional investigation is conducted within the Embankment and Apron to confirm the previous results. A sampling, analytical and quality plan for the additional investigation is to be provided to and endorsed by the Auditor prior to sampling.
2. Fill to be retained shall be assessed for asbestos as per NEPM (2013) requirements and as per Section 5 of the RAP. The Auditor requires sampling be conducted to the base of the fill with adequate samples to characterise the fill. The consultant shall demonstrate that any impact has not impacted the underlying natural material.
3. Pending consultation with Council, the location of any tree that will be retained is to be confirmed. Any tree to be retained will require adequate assessment. The proposed assessment around any tree to be retained shall be provided to and endorsed by the Auditor prior to sampling.
4. Remaining impacts in the fill (if any) shall be assessed for potential leaching to groundwater.
5. Should contamination be retained onsite, details of proposed capping and capping validation strategy (quality and extent) are to be provided in a revised RAP. The revised RAP shall be provided to the Auditor for endorsement prior to the capping placement.
6. Should friable asbestos be identified at the site, or should significant asbestos containing fragments are identified, the need for air monitoring shall be assessed by a licenced asbestos assessor or a competent person in accordance with the SafeWork NSW (2016) Code of Practice How to Manage and Control Asbestos in the Workplace and SafeWork NSW (2016) Code of Practice How to Safely Remove Asbestos. Asbestos removal and validation shall be conducted as per these Code of Practices.
7. Material tracking be conducted for material remaining onsite and material disposed of offsite as per the RAP and NSW EPA (2017) requirements.

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1. Introduction

This Audit was commissioned by Mushan Group Pty Ltd (Mushan) to provide an independent review of the appropriateness of environmental works completed at 10 Nelson Short Street, Potts Hill, NSW ('the site').

This Site Audit Report (SAR KJL196 SctB) and associated Site Audit Statement (SAS KJL196 SctB) were produced by Kylie Lloyd (Accreditation No. 0302) employed by Zoic Environmental Pty Ltd (Zoic). Cheryl Halim of Zoic provided assistance during the course of the Audit.

The site occupies approximately 1.9ha and is identified as Lot 104 DP1149790.

This Site Audit Report (SAR) and associated Site Audit Statement (SAS) considers investigation, remediation and validation works conducted by AECOM and CES to form an opinion on whether the site is suitable for the proposed high-density residential development for seniors living comprising a four-storey apartment block above a single-level underground car park. The Auditor notes that several other companies and consultants (Fluor Daniel GTI (Australia) Pty Ltd, Sydney Water Corporation, URS Australia, GHD Pty Ltd, Coffey Geosciences Pty Ltd) were also involved during previous site audit conducted by Environ (2010), but their reports were not reviewed by the current auditor.

It is understood that the Audit is currently non-statutory in nature and has been prepared to accompany documents for development application (DA) submission.

This SAR makes reference to guidelines that were originally issued by the environmental regulator under the names of the NSW Environmental Protection Authority (EPA), NSW Department of Environmental and Conservation (DEC), NSW Department of Environment and Climate Change (DECC), NSW Department of Environment, Climate Change and Water (DECCW) and NSW Office of Environment & Heritage (OEH) part of the Department of Premier and Cabinet. For the purpose of currency, the organisation is referred to as EPA in this report. EPA approved guidelines will be referenced by the name of the organisation at the time of publication.

1.1 Site Background

1.1.1 Regulatory Requirements for Audit

The site audit has not been required by any regulatory requirement at this stage.

1.1.2 Previous Site Audit

Graeme Nyland of Environ previously issued a Section A site audit for the site, as documented in Environ (2010) Site Audit Statement & Site Audit Report, Proposed Lot 104, Potts Hill NSW (Ref: AS120712, GN221-7, May 2010). The site audit findings are as follows:

The site was subject to substantial filling during construction of the Potts Hill Reservoir, and the main area of the site was previously occupied by the Sydney Water hydrographics office and workshop/ test room facilities as well as areas used for storage of equipment and drums. Investigations at the site indicated generally uncontaminated bulk fill at depth and some, primarily PAH, contamination of shallow/ surface fill in the main area and in the embankments in the south and east of the site. Underground storage tanks (USTs) have been removed from the site, and remediation of shallow fill conducted. Works have been undertaken to stabilise the embankments, however contaminated material was not all removed. Therefore ongoing management of the embankments is required under an Environmental Management Plan (EMP) to prevent site users from exposure to residual contamination in the embankments. The management area subject to the controls specified in the EMP comprises the embankments and adjacent apron. The key features of the EMP are:

- Identification of potential hazards and minimum health and safety measures specific to PAH contamination.
- Maintenance of the jute matting on the embankment faces and ensuring adequate vegetation coverage over the management area
- Environmental protection measures for when soils are excavated, exposed or otherwise disturbed, including for water, soil, odour and dust control/ management
- Requirements for the classification and disposal of any soils from the embankment
- Routine inspection of the management srea to confirm it is being maintained in a stable condition, with a corresponding corrective action process
- Process for annual review of records under the EMP and revision of the EMP as appropriate.

The EMP is attached as an appendix to the Site Audit Report. It is recommended that the EMP be included with the Section 149(5) certificate for the site.

Groundwater has not been assessed and no contamination has been detected in soil that would be expected to lead to groundwater contamination. Abstraction of groundwater would not be expected at the site given the saline and low yield nature of the aquifer. Any future groundwater abstraction would require investigation of the groundwater resource and approval from the NSW Office of Water.

1.2 Overview of Site Audit Process

The Audit has been conducted in accordance with the requirements of the CLM Act 1997, as amended, which (in Part 1, Section 4 definitions) states:

"site audit" means a review:

a. That relates to management (whether under this Act or otherwise) of the actual or possible contamination of land; and

b. That is conducted for the purpose of determining any one or more of the following matters:

   i. The nature and extent of any contamination of the land,

   ii. The nature and extent of any management of actual or possible contamination of the land,

iii. Whether the land is suitable for any specified use or range of uses,

iv. What management remains necessary before the land is suitable for any specified use or range of uses, and

v. The suitability and appropriateness of a plan of management, long-term management plan or a voluntary management proposal.

NSW EPA (2017) Contaminated Land Management Guidelines for the NSW Site Auditor Scheme (3rd Edition), describes the site assessment and audit process as:

1. The Consultant is commissioned to assess contamination. The contaminated site consultant designs and undertakes the site assessment and, where required, all remediation and validation activities to achieve the objectives specified by the owner or developer; and
2. The Site auditor reviews the Consultant's work. The site owner or developer commissions the site auditor to review the consultant's work. The auditor prepares a site audit report and a site audit statement at the conclusion of the review, which are given to the owner or developer.

Part 4, Section 53B (6) of the CLM Act 1997, as amended, describes that Audits conducted by EPA accredited Auditors must take the following matters into account:

- The provisions of the CLM Act and the CLM Regulations;
- The guidelines made or approved by the EPA; and
- The provisions of any environmental planning instruments applying to the site.

1.3 Guidelines Made or Approved by EPA Under the CLM Act

Guidelines made by EPA under Section 105 of the CLM Act 1997 at the time of this report are:

- EPA (1995a) Contaminated Sites: Guidelines for the Vertical Mixing of Soil on Former Broad-Acre Agricultural Land. NSW EPA, Sydney;
- EPA (1995b) Contaminated Sites: Sampling Design Guidelines. NSW EPA, Sydney;
- EPA (1997) Contaminated Sites: Guidelines for Assessing Banana Plantation Sites. NSW EPA, Sydney;
- DEC (2005) Contaminated Sites: Guidelines for Assessing Former Orchards and Market Gardens. NSW DEC, Sydney;
- DEC (2007) Guidelines for Assessment and Management of Groundwater Contamination. NSW DEC Sydney;
- DECCW (2009) Guidelines for Implementing the POEO (Underground Petroleum Storage Systems) Regulation 2008;
- OEH (2011) Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites. NSW OEH, Sydney;
- EPA (2015) Contaminated Sites: Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 2009. NSW EPA, Sydney; and
- EPA (2017) Contaminated Land Management Guidelines for the NSW Site Auditor Scheme (3rd Edition). NSW EPA, Sydney.

Guidelines approved by EPA under Section 105 of the CLM Act 1997 at the time of this report are:

- NSW Agricultural/CMPS&F (1996) Guidelines for the Assessment and Clean Up of Cattle Tick Dip Sites for Residential Purposes, NSW Agricultural and CMPS&F Environmental, Canberra.

- Lock, W. H., (1996) Composite Sampling, National Environmental Health Forum Monographs, Soil Series No. 3, National Environmental Health Forum, SA Health Commission, Adelaide;
- NEPC (1999) National Environment Protection (Assessment of Site Contamination) Measure, Schedule A and Schedules B(1)-B(9). National Environment Protection Council, Adelaide as amended in April 2013 [referred to herein as NEPM (2013)];
- ANZECC/ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Paper No 4, Canberra;
- Department of Health and Ageing and EnHealth Council (2002) Environmental Health Risk Assessment: Guidelines for Assessing Human Health Risks from Environmental Hazards. Commonwealth of Australia, Canberra; and
- WA DoH (2009) Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia;
- NHMRC/NRMMC (2011) Australian Drinking Water Guidelines. National Health and Medical Research Council and National Resource Management Ministerial Council of Australia and New Zealand (Updated November 2016);
- CRC Care (2011) Technical Report No. 10 Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater;
- CRC Care (2013) Technical Report No. 23 Petroleum Hydrocarbon Vapour Intrusion Assessment;
- Protection of the Environment Operations (Underground Petroleum Storage Systems Regulation) 2014;
- Protection of the Environment Operations (General) Amendment (Underground Petroleum Storage Systems Regulation) 2017.

In addition to the above, the Auditor has given due regard to the provisions of the NSW Government's framework for managing waste under the Protection of the Environment Operations Act 1997 (NSW) (POEO Act 1997) and Waste Avoidance and Recovery Act 2001.

Where relevant, consideration has also been given to technical guidance on the assessment of contamination in NSW as presented on the EPA website (http://www.epa.nsw.gov.au/clm/otherguidance.htm).

1.4 Reports Reviewed

During the course of the Audit, the following reports were provided to the Auditor:

- CES (16 August 2017) Stage I – Preliminary Site Investigation 10 Nelson Short Street, Potts Hill, New South Wales (Ref: CES170303-SD-AB).
- CES (17 August 2018a) Stage 1 Preliminary Site Investigation 10 Nelson Short Street, Potts Hill, New South Wales (Ref: CES170303-SD-AD Revision 1.0).
- CES (17 August 2018b) Remedial Action Plan 10 Nelson Short Street, Potts Hill, New South Wales (Ref: CES170303-SD-AE Revision 1).

Additionally, the Auditor also reviewed the following reports:

- AECOM (2010) Lot 104, Environmental Management Plan, (Ref: S4089128, 20 May 2010).
- Environ (2010) Site Audit Statement & Site Audit Report, Proposed Lot 104, Potts Hill NSW (Ref: AS120712, GN221-7, May 2010).

The Auditor notes that the previous site audit report (Environ, 2010) provide an extensive report reference. These reports have not been provided to the auditor for review. The Auditor relies on the information provided in AECOM (2010) and Environ (2010) as a supplementary to the CES reports.

1.5 Audit Meetings and Site Inspection

The Auditor conducted a site visit on 8 August 2018. At the time of the site visit, the site was fenced. The observations during site visit indicated that the site was flat comprising one big mound across the site. The mound was estimated to be deepest on the Graf Avenue boundary (at 8m deep), and reduces in depth to being level with Nelson Short Street boundary. No obvious odour or signs of contamination were observed. No evidence of fibre cement fragment potentially containing asbestos was identified on the site surface. A few additional stockpiles which appeared to have been recently dumped were observed on the south west of the property. Vegetation onsite appeared to be in healthy condition.

Mushan states that there will be a 20m setback from Graf Avenue and that the majority of the site will have one basement level. A tree and associated fill on the Bruker Street boundary are likely to remain.

1.6 Audit Correspondence

The Auditor provided feedback to the consultant during the course of the Audit in the form of interim advice letters or email correspondence. A copy of these letters or relevant email correspondence is included in Appendix B together with any relevant consultant responses. Where appropriate, these are referred to in the SAR.

2. Site Identification and Description

This section provides detail on land use, surrounding properties and summarises potential sensitive human health and environmental receptors. This information has been sourced from the reports referenced in Section 1.4.

2.1 Site Identification

The site location is shown in Consultant Figures reproduced in Appendix A. The site identification and land use details include:

Table 2.1: Site Identification

Title	Details
Street Address:	10 Nelson Short Street, Potts Hill, NSW
Property Description:	Lot 104 DP1149790
Current Site Ownership:	Potts Hill Group Pty Ltd
Geographical Coordinates:	Lat: -33.898° Long: 151.035°
Property Size:	1.9 hectares
Local Government Area:	City of Canterbury Bankstown
Zoning – Existing:	B7 – Business Park
Zoning – Previous:	Previous Audit reports that the site was previously zoned as 'Special A' (water, sewerage and drainage)

2.2 Surrounding Land Use

The site is located in a predominantly residential and commercial/industrial area with immediate adjoining land uses described as follows:

Table 2.2: Immediate Site Surrounds

Title	Details
North:	Potts Hill NSW Police Facility within the Potts Hill Business Park, with residential areas beyond. The previous audit identifies the site was previously used for equipment storage.
East:	Graf Avenue, with low density residential properties of Yagoona beyond, and the industrial areas of Chullora further east.
South:	Brunker Road, with low density residential properties of Yagoona beyond.
West:	Elson Short Ridge and the Sydney Water reservoir 'Reservoir 2' beyond.

2.3 Site Condition

2.3.1 Historically

In the 2010 Audit, the investigations 2003-2009 identify the following prior to **remediation and validation:**

- A large building in the central west identified as condemned, which was believed to include offices, equipment test room, laboratory;
- An amenities block;
- Demountables used for hydrographic operations and minor workshops for calibration and field storage equipment;
- An external water flume used to calibrate water flow meters. It was reported as using potable water;
- An underground storage tank on the south-west of the site;
- South and south-eastern yard areas used to store shopping containers (with no evidence of bulk chemicals) was characterised by poor condition asphalt
- Concrete and asphalt were observed on the remainder of the site to be in good condition.
- A small above ground fuel storage area was observed in the north-west corner of the site with some rusted drums in the middle of the eastern boundary of the main area, south of the washdown area.
- Potential building waste material (concrete, bitumen, ballast, terracotta, gravels) in accessible areas of the southern embankment.
- The buildings contained some hazardous materials (flat fibrous cement sheeting);
- No significant quantities of ACM were identified

At the completion of the site remediation and embankment stabilisation works in April/May 2010, the site was observed to be unsealed, even grade, with reworked, reinstated and stabilised embankments with some minor anthropogenic materials on the surface (coal, terracotta, asphalt and plastic).

2.3.2 Areas of the Audit

The Auditor notes that the previous investigations and the AECOM (2010) EMP have divided the site into three main areas based on works completed post demolition of historical use:

- **Main Area**: the flat or developable portion of the site, comprising 1.5ha and the fill was observed to comprise reservoir-derived spoil.
- **Embankments**: steeply sloping land positioned below and to the east and south of the Main Area.
- **Apron**: a strip of land between the base of the Embankments and the eastern and southern site boundary.

These areas will be referred to in this SAR.

2.3.3 Current

At the time of CES site inspection in July 2017, the site comprised two conjoined areas of vegetated open space with no buildings. CES states that during the site inspection there were signs of dry and browned vegetation, however the vegetation was not considered distressed. No

surface staining was identified in the accessible areas observed. No evidence of above ground or below ground fuel storage tanks was identified at the site.

2.3.4 Proposed

The proposed development includes high density residential for seniors living comprising several four-storey apartment blocks above a common single-level underground car park. A 20m landscaped set back is proposed along the Graf Avenue boundary, with smaller landscaped setbacks on the other boundaries. Site entrance will be through Nelson Short Street.

2.4 Auditor Discussion

The information required by OEH (2011), in regard to site identification and condition, was generally provided, and is consistent with observations made during the initial site inspection conducted as part of this Audit.

Where the information was not provided, the Auditor contacted Mushan or CES to obtain the necessary information.

The site has been previously used as ancillary to Sydney Water operations, with a UST, buildings and the main area being paved. The observations made by CES and the Auditor are consistent with the reported post remediation stage documented in the Environ Audit in 2010.

3. Stages of Work

3.1 Summary of Works

The table below provides a summary of the investigation, remediation, validation and management works that have taken place at the site:

Table 3.1: Summary of Works Completed

Date	Report Objectives, Scope and Outcomes
AECOM (2010) Lot 104, Environmental Management Plan (Ref: S4089128, 20 May 2010)	This document was prepared to address PAH contamination related risks and appropriate management of those risks during the construction and operational phase of the site. The EMP defines the following three areas: • **Main Area**: the flat or developable portion of the site, comprising 1.5ha and the fill was observed to comprise reservoir-derived spoil. BaP was identified at up to 8.2mg/kg, with 95% UCL of BaP and total PAHs to 1.1mbgl below the site criteria. This area was considered to be suitable for commercial/industrial landuse. • **Embankments**: steeply sloping land positioned below and to the east and south of the Main Area. This area was contaminated with PAHs but was considered to be able to be suitable for commercial/industrial landuse provided the EMP is adopted. The locations were PAH contamination were identified had been substantially reworked. • **Apron**: a strip of land between the base of the Embankments and the eastern and southern site boundary. The Apron is part of the Embankments and is known as the Management Area for the purpose of the EMP. Limited investigation data was available, however no PAH was identified at the locations tested. The objectives of the report were to: • Summarise background environmental information and conditions at the site, particularly the Management Area. • Outline methods to mitigate any adverse effects of the Management Area on the environment and human health. • Provide measures for the management of PAH contaminated fill material in the Management Area. • Provide monitoring and maintenance measures for the Management Area The EMP applies for the construction works and operational phase of the site and provides strategy for the following activities: • Excavations into the Management Area (e.g. for the installation and/or repair of services, gardening/landscaping purposes). • The stockpiling, storage, movement and general handling of the excavated Management Area materials. • The onsite reuse or offsite disposal of excavated Management Area fill materials. • General disturbance of the Management Area during routine maintenance works (e.g. lawn-mowing and gardening contractors). • The importation and use of soil fill materials on the Management Area. • Routine inspections of the Management Area (i.e. monitoring of Management Area conditions).
Environ (2010) Site Audit Statement & Site Audit Report, Proposed Lot 104, Potts Hill NSW (Ref: AS120712, GN221-7, May 2010)	The objective of the audit is to assess site suitability for commercial/industrial use. The Audit concluded "the site is suitable for the purposes of "commercial or industrial" land use subject to compliance with the following environmental management plan which specifies controls for the Embankments: • 'Lot 104, Environmental Management Plan' dated 20 May 2010 by AECOM Australia Pty Ltd. Groundwater has not been assessed and no contamination has detected in soil that would be expected to lead to groundwater contamination. Abstraction of groundwater would not be expected at the site given the saline and low yield nature of the aquifer. Any future

Date	Report Objectives, Scope and Outcomes
	groundwater abstraction would require investigation of the groundwater resource and approval from the NSW Office of Water."
CES (16 August 2017) Stage I – Preliminary Site Investigation 10 Nelson Short Street, Potts Hill, New South Wales (Ref: CES170303-SD-AB)	The objective of this report was to assess whether the site is likely to be suitable for the proposed high density residential development designed for seniors living, or whether further investigation or remediation is required. Scope of work included: • Desktop study, including review of previous investigation, remediation and validation reports and site audit report/site audit statement; review of historical title records, aerial photographs, Section 149 planning certificates, NSW EPA records, groundwater bore data records, SafeWork NSW records. • Site inspection and soil sampling from 15 boreholes (BH01 to BH15). All locations were conducted from the Main Area (not within the Embankments). • Groundwater sampling from 2 wells (BH02 and BH03). The outcomes of the report were as follows: • All samples were below health-based criteria. One location exceeded BaP ESL, however CES considers this to be acceptable given the entire footprint of the proposed development will be excavated for the construction of a basement carpark. • Groundwater concentrations were below criteria, with the exception of copper, nickel and zinc which exceeded NEPM (2013) marine water groundwater investigation level (GIL). CES considers the heavy metal concentrations to be background concentrations and are unlikely to impact the receiving water body of Cooks River. • The total organic carbon (TOC) content of fill and natural soil samples below 3m indicates a Characteristic Situation 1 and was considered to be a very low ground gas risk. • CES considers the main site (flat area) is likely to be suitable for the proposed high rise residential seniors living development. However, the area of the embankment (currently subject to EMP) has not been investigated due to access issue. The Embankment area will require investigation and potentially remediation to address previously identified contaminants for the proposed landuse. • Preliminary waste classification indicates the fill material was expected to be classified as general solid waste (GSW).
CES (17 August 2018a) Stage 1 Preliminary Site Investigation 10 Nelson Short Street, Potts Hill, New South Wales (Ref: CES170303-SD-AD Revision 1.0)	This document provides response to comment made by City of Canterbury-Bankstown Council regarding site suitability for the proposed residential seniors living development. Council states that "*Based on the PSI and historical records, Council's Environmental Health Unit is not satisfied that the land is suitable for the proposed use in accordance with SEPP 55 and that a detailed site investigation is required.*" CES provides the following information/justifications: • The concentration of BaP at BH12 (0.5-0.6m) (1.4mg/kg is below the CRC Care (2017) high reliability ESL of 33mg/kg and therefore CES considers that BaP at this location does not pose an unacceptable risk to ecological receptors. • The proposed development includes a single level basement car park extending the entire footprint of the site. Based on the proposed development, soil at BH12 (0.5-0.6m) would be excavated and disposed of offsite. • CES did not encounter any of the materials (Ash, coal, road base, black resin-like materials, asphalt/bitumen) associated with previous PAH impacts in the fill soils and no exceedance occurred above health-based criteria. • The 95% UCL of BaP in the CES investigation was calculated to be 0.68mg/kg, which is below the NEPM (2013) ESL. CES considers the site in its current state is likely to be suitable for the proposed development, noting that further investigation is required in the embankments at the eastern and southern boundary of the site.
CES (17 August 2018b) Remedial Action Plan 10 Nelson Short Street,	The objectives of this report were to:

Date	Report Objectives, Scope and Outcomes
Potts Hill, New South Wales (Ref: CES170303-SD-AE Revision 1)	• Set remediation goals which will assist in making the site suitable for the proposed residential use and will pose no unacceptable risk to human health or to the environment; • Document all procedures and plans to be implemented to reduce risks to acceptable levels for the proposed high density residential land use; and • Establish the environmental safeguards required to complete the remediation in an environmentally acceptable manner. The RAP includes: • a review and summary of the previous environmental site assessment report; • identification of reported impacts, data gaps and areas that require further investigation or remediation; • preparation of site conceptual model characterising the known contamination sources, pathways and (current and future) receptors; • evaluation of remediation options and rationale for the recommended remedial option including contingency plan and setting of remediation goals and acceptance criteria; • preparation of validation procedures for the site; • setting of Construction Site Management Plan requirements for stormwater, soil management, noise control, dust control, odour control and WHS plan for the operational phase of remediation; • preparation of Contingency Plans to respond to site incidents that may affect site workers or surrounding site environments or communities; • identification of regulatory compliance requirements such as licences or approvals identification of a remediation timeline and schedule and hours of remedial work operations; • identification of appropriate personnel, reporting requirements; and long-term site management plan (if required). The goal of the remediation is to provide sufficient engineering and management controls to make the site suitable (with respect to soil contamination) for the proposed development with accessible soils, to ensure protection of human health and the environment during and post remediation works, and to manage soils in a cost-effective manner. The contamination requiring remediation is PAH and asbestos impacts.

3.2 Auditor Discussion

The historical industrial use was well documented in the Environ Audit together with the first stage of remedial actions resulting in a conclusion that the site was suitable for ongoing industrial use with the implementation of an environmental management plan, largely due to residual PAHs within the embankment soils.

The Auditor considers the subsequent works completed, followed an iterative process collecting information to characterise the residual contamination on the site and then providing a remedial approach to render the site suitable for more sensitive proposed high density residential development for seniors living comprising a four-storey apartment block above a single-level underground car park.

The following chapters of this SAR contain details relevant to the site to the extent information is available.

4. Evaluation of Conceptual Site Model

4.1 Site Condition

The site condition prior to commencement of the works described in this SAR is summarised in this section. This information has been sourced from the reports listed in Section 1.4.

Table 4.1: General Site Condition

Title	Details
Topography and Drainage:	Section 2.4 of CES (16 August 2017) states that the site does not have preferential slope, with fill embankments along the eastern and southern boundaries of the site. This statement remains in their 2018 revision. However, is noted that the appendix included within this report identifies that the site drops from 56m AHD to 54m AHD, across the site, with a bigger drop on the eastern boundary of the property (48m AHD).
Boundary Condition (type & condition of fencing, soil stability & erosion):	The site was reported as being fenced by chain link or metal fence, with gates on the southern and northern boundary. The Auditor confirms this description from the site visit completed and notes that there were no signs of erosion or instability of the mound.
Visible Signs of Contamination:	Section 2.3 of CES (16 August 2017) states there was no surface staining observed. The Auditor confirms this statement from the site inspection completed, however, it is noted that several mounds of rubbish was observed on the south-west corner of the site.
Visible Signs of Plant Stress:	Section 2.3 of CES (16 August 2017) states there were signs of dry and brown vegetation, however vegetation was not considered distressed. The Auditor confirms there were no obvious signs of plant distress observed during the site visit.
Presence of Drums, Wastes and Fill Materials:	Section 2.3 of CES (16 August 2017) states there was no evidence of above ground or below ground fuel storage tanks on the site. The Auditor confirms this statement from the site inspection completed.
Odours:	Section 3.6 of CES (16 August 2017) states there were no significant odours detected. The Auditor did not encounter any odours during the site visit completed.
Condition of Buildings & Roads:	Section 3.6 of CES (16 August 2017) states no building was present onsite. No buildings /roads were observed on the site during the site inspection.
Quality of Surface Water:	No surface water is present onsite. No surface water was encountered on the site during the site visit.
Flood Potential:	Section 149 planning certificate included in CES (16 August 2017) indicates flooding is not a potential issue at the site.
Relevant Local Sensitive Environments:	The nearest surface water feature is the Cooks River, located approximately 262m north-east of the site. Section 4.4 states that potential sensitive receptors (onsite and offsite) include: • Future construction workers during the construction of the proposed redevelopment • Future residents and employees • Groundwater beneath the site • Neighbouring residents
Other Relevant Information:	None identified.

4.2 Site History

The site history is summarised in this section. This information has been sourced from the reports listed in Section 1.4:

Table 4.2: Site History

Title	Details
Previous Land Use & Chronological List:	Section 3.1 of CES (16 August 2017) indicates the site would have been utilised for works and operations of the Sydney Water reservoirs (mostly as storage yard), with the construction of the reservoir (outside the site) likely conducted around 1911. The previous Audit (Nyland, 2010) identifies that the site was associated with the nearby construction of Sydney Water Reservoir 1 in 1888 and Sydney Water Reservoir 2 in 1923. As part of the operations, the site was used as a 'laydown' area for construction materials, included a hydrographic laboratory complete with hydrographic flume and a 45,000L UST. Demountable and temporary storage sheds were used to store batteries and calibrate field meters. By 1996 the UST was removed and in 2009-2010 the buildings, roads and infrastructure were removed, ground improvement works occurred and the embankments were stabilised, with appropriate compaction and remediation of contaminated areas to enable the site to be rendered suitable for industrial land use. Since 2010, it is believed the site has remained grassed and vacant.
Land Titles:	Section 3.1 of CES (16 August 2017) indicates the following titles: • 1911 – 1988: Metropolitan Water Sewerage and Drainage Board, with various leases • 1988 – 2005: Sydney Water Board • 2005 – 2016: Sydney Water Corporation • 2016 – to date: Potts Hill Group Pty Ltd It is noted that Section 3 of Graeme Nyland's Audit report identifies that the site was owned by Sydney Water (or its predecessors) since 1888, as confirmed in the NSW OEH records of NSW heritage (https://www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx).
Summary of Council Records:	Section 3.4 of CES (16 August 2017) reports that the Section 149 Planning certificate indicates: • The land is not significantly contaminated; • The land is not subject to a management order; • The land is not subject of an approved voluntary management proposal; • The land is not subject of an approved voluntary management proposal; • The land is not subject to an on-going maintenance order; and • The land is not subject to an audit statement. • The site is subject to the AECOM (2010) EMP, which provides management of PAHs during construction and operational phase of the site. It is noted despite an EMP being listed on the 149(5) certificate, and being part of an audit, an Audit is not identified on the certificate.
EPA Records:	Section 2.11 of CES (16 August 2017) states that the site is located within proximity to six sites listed under the NSW EPA contaminated lands list: • Shell Coles Express Service Station Chullora located 165m east • Galserv Galvanising Services Chullora located 259 north-east • Former Plating Works Greenacre located 336m south-east • Sydney Water Potts Hill Complex located 336m west • BP Potts Hill Service Station and Truckstop located 470m north-east • 7-Eleven (former Mobil) Service Station Greenacre located 930m south-east

Title	Details
	The Auditor also conducted a search in August 2018 of the NSW EPA contaminated land record for the suburb Potts Hill and the search did not indicate any contaminated land records in Potts Hill. A search of the PoEO registered of environment protection licences, applications, notices, audits or pollution studies and reduction programs indicates the former Sydney Water Potts Hill Reservoir on Brunker Street and Copper Street had licence registered for Landcom land-based extractive activity, but this licence was surrendered in 2011. The Auditor confirmed this information in August 2018 and notes the following: • CLM Act - No site is currently being regulated within the suburb of Potts Hill; - No site has recently been reported to NSW EPA within Potts Hill. The former plating works and 7-Eleven properties do not require regulation, no other previously mentioned properties are included on the current list. • POEO Act – In addition to the POEO licence surrendered by Landcom for the Brunker Street and Cooper Street Property, Western Earthmoving Pty Ltd contains a current S58 licence for a property located at 146 Rookwood Road Potts Hill.
SafeWork NSW Dangerous Goods Licenses/ USTs/ ASTs:	Section 3.3 of CES (16 August 2017) states that a search of the SafeWork NSW Stored Chemical Information Database and microfiche records did not indicate records pertaining to the site. CES reports that the Environ Audit (2010) recorded a former 45,000L petrol underground storage tank (UST) was present in the south-western portion of the site, which was decommissioned in 1996 by Fluor Daniel GTI. At the time of decommissioning, the UST was stated to be in very good condition, with no significant corrosion or visible leaks, however petrol contamination was noted. The remaining pit was backfilled with sand originally surrounding the UST and topped with imported fill. Coffey (as documented in Environ (2010)) noted a small above ground fuel storage area in the north-western corner of the site and some rusted drums on the middle of the eastern boundary of the Main Area, directly south of an equipment wash down area.
Summary of Aerial Photographs (on site and adjacent sites):	Section 3.2 and Appendix B of the CES (16 August 2017) provide the following summary of historical aerial photographs: • 1943: The site consisted of open space with coverage of trees along the southern boundary and the northern half of the site. Tracks were visible across the centre of the site. The area surrounding the site was occupied by Sydney Water reservoirs to the west and open space and open space with a number of properties located south of Brunker Road and west of Rookwood Road occupying the area to the south. Residential properties appeared to occupy the area east of the site. Surrounding area to the north appeared to be utilized as a storage yard. • 1955: The trees at the centre of the site appeared to have been cleared and the central area appeared to be used as a storage yard for construction materials. The remaining area along the southern boundary appeared to remain unchanged. The area occupied by storage yard appeared to have extended to the boundary of the site. The residential areas to the east and south also appeared to have expanded since the previous aerial photograph. The remaining surrounding area to the west remained unchanged. • 1961: The site appeared largely unchanged with the exception of a large building (warehouse/shed) in the centre. Residential development appeared to have increased with in the areas to the south and east of the site since the previous aerial photograph was taken. Increased storage activities were apparent to the north of the site. • 1965: The site appeared unchanged with the exception of the construction of a small shed adjacent to the large shed. Increase residential development occurred in the area south of the site. • 1970: The site appeared unchanged. A large building was constructed north-east of the site. • 1982: The site appeared unchanged. Further development occurred to the large building north-east of the site. A sporting pitch/greyhound racing track was constructed north-east of the site.

Title	Details
	• 1991: The area formerly used for storage of construction materials appeared to be used as a car park. The surrounding area to the north of the site appeared to be used for car park in addition to the storage of construction materials. • 2003: The site appeared largely unchanged, with the exception of additional buildings in the north-western corner. The surrounding area to the site occupied by Sydney Water reservoir appeared to have a cover installed. The area to the north of the site (previously occupied by construction materials) had been cleared. The United Service Station also appeared to have been constructed off Rookwood Road to the south-east. • 2009: The site appeared largely unchanged, with the exception of the removal of a number of small buildings from the site. Surrounding area appeared largely unchanged. • 2010: Remediation and earth moving were apparent across the majority of the site. The area to the north appeared to be undergoing earthworks for the construction of the Potts Hill NSW Police Facility. • 2014: The site appeared to be open space and used as a storage yard. The Potts Hill NSW Police Facility had been completed to the north. • 2015: The site and surrounding areas appeared largely unchanged. The Auditor considers that the although CES identifies that the 1961 historical aerial photograph identifies a warehouse and the site 'largely unchanged' in the Auditors opinion the site has been significantly changed and clearly contains machinery storage across the site. In addition, the 2014 historical aerial shows the majority of the site appeared cleared and non-vegetated
Summary of Historical Site Photos (where available):	Not provided. The absence of this information will not impact the outcome of the audit.
Description of Manufacturing / Industrial Processes and Location:	Based on the historical desktop review, CES reports no manufacturing or industrial processes were identified, noting the site was mainly used as a storage yard. The Auditor notes that the Environ report identifies offices and workshops that identified the site being used as a 'laydown' area for construction materials, a hydrographic laboratory with hydrographic flume and general storage noting that a significant area was filled from creation of the nearby water reservoirs.
Inventory of Chemicals and Wastes and their Location:	Section 3.6 of CES (16 August 2017) states no evidence of chemical storage was observed. Environ (2010) states there was no evidence of bulk chemical storage noted in the area, although several drums were present. AECOM (as documented in Environ (2010)) states that potential building materials such as concrete, bitumen, ballast gravels and terracotta pipe were observed in the accessible areas of the southern embankment. Steel and concrete wastes were encountered within the eastern embankment.
Product Spill and Loss History:	No detail provided by CES, however Environ (2010) SAR states that some spills occurred in the vicinity of the UST, which had been remediated and no detections reported in the validation samples.
Discharges to Land, Air & Water:	CES states no details are available. The absence of this data will be addressed during remediation, development works and validation.
Complaint History:	CES states no details are available. The absence of this information will not impact the outcome of the audit.
Sewer & Service Plans:	Section 3.5 of CES (16 August 2017) states that a review of Dial Before You Dig (DBYD) plans indicate the presence of 225mm PVC sewer mains long the entire southern and eastern boundaries of the property, including three maintenance holes located in the south-eastern corner of the site and two maintenance shafts, each located along the mid-southern boundary and upper third of the eastern boundary of the site which may service as a preferential pathway of contaminant migration of the site.

Title	Details
	Two large (2m by 2m) concrete pits covered by metal grates were identified in the north-eastern and south-eastern corners of the main investigation area. It is expected that these pits are connected by means of concrete-cased conduits.
Local Site Knowledge:	CES states no details are available. The absence of this information will not impact the outcome of the audit.
Local Literature Review:	Not provided, but not considered to affect the outcome of the audit.
Permits, Licenses and Approvals:	Not provided. The Auditor notes that a search of the PoEO registered of environment protection licences, applications, notices, audits or pollution studies and reduction programs indicates the former Sydney Water Potts Hill Reservoir on Brunker Street and Copper Street had licence registered for Landcom land-based extractive activity, but this licence was surrendered in 2011.
Other Relevant Information:	Although not included in the discussion within the body of the report, the appendix CES (16 August 2017) identifies some historical maps rom 1917 and 1949 confirming no buildings on the site and the property holding being associated with the Reservoir.

4.3 Geology, Hydrogeology and Hydrology

The geology, hydrogeology and hydrology are summarised in this section. This information has been sourced from the reports listed in Section 1.4.

Table 4.3 Subsurface Conditions

Title	Details
Geology Map Conditions	Section 2.6 of CES (16 August 2017) states that the Sydney 1:100,000 Geological Series Sheet 9130 (1983) indicates that the majority of the site is underlain by Bringelly Shale of the Wianamatta Group, of Triassic Age, which typically comprises shale, carbonaceous claystone, claystone, laminate, fine to medium-grained lithic sandstone, rare coal and tuff. The nature of the formation is considered alluvial and estuarine.
Soil Map Conditions	Section 2.7 of CES (17 August 2018a) states that reference to the Sydney 1:100,000 Soil Landscape Series Sheet 9130 indicates that the site is underlain by disturbed terrain, where soils are likely to be highly modified from their natural condition. This is evident from the fill included on the site.
Acid Sulfate Soils:	Section 2.9 of CES (16 August 2017) states that there is no acid sulfate soil risk mapped for the site in the Bankstown LEP (2015) Acid Sulfate Soils Map (Sheet ASS-004).
Salinity:	CES reports electrical conductivity values of the groundwater indicate groundwater at the site is saline. It is noted that although not discussed in the body of the CES (16 August 2017) report, the appendix at the rear of the report identifies that the site is located in an area of moderate salinity potential, with the southern tip associated with high salinity potential.
Soil Classification Method:	Not provided. It is considered to be based on USCS system.
Ground Conditions Summary from boreholes records:	The sub-surface profiles described in Environ (2010) are as described follows: • 0-0.1/0.2m: Asphalt/bitumen or concrete • 0.1-0.6m: Road base gravels or fill with high gravel content, occasional asphalt • 0.0-6.3m: Fill: mixed clay, shale, silt, sand, gravel, with ironstone fragments and decayed organic matter at depth. Waste materials present primarily in embankments

Title	Details
	and some ash, slag, bitumen, etc. Coffey inferred that the highly variable fill material designated Unit 1A (containing materials such as slag, ash, roots, concrete, bricks, glass, asphalt, tiles, domestic refuse etc.) was present typically to depths of <1mbgl, but locally up to 2mbgl in the Main Area of the site. • 1.1-7.5m: Residual silty clay – clayey silt • 4.2-6.6m: Residual clay • 1.6-5.3m+: Shale with interbedded sandstone Environ (2010) states that URS estimated that the fill depth ranged from about 5m on the western boundary to greater than 7m on the eastern boundary (top of embankment). The clayey/shale fill is consistent with material excavated during construction of the reservoirs. Subsequent to the majority of the investigations, Unit 1A material was excavated from a portion of the Main Area to a depth of 0.2m to 0.85mbgl (average 0.5mbgl) for geotechnical purpose. The extent of the excavation is provided in Environ (2010) but it is not legible for our review. The investigation by CES (17 August 2018a) indicates the site comprised fill to a maximum depth of 7.2mbgl, underlain by clay. The fill comprised gravelly clay, clay, silty clay, with shale cobbles, sandstone cobbles, mudstone. Cobbles of concrete were recorded to be on the surface. No evidence of visual or olfactory evidence of contamination was recorded, with the exception of organic odour identified at approximately 3.7mbgl at BH05, at 6.0mbgl at BH06, at 5.0mbgl at BH09, at 5.6mbgl at BH10, at 5.7mbgl at BH14. The following PAH-contaminated fill materials were identified in the embankments: • Ash: generally dark grey to light silver grey, slightly porous to vesicular matrix. Could be present in thin, discontinuous bands or randomly dispersed as small fragments/granules within the fill material. • Coal: black, carbonaceous material. Could occur as gravel sized fragments to fine particles, randomly dispersed in fill materials. • Roadbase gravels: grey to blue-grey volcanic type gravels which have shiny appearance as a result of sprayed tar. Could be mildly odorous (tar-like odour). • Black resin-like materials: fragments of black (shiny to dull) material with a resin or hard plastic-like appearance. Randomly distributed in the fill material. Fragments could be large (e.g. tennis ball sized) to finely granulated. • Asphalt/bitumen: pieces of former hardstand/road pavement surfaces. Ranged in size from visible obvious (e.g. slabs up to 1m diameter) to finely granulated. Randomly distributed in the fill material. Sections 2.6 to 2.8 of AECOM (2010) provides the following information for the embankment: • Slope stability works were conducted on the embankments, which involved the excavation of fill and the subsequent placement of 200mm lifts, each of which were compacted. The top of the Eastern Embankment was positioned 20m to the west of the eastern site boundary and the top of the Southern Embankment was positioned 10m to the north of the southern site boundary. A drainage swale and subsoil drainage infrastructure were installed near the base of each embankment. As a result of the slope stability works, a strip of land approximately 5m to 7m width to the west of the Eastern Embankment comprised reworked Embankment fill materials (and referred to as the 'Skirt'). • The Skirt material comprised BaP of 8.8mbg/kg in one sample (TP401 (0.0-0.2m)), exceeding the NEPM (1999) HIL D at the time. The 95% UCL of BaP in the Skirt material was 1.5mg/kg and total PAHs was 9.7mg/kg. • The embankment landscaping plan indicates landscaping works within the embankment included: - Installation of jute matting (hessian-like material) on the embankment faces. • Planting of vegetation through the jute matting and/or directly into the ground, which includes a mix of trees, shrubs, grasses, and ground covers. The plants were expected to be self-mulching.

Title	Details
Location of Fill Materials:	Environ (2010) reports that prior to previous remediation, a large amount of fill (approximately 5m thick) was present at the site. The fill also contained ash and coal wastes associated with steam-driven machinery used during construction of the reservoirs. The ash waste could typically be present as thin (e.g. 5cm thick) discontinuous seams within the bulk filling. Coal waste appeared to be less prevalent than ash, and typically occurred as small fragments to finely ground particles. Environ (2010) notes that excavated reservoir spoil was present across the Potts Hill reservoir area, which could have potentially contained ash waste, fly ash and waste associated with the removal of bitumen-based pipe linings. Significant placement of the spoil is believed to have occurred at the site creating the steep embankments in the south and east. Section 2.2 of AECOM (2010) states that rubbish materials such as ash, bricks, timber, plastic, bitumen fragments, scrap steel, terracotta pipe fragments, glass, ceramic, rubber, fragments of bitumen-based sealant materials and concrete were identified within the embankments. The majority of the visible obvious rubbish materials were likely removed during slope stability works. One fragment of asbestos containing cement-bonded sheeting was previously identified on the surface of the eastern embankment (at TP249). The presence of fill across the site containing ash and coal and other extraneous material was identified by CES in their most recent investigation (see above).
Regional Hydrogeology:	CES provide no discussion on regional hydrogeology. Groundwater investigations were not conducted during previous audit of Lot 104 (Environ, 2010) but Environ (2010) notes that groundwater was encountered during intrusive soil investigations. Environ (2010) also states that a number of wells were installed around Reservoir 1 to the north-west of the site and sampled in 1993 and groundwater was found to be present at depths of greater than 8mbgl. Prior to its drainage, it was found that the reservoirs influenced the groundwater flow. (Environ, 2010) Groundwater flow across Lot 104 is expected to be towards the south and east following natural topography and being away from the two reservoirs. Environ (2010) also notes that water encountered at the fill/natural interface is likely to be perched groundwater. True groundwater at the site likely occurs below 8mbgl within clay. The groundwater would be expected to be saline and low yielding, with limited potential for beneficial use.
Summary of Monitoring Wells:	In their recent work, CES installed two groundwater monitoring wells. A summary of the monitoring wells at the site is as follows. Well ID / Well depth (mbtoc) / Well screen (mbtoc) / Screened lithology / SWL (mbtoc) BH02 / 12m / 10m to 12m / Shale / 9.202m BH03 / 10m / 7m to 10m / Silty clay and shale / 8.206m
Depth to Groundwater:	Groundwater depth is reported Section 2.8 of CES 2018 as ranging from between 1.8m and 9.1mbgl. in the nine registered groundwater abstraction wells in the vicinity of the site.
Direction and Rate of Groundwater Flow:	Section 2.7 of CES (16 August 2017) states that groundwater flow direction is expected to be to the south-east towards the Cooks River.
Use of Water Abstraction:	A search of the Department of Primary Industries Office of Water database in July 2016 indicated there were nine registered groundwater abstraction wells located between 941m and 972m from the site boundary. All nine wells were registered for monitoring purposes and extend between 3.7m and 13mbgl.

Title	Details
Nearest Water Body:	The nearest surface water receptor is the Cooks River located 262m north-east of the site.
Direction of Surface Water Run Off:	Not provided, considered likely to penetrate vegetation onsite and flows to the east and south into the drains at the base of the embankments.
Background Water Quality:	Not provided. The absence of this information is not considered to impact the outcome of the audit.
Preferential Water Courses:	None reported by CES as being on site and none were observed by the Auditor during the site visit.
Summary of Local Meteorology:	Section 2.10 of CES (16 August 2017) states that meteorological information from the Bankstown Airport states: • Mean annual temperature is 23.3°C. • Mean annual lowest temperature is 12°C. • Mean annual rainfall is 996.7mm.

4.4 Contaminants and Media

CES (16 August 2017) identified the following potentially contaminating activities and contaminants of concern associated with past and present activities across the site.

Table 4.4 Summary of Potentially Contaminating Activities

Area	Activity	Potential Contaminants
Entire site	Commercial activity as Sydney Water storage yard facility (through the use of petroleum products such as fuels, oils and hydraulic oils, in addition to pesticides)	Heavy metals, total recoverable hydrocarbon (TRH), benzene, toluene, ethylbenzene, xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), organochlorine pesticides (OCPs)
Entire site	Uncontrolled fill, potentially associated with reservoir spoil	Heavy metals, TRH, BTEX, PAHs, OCPs, PCBs, asbestos

The consultant has considered the contaminants of potential concern (COPC) in the following media:

- Soil
- Groundwater

4.5 Auditor Discussion

Previous investigations completed in 2003-2009 identified the whole site as being potentially impacted with fill from unknown origin and potential impact from storage of containers on the site and construction materials. The analytes identified are consistent with those identified by CES in 2017 and 2018.

The information required by OEH (2011), in regard to site condition and history, geology, hydrology and hydrogeology, has generally been provided, and is consistent with the Auditor's

understanding of the site area. Those items not provided are listed above but their omission is not considered to affect the conclusions of this SAR.

The Consultants did not consider for the potential of per- and poly-fluoroalkyl substances (PFAS). However, the Auditor considers that based on the site history of the site, there is no evidence of historical activities that may result in PFAS contamination at the site.

The Auditor concurs with the consultant that the COPC identified for the site are those listed above and are therefore generally appropriate for the purposes of this SAR.

5. Sampling and Analysis Plan

This section provides a summary of the review of the sampling and analysis plan and associated methodologies adopted by the consultant for the investigation and validation works conducted at the site. This information has been sourced from the documents presented in Section 1.4. More detailed review is provided in Table E1 in Appendix E.

5.1 Auditor Discussion

The information required by OEH (2011) in regard to the sampling and analysis plan and associated methodologies, has been generally provided for all investigations characterising the site. The Auditor considers that this is appropriate given the conceptual model for the site with the following exceptions:

- Asbestos investigation has not been conducted as per NEPM (2013) requirements, with samples were only analysed for absence/presence only. **The Auditor requires remaining fill to be assessed for asbestos in accordance with NEPM (2013) requirements.**
- The number of sampling locations (15) does not meet NSW EPA (1995) requirement for a 1.5ha site (for the Main Area) or 1.8ha site (entire site). The Auditor considers that the additional 13 locations proposed in the Embankment and Apron area will be adequate to meet the NSW EPA (1995) requirements, noting the slight reduction in sample density.
- The Auditor notes that CES has not conducted investigation within the Embankment or the Apron areas. Further investigation should be conducted in these areas in accordance with the RAP.

Further comments on the consultants' reports are provided in the Interim Advice correspondence presented in Appendix B.

The NSW EPA (2017) requires that an Auditor must comment on each of the following:

- CES (17 August 2018a) did not provide DQOs, although elements of DQOs were presented throughout the report. The Auditor requires DQOs to be presented in future investigation reports.;
- The Auditor confirms that CES (17 August 2018a) included a plan to achieve pre-determined QA/QC plan; and
- The Auditor confirms that CES (17 August 2018a) included procedures to be undertaken if the data did not meet the expected QA/QC plan.

6. Evaluation of Site Criteria

6.1 Assessment Criteria for Soil

The soil assessment criteria adopted by the CES (17 August 2018a) and CES (17 August 2018b) RAP included the following:

- NEPM (2013) HIL B for high density residential land use;
- NEPM (2013) HSL A/B for low / high density residential land use in a clay soil;
- NEPM (2013) EIL for urban residential and public open space using conservative soil data;
- NEPM (2013) ESL for urban residential and public open space for fine soil.
- NEPM (2013) HSL B guidelines for asbestos; and
- CLAIRE (2013) criteria for TOC for assessment of ground gas risk.

6.2 Assessment Criteria for Groundwater

The assessment criteria used by the consultant included the following:

- NEPM (2013) GIL for marine and fresh waters.

6.3 Other Assessment Criteria

Where no Australia criterion is available, the limit of reporting (LOR) will be adopted as a preliminary screening criterion. Where the concentration exceeds the LOR, reference criteria will be selected from national and international guidance as appropriate to determine the significance or otherwise of the detected analyte.

6.4 Waste Classification

Waste classification was conducted in accordance with EPA (2014) Waste Classification Guidelines: Part 1: Classifying Waste.

6.5 Auditor Discussion

The Auditor considers that the adopted criteria were appropriate for the contaminants of concern identified for the guidelines present at the time of reporting, the environmental setting for the site and the proposed future land use.

The Auditor makes the following comments regarding the adopted assessment criteria:

- CES (17 August 2018a) and CES (17 August 2018b) adopted HSL A/B to assess vapour intrusion risk from soil. The Auditor considers whilst this is conservative given the presence of basement car park and considers that HSL D the use of more conservative guidelines will not affect the outcome of the audit.
- The EILs adopted by CES (17 August 2018a) did not consider site-specific soil data. The CES (17 August 2018b) provides requirement of collecting site-specific soil data for more relevant EILs as part of the remedial and validation works.

- CES has not compared groundwater results against NEPM (2013) HSLs to assess soil vapour risk. Whilst a comparison of groundwater against NEPM (2013) HSL D shows no exceedences, these criteria should be used for future groundwater assessment.
- CES (17 August 2018a) considers the CLAIRE (2012) A Pragmatic Approach to Ground Gas Risk Assessment (RB17) TOC criterion to assess potential ground gas risk. Although this is a UK-based guideline, its use for screening purposes is acceptable given the link of the current Hazardous Ground Gas Guidelines to UK guidance and noting this screening shows there is low risk of ground gas risk at the site based on site history.

7. Assessment of Investigation Results

The results for all investigation phases completed at the site and presented in CES (17 August 2018a) are summarised below. Refer to Appendix A and C for sample locations and analytical result summary tables.

7.1 Soil Analytical Results

Soil results compared against commercial/industrial guidelines in place at the time of the previous SAR (Environ, 2010) are summarised in Table 7.1 below. These results are investigations completed prior to remediation. The tables provided in the Environ (2010) SAR are reproduced in Appendix C.

Table 7.1: Summary of Soil Results from Environ (2010) SAR (mg/kg)

Area	Depth (mbgl)	Soil Material	Exceedances/Comment
Main Area	≤1.1mbgl	Fill	• BaP: 3 exceedances out of 126 samples, with maximum concentration of 8.2mg/kg. The 95% UCL of BaP was calculated to be 1.3mg/kg. • The following is noted: - maximum concentration exceeds BaP TEQ HIL B and BaP ESL. - Only one sample was analysed for asbestos.
	≥1.2mbgl	Fill	• No exceedances were detected above commercial /industrial criteria, noting that no sample was analysed for asbestos. • PAHs, TPH and asbestos were not detected above LOR, BTEX, phenol and heavy metals were below commercial/industrial criteria. • The concentrations of heavy metals were not provided so the Auditor is unable to check against current NEPM (2013) HIL B and EILs.
Embankments	Not provided, assumed to the base of fill	Fill	• BaP: 59 exceedances out of 296 samples, with maximum concentration of 77.8mg/kg. The maximum concentration exceeds BaP TEQ HIL B and BaP ESL. • Total PAHs: 38 exceedances out of 296 samples, with maximum concentration 987mg/kg. The maximum concentration exceeds BaP TEQ HIL B. • TPH C10-C36: 5 exceedances above NSW EPA (1994) criterion, with maximum concentration of 2260mg/kg. No information is available on the breakdown of the TPH to assess the concentration against NEPM (2013) criteria. • Asbestos: One detection out of 206 samples in the form of small fragment of cement bonded sheeting at TP249 (0-0.2m).
Apron	Not provided, assumed to the base of fill	Fill	No exceedances, but the Auditor notes that there was only limited sampling conducted (4 samples), which were only analysed for heavy metals, TPH and BTEX.

Area	Depth (mbgl)	Soil Material	Exceedances/Comment
Entire Site	Not provided	Natural	• No exceedances occurred. PAHs, TPH, asbestos, BTEX and phenol were not detected above LOR, heavy metals were below commercial/industrial criteria. • The concentrations of heavy metals were not provided so the Auditor is unable to check against current NEPM (2013) HIL B and EILs.

7.1.1 CES (17 August 2018a)

Soil results from CES (17 August 2018a) are summarised in Table 7.2. These investigations have only been conducted within the area known as the 'Main Area'. No investigation has been completed within the 'Embankment' or the 'Apron' areas.

Table 7.2: Summary of Soil Results (mg/kg)

Constituents	Num. of Samples	Max Result	HIL B/HSL A/B[1]	EIL/ESL[2]	No. Samples > Criteria (Exceedance)
Arsenic	16	11	500	100	0
Cadmium	16	<0.4	150	-	0
Chromium	16	23	500	190	0
Copper	16	57	30000	95	0
Lead	16	25	1200	1100	0
Mercury	16	<0.1	120	-	0
Nickel	16	29	1200	30	0
Zinc	16	130	60000	230	0
F1 TRH C_6-C_{10} less BTEX	25	<25	50 (0-<1m) 90 (1<2m) 150 (2-<4m) 290 (4m+)	180	0
F2 TRH >C_{10}-C_{16} less Naphthalene	25	<50	280 (0-<1m) NL (1<m+)	120	0
F3 TRH >C_{16}-C_{34}	25	<100	-	1300	0
F4 TPH C_{34}-C_{40}	25	<100	-	5600	0
Benzene	25	<0.2	0.7 (0-<1m) 1 (1<2m) 2 (2-<4m) 3 (4m+)	65	0
Toluene	25	<0.5	480 (0-<1m)	105	0

Constituents	Num. of Samples	Max Result	HIL B/HSL A/B[1]	EIL/ESL[2]	No. Samples > Criteria (Exceedance)
			NL (1m+)		
Ethylbenzene	25	<1	NL	125	0
Xylenes	25	<2	110 (0-<1m) 310 (1-<2m) NL (2m+)	45	0
Naphthalene	17	<0.1	5 (0-<1m) NL (1m+)	170	0
BaP TEQ	17	1.8	4	-	0
BaP	17	1.4	-	0.7	1>ESL: BH12_0.5-0.6=1.4
Total PAH	17	16	400	-	0
PCB	16	<0.1	1	-	0
OCP (various)	16	<0.1	10-600	-	0
OPP (various)	16	<0.1	340	-	0
TOC	10	0.014%	1%[3]	-	0
Asbestos identification	15	Not Detected	Detected	-	0

Notes:
1 NEPM (2013) HIL B/ HSL A/B soil vapour intrusion for clay soil. The Auditor notes that HSL A/B is conservative and that HSL can also be adopted given the presence of basement carpark.
2 NEPM (2013) EIL/ESL – Urban residential and open public space for fine soil
3 CLAIRE (2012) TOC criterion for Characteristic Situation 1 (CS1).
Note that some ESL for TRH F2 applies for TRH >C10-C16 without subtraction of naphthalene, and ML for TRH F1 and TRH F2 apply for TRH C6-C10 and TRH >C10-C16 without subtraction of BTEX and naphthalene, respectively.
NL No Limit
No guideline

7.1.2 Auditor Discussion on Contamination Status of Soil

There was a total of 15 sampling locations across the site (focused on the Main Area of the site), and no investigation has been conducted in recent times on the Embankment or the Apron areas. The number of sampling locations (15) does not meet NSW EPA (1995) requirement of a 1.5ha site (only of the Main area) or of a 1.8ha site (entire site), while the results were used to assess suitability for the Main area. The Auditor requires that adequacy of sampling should be assessed following additional investigations in the Embankment and the Apron areas.

Based on the information presented in Table 7.1 above, the Auditor draws the following conclusions regarding the contamination status of the soils at the site:

- Soil results from CES (17 August 2018a) sampling indicated results were below criteria, with the exception of one sample exceeding ESL for benzo(a)pyrene (at 1.4mg/kg), noting this location is located in an area likely to be excavated for basement excavation. Asbestos was not detected in the samples.

- The previous SAR (Environ, 2010) identified BaP concentration (and hence associated BaP TEQ) exceeding NEPM (2013) HIL B within the Main Area, however the calculated 95% UCL presented in the SAR (1.2mg/kg) appears to be below HIL B.
- Very limited asbestos investigation has been completed within the fill in the Main Area during the previous SAR and CES (17 August 2018a) investigation was not conducted as per the NEPM (2013) requirement. As a result, the remaining fill or fill reused onsite will be required to be assessed for asbestos as per NEPM (2013) requirements.
- No recent investigation has been completed within the Embankment or the Apron (where the AECOM (2010) EMP applies) due to accessibility. Additional investigation must be conducted in these areas.

7.2 Groundwater Analytical Results

No groundwater investigations were completed as part of the previous Audit. Groundwater results from the two wells installed by CES (17 August 2018a) are summarised in Table 7.3.

Table 7.3: Summary of Groundwater Results (µg/L)

Constituents	Num. of Samples	Fresh Water[1] (µg/L)	Marine Water[2] (µg/L)	NEPM (2013) HSL D[3]	Maximum Result (ug/L)	No. Samples > Criteria (Exceedance)
Arsenic[4]	2	24/13	-	-	<1	0
Cadmium	2	0.2	0.7	-	0.2	0
Chromium[5]	2	1	27/4.4	-	<1	0
Copper	2	1.4	1.3	-	3	1>freshwater & marine GILs: BH02=3
Lead	2	3.4	4.4	-	<1	0
Mercury	2	0.06	0.1	-	<0.05	0
Nickel	2	11	7	-	48	2>freshwater & marine GILs: BH02=48, BH03=38
Zinc	2	8	15	-	49	2>freshwater & marine GILs: BH02=48, BH03=49
F1 TRH C_6-C_{10} less BTEX	2	-	-	6000	<10	0
F2 TRH >C_{10}-C_{16} less Naphthalene	2	-	-	NL	<50	0
TRH C_{16}-C_{34}	2	-	-	-	<100	0
TRH C_{34}-C_{40}	2	-	-	-	<100	0

Constituents	Num. of Samples	Fresh Water[1] (µg/L)	Marine Water[2] (µg/L)	NEPM (2013) HSL D[3]	Maximum Result (ug/L)	No. Samples > Criteria (Exceedance)
Benzene	2	950	500	5000	<1	0
Toluene	2	180	180	NL	<1	0
Ethylbenzene	2	80	5	NL	<1	0
Xylenes	2	350/75/200[6]	350/75/200[6]	NL	<2	0
Naphthalene	2	16	50	70	<1	0
Benzo(a)pyrene	2	0.1	-	-	<1	0
Other PAHs	2	Various	Various	-	<1-<2	0
OCP	2	0.006-0.01	0.004-0.005	-	<0.2	0, noting LOR>criteria
OPP	2	0.004-0.2	0.009	-	<0.2	0, noting LOR>criteria
PCB	2	0.01-0.3	Various	-	<2	0, noting LOR>criteria

Notes:
1 NEPM (2013) Fresh water Groundwater Investigation Level and low reliability criteria
2 NEPM (2013) Marine water Groundwater Investigation Level and low reliability criteria
3 NEPM (2013) HSL D for vapour intrusion in a sandy soil assuming water level >2 to 4m bgl (noting that this was not presented by CES).
4 Value for As (III) / As (V)
5 Value for Cr (III) / Cr (VI)
6 Value for o-Xylene / m-Xylene / p-Xylene
NL No Limit
- No Guideline

Light non-aqueous phase liquid (LNAPL) was not identified at the site.

7.2.1 Auditor Discussion on Contamination Status of Groundwater

Based on the number of groundwater samples analysed, the location of monitoring wells and COPC encountered at the site, the Auditor considers that groundwater was adequately characterised when the data set is considered as a whole.

Based on the information presented in Table 7.2 above, the Auditor draws the following conclusions regarding the contamination status of the groundwater at the site:

- Groundwater samples from CES (16 August 2017) sampling indicated results were below criteria with the exception of copper, nickel and zinc exceeding marine and/or freshwater GILs. O-xylene was detected at PQL in one sample.
- CES (17 August 2018a) states that the heavy metal concentrations were likely to be associated with natural background concentrations and given the likely very low permeability of the onsite geology, the depth of groundwater (>8mbtoc) and nature of the proposed site use, CE considers the impact to unlikely affect the receiving marine ecosystem of the Cooks River. The Auditor accepts this statement.

Based on this, the Auditor considers further groundwater assessment is not required.

8. Evaluation of Quality Assurance (QA) and Quality Control (QC)

The EPA (2017) requires that an Auditor must check each of the following requirement and make clear statements regarding data suitability. Therefore, the following statements are made:

- The Auditor confirms that the applicability and limitations of field sampling methodology are discussed and addressed in the CES (17 August 2018a) report;
- The Auditor confirms that the CES (17 August 2018a) report has ensured adequate calibration of field instruments;
- The Auditor confirms that the CES (17 August 2018a) reports have generally assessed the significance of the field determination of the results compared with the laboratory results and where not compatible has been explained by the CES;
- The applicability and limitations of laboratory methodology are not discussed and addressed in the CES (17 August 2018a) reports. The Auditor is satisfied that a NATA accredited method and laboratories were used by the CES (17 August 2018a);
- The Auditor confirms that the methods used for site investigation are of sufficient precision and accuracy and sensitivity to achieve the assessment of risk; and
- The laboratory results meet the accuracy criteria specified by the CES (17 August 2018a) for each performance method; and
- CES (17 August 2018a) indicates that the results generally meet the criteria specified by the consultant in their DQO with some exceptions. Where exceeded, the Auditor considers that the exceedances would not affect the outcome of the audit.

The Auditor has determined that the above requirements have been met based on the tabulated evaluation presented in Appendix E for investigation, remediation and validation works conducted at the site.

9. Evaluation of Remedial Action Plan

The remedial action plan (RAP) has been audited in accordance with the requirements outlined in EPA (2017) Contaminated Land Management Guidelines for the NSW Site Auditor Scheme (3rd edition), OEH (2011) Guidelines for Consultants Reporting on Contaminated Sites and with consideration of the amended NEPC (1999) National Environment Protection (Assessment of Site Contamination) Measure, Schedule A and Schedules B(1)-B(9) by National Environment Protection Council, Adelaide (April 2013). A summary of the document review is presented in the following table.

Table 9.1: Summary of CES (17 August 2018b) RAP

Requirement	Consultant Consideration	Auditor Comment
Remediation Goal:	Section 7.1 states that the goal is to provide sufficient engineering and management controls to make the site suitable (with respect to soil contamination) for the proposed development with accessible soils, to ensure protection of human health and the environment during and post remediation works, and to manage soils in a cost-effective manner.	Acceptable
Extent of remediation required as outlined in RAP:	Section 7.2 states that extent of remediation includes fill from the top 4.5m from the entire footprint of the proposed development (which is proposed to be excavated for construction of a basement car park). Further remediation is considered required for the embankment.	Acceptable, noting that material from the Main Area is generally acceptable for the proposed use and that the excavation will be conducted for basement excavation purposes.
Discussion of possible remediation options:	Section 7.4 provides discussion of the following remediation options: • Onsite treatment of PAH impacted soils and reuse onsite • Offsite treatment of PAH impacted soils • Excavation, transport and disposal of PAH impacted soils • Onsite containment of PAH impacted soils • Onsite relocation of PAH impacted soils • Onsite containment of asbestos • Excavation, transport and disposal of asbestos impacted soils	Acceptable noting the development requires removal of a significant amount of fill from the 'main area' of the site.
Rationale for selected remedial option:	Section 7.4 provides a remedial assessment. The selected remedial options were excavation, transportation and offsite disposal to a licensed facility, with a contingency of excavation, reuse and onsite encapsulation of impacted soils in an area of the site which has a less sensitive landuse.	Acceptable noting, conditions have been placed on the audit confirming requirements if fill is to be retained on site.
Basis for selected remediation criteria:	Section 4 provides the following criteria: • NEPM (2013) HIL B and HSL A/B • NEPM (2013) EIL and ESL. • NEPM (2013) HSL B for asbestos • CL:AIRE (2013) TOC values	Generally acceptable.

Requirement	Consultant Consideration	Auditor Comment
	• NEPM (2013) freshwater and marine water GILs • NSW EPA (2014) Waste Classification Guidelines	
Proposed testing to validate the site after remediation:	Section 5.5 provides the following data gap assessments: • Management Area (Embankment and Apron): 13 locations analysed for PAH and asbestos. • Validation of Base of basement excavation: 27 locations analysed for PAHs and asbestos (10L and 500mL as per NEPM) • Soil surrounding retained tree(s) – No details on sampling density. Samples to be analysed for TRH, PAH, asbestos, metals, OCP. • Soil in the proposed landscaped areas – pH, CEC, organic carbon, clay content. • Stockpiles that have been fly tipped onsite – shall be assessed for offsite disposal in accordance with Section 8.7 of the RAP. Section 8.7.2 provides stockpile assessment: • PID screening for minimum 10 samples for the first 200m^3, and then 1 sample per 25m^3 within a stockpile. • Stockpile sampling as per Vic EPA IWRG 702 (reproduced in Table 4 Schedule B2 NEPM 2013) – analysed for TRH, PAH, asbestos, metals, OCP. Sections 8.12, 9.1.5, 9.1.6, 9.1.7 requires imported material to be VENM or ENM. Landscaping material will require approval by site auditor and environmental consultant. Validation samples will be analysed at a rate of minimum 3 samples, for heavy metals, TRH, BTEX, PAH, OCP, asbestos. Section 9 provides validation plan: • Samples will be analysed from walls and base at a frequency of 1 sample per 25m^2. • Stockpile footprint may be analysed at 1 sample per 25m^2 where deemed required. • Waste classification samples will be analysed for heavy metals, PAH, moderately harmful pesticides, TRH, BTEX, scheduled chemicals.	Acceptable, noting that: • Asbestos assessment in all validation samples shall be as per NEPM (2013) requirements. • Proposed assessment strategy in the Embankment and Apron has not been provided. The Auditor requires sampling be conducted to the base of the fill with adequate samples to characterise the fill. The consultant shall demonstrate that any impact has not impacted the underlying natural material and/or groundwater. • The location of the tree that will be retained is to be confirmed. The proposed assessment around the tree shall be agreed with the site auditor prior to sampling.
Contingency plan for remediation:	Section 8.13 provides remedial contingencies: • Excavation becomes unmanageable due to mud • Excessive stormwater runoff • Excessive dust • Heavy rain, wind, or inclement weather • Equipment failures • Unexpected contamination • Neighbour or community complaints • Selected remedial options are not effective.	Acceptable
Interim site management plan prior to implementation of remediation (health, safety & environment):	Section 3.6.2 provides a summary of the current Environmental management plan.	The site is currently under an EMP which is considered adequate to manage risk prior to remediation for the proposed residential land use.

Requirement	Consultant Consideration	Auditor Comment
Site management plan for remediation works (environment)	Section 8.6 provides site access and Section 8.7 provides soil stockpile management. Section 8.8 provides requirements for construction environmental management plan (CEMP). Section 11 provides site management, which includes: • Site signage and contacts • Site access • Sediment and runoff • Air quality (dust control, odour, potential vapour exposure) • Noise	Acceptable, noting that site management plan shall be prepared in accordance with appropriate guidelines and regulations. **No friable asbestos has been identified at the site. Should friable asbestos be identified at the site, or should significant asbestos containing fragments be identified, the need for air monitoring shall be assessed by a licenced asbestos assessor or a competent person in accordance with the SafeWork NSW (2016) Code of Practice How to Manage and Control Asbestos in the Workplace and SafeWork NSW (2016) Code of Practice How to Safely Remove Asbestos.** **Asbestos removal and validation shall be conducted as per these Code of Practices.**
Site management plan for remediation works (health & safety)	Section 8.5 states that prior to commencing works, the nominated remediation contractor should prepare health, safety and environment plans and safe work method statements. The remediation contractor is to confirm that all necessary environmental management, notifications, permits and safety controls are in place. Section 10 also provides work health and safety requirements that should be addressed: • regulatory requirements; • responsibilities hazard identification and control; • air monitoring (including action levels) during excavation and construction (if necessary); • noise; • odours; • chemical hazard control; • handling procedures; • personal protective equipment (PPE); • work zones; • decontamination procedures; • emergency response plans; • contingency plans; and • incident reporting.	Acceptable
Remediation schedule	Section 8.4 provides remediation sequencing, including: 1. Notifications and permits 2. Installation of environmental, safety, traffic management, construction utilities, site boundary and waste management controls 3. Mobilisation of site amenities	Acceptable, noting the proposed development is not yet finalised.

Requirement	Consultant Consideration	Auditor Comment
	4. Investigation of areas identified for further assessment in the RAP 5. Update of the RAP 6. Remediation works executed in accordance with the RAP and the preferred remediation approach 7. Validation sampling and analyses of remediated areas	
Hours of operation	Section 11.1 states hours of operation are: • 7am – 6pm Monday to Friday • 8am – 1pm Saturday • No work permitted on Sundays or public holidays	Generally acceptable, noting that hours of operation shall meet DA requirements.
Contingency plans for incidents:	Section 10 states that the WHS plan should include response to incidents occurring at the site and emergency contact numbers.	Acceptable
Licenses and approvals:	Section 6 provides the following applicable legislation/regulation and guidelines: • CLM Act 1997 • PoEO Act 1997 • PoEO (Waste) Regulation 2005 • SEPP55 – Remediation of Land • WHS Act 2011 • WHS Regulation 2011 • SafeWork NSW requirements • Various guidelines	Acceptable
Contact persons	Not provided, however Section 11.2 states signage at the main access points will include after-hours contact details of the remediation contractor and site manager.	Acceptable
Community relations (where applicable)	Not provided, but Table 7 provides contingency should complaints be received.	Acceptable, noting community consultations will be required as part of DA approval.
Staged progress reporting (where applicable)	Not provided	Not anticipated for the site
Long term site management plan	Section 8.11 states that ongoing monitoring or management is not required if contaminated material is removed.	Acceptable, noting that long term site management plan will be required should contamination be retained onsite.

10. Compliance with Regulatory Guidelines

Guidelines currently approved by the NSW EPA under Section 105 of the CLM Act are listed in Section 1.2 of this SAR. Where relevant, the Auditor has used this guideline in assessing the works conducted by the consultants.

The consultant's departures from the above guidelines are discussed in the preceding sections of this SAR. The Auditor considers that these departures do not detract from the quality of the data set or any associated conclusions made for the purposes of this SAR.

The Auditor considers that the work completed by the consultant was of sufficient quality to meet the requirements of the endorsed RAP and achieve the objectives of this SAR given the proposed development.

Approvals and licences for NSW legislation for the works discussed in this SAR are as follows:

- Environmental Planning and Assessment Act 1995 / SEPP55 – Although the works constituted Category 2 Remediation, they were conducted in accordance with a development approval (DA) from City of Canterbury Bankstown.
- Waste Classification Guidelines (EPA 2014) – The RAP requires waste classification be conducted as per NSW EPA (2014) Waste Classification Guidelines.
- POEO (Waste) Regulation 2014 – Waste disposal shall be conducted as per the PoEO (Waste) Regulation 2014.
- Bankstown Development Control Plan 2015 – The RAP is in general accordance with the Bankstown DCP 2015. The remediation works shall be conducted as per the RAP.
- SafeWork NSW – Compliance to SafeWork NSW requirements shall be provided in the Validation Report.
- NSW WHS Regulation 2017 – Compliance to WHS Regulation 2017 shall be provided in the Validation Report.
- WaterNSW – No information has been provided regarding the licensing of groundwater monitoring wells installed at the site. Compliance to WaterNSW requirements shall be provided in the Validation Report.
- Sydney Water – Compliance to Sydney Water requirements regarding potential discharge of contaminated water shall be provided in the Validation Report.
- NSW EPA/Council – Compliance to NSW EPA and Council requirements regarding potential discharge of contaminated water shall be provided in the Validation Report.

11. Assessing Urban Redevelopment Sites

The EPA (2017) Contaminated Land Management Guidelines for the NSW Site Auditor Scheme (3rd edition) describes that in assessing the suitability of a site for an existing or proposed land use in an urban context, Auditors should ensure that the contaminated land consultants have followed the decision process for assessing urban redevelopment sites (Appendix A of EPA 2017).

For the purposes of the following assessment, the proposed land use of the site is residential with minimal opportunity for soil access, including units:

- The Consultants site assessment, remediation and validation reports follow applicable guidelines listed in Section 1.3. The departures from the guidelines are listed in the preceding sections of the report. Where departures were noted these results were discussed and either included considering the shortcomings or omitted from consideration. Notwithstanding these departures, the Auditor considers there is sufficient information provided to enable a conclusion to be made on the suitability of the site.
- OEH (2011) provides guidance as to assessment, remediation and validation reporting processes and content. The OEH (2011) has generally been followed through the carrying out of soil / groundwater investigation.
- Aesthetic inspections were carried out by the environmental consultant throughout investigation activities.
- The soils have been assessed against the health-based investigation levels for the use as high density residential apartments with basement car park (NEPM (2013) HIL B/HSL A/B). The Auditor notes that the adoption of HSL A/B is conservative given the proposed basement car park.
- The groundwater was assessed against the NEPM (2013) for fresh and marine water groundwater investigation levels (GILs). The Auditor has also assessed the results against NEPM (2013) HSL D.
- Potential impacts to buildings and structures have been considered through consideration of acid sulfate soil.
- Hazardous ground gases have been assessed against NEPM (2013) HSL for vapour intrusion.
- Any issues relating to local area background soil concentrations that exceed appropriate site soil criteria have been addressed in the site assessment reports.
- To the extent practicable, human health impacts of chemical mixtures have been assessed.
- The site is currently managed under an existing AECOM (2010) EMP. Should there be contamination being retained onsite following remediation, the EMP shall be updated.
- There is no evidence of migration of contaminants either onto or off the site.

12. Auditor's Assessment of Risk

12.1 Risk to human health, structures and the environment arising from the actual or potential contamination of the land

The Auditor considers that CES (17 August 2018a) has adequately assessed the potential risk of fill within the Main Area of the site. The Auditor considers that the potential risk to future site users for the embankment and apron can be managed through the implementation of the CES (17 August 2018b) RAP.

12.2 Potential for off-site migration of contamination and duty to report guidelines

The Auditor considers that there is no contamination that has been identified onsite which has the potential for off-site migration.

12.3 Requirement for any ongoing management of residual contamination

The site is currently managed under an existing AECOM (2010) EMP. Should there be contamination being retained onsite following remediation, the EMP shall be removed or updated if required.

13. Site Audit Conclusions

The site occupies approximately 1.9ha and is identified as Lot 104 DP1149790 and is proposed to be developed as high density residential development for seniors living comprising a four-storey apartment block above a single-level underground car park

The historical land uses identified potential contaminants of concern (COPC) including M8, TPH, BTEX, PAH, OCP, OPP, VOC and asbestos. The consultant has assessed the identified COPC in soil, groundwater and soil vapour, as appropriate.

The site was subject to the previous site audit (Environ, 2010). Work conducted during previous site audit were as follows:

- Potentially contaminating activities at the site included a former underground storage tank (UST) in the south-western portion of the site, storage of shipping containers and drums, above ground fuel storage area in the north-western corner of the site, the presence of drums on the middle of the eastern boundary of the Main area, equipment wash down area, potential building waste materials in the embankment, distribution of excavated spoil which could potentially contain ash waste, fly ash, waste associated with the removal of bitumen-based pipe linings (including within the embankment).
- Previous investigations indicated elevated heavy metals (primarily arsenic, lead, zinc), TPH C_{10}-C_{36} within the Main area and a fragment of asbestos containing cement bonded sheeting within the embankment.
- Remediation works previously conducted at the site included re-excavation and validation of the UST pit area, the excavation and offsite disposal of the PAH impacted fill from five locations, the screening and removal of the top one metre of surface material from a portion of the Main Area with the screened soil validated for re-use to backfill remediation excavations at the site and adjoining sites, and the excavation, screening and re-emplacement of soils for the stabilisation of the Embankment.
- The previous Environ (2010) site audit report and site audit statement concluded that the remedial works and validation sampling was adequate to demonstrate the Main Area of the site suitable for commercial/industrial use. The Embankment area, however, was not considered suitable for unrestricted commercial/industrial use but could be maintained in a condition suitable for commercial/ industrial use with the provision of an Environmental Management Plan (EMP) to manage PAH contaminated fill at the site.

The investigation conducted by CES indicated:

- Soil results in fill in the main area of the site were below criteria nominated for residential use with minimal access to soils, with the exception of one sample exceeding ESL for benzo(a)pyrene (at 1.4mg/kg), noting this location is located in an area likely to be excavated for basement excavation. Noting that that no investigation was conducted within the embankment (where the EMP applies) or the apron.
- Groundwater samples from the recent investigation indicated results were below criteria with the exception of copper, nickel and zinc exceeding marine and/or freshwater GILs, which were considered to be associated with background concentrations.

CES (17 August 2018b) remedial action plan provides a strategy to confirm the historical results in the embankment and apron and validate the site following basement excavation.

The investigation reviewed are generally considered to have met the requirements of EPA (2017), other relevant guidelines endorsed under s.105 of the CLM Act and the objectives of the Site Audit.

Where the consultant's work deviated from the guidelines, the Auditor has discussed this within this SAR and is satisfied that these omissions do not affect the conclusions of the Audit.

On this basis a Section B SAS will be issued certifying that, in the opinion of the Auditor, the site is suitable for residential with minimal opportunity for soil access, including units, provided that the CES (17 August 2018b) Remedial Action Plan 10 Nelson Short Street, Potts Hill, New South Wales (Ref: CES170303-SD-AE, Revision 1.0) is implemented together with the following conditions:

1. Additional investigation is conducted within the Embankment and Apron to confirm the previous results. A sampling, analytical and quality plan for the additional investigation is to be provided to and endorsed by the Auditor prior to sampling.
2. Fill to be retained shall be assessed for asbestos as per NEPM (2013) requirements and as per Section 5 of the RAP. The Auditor requires sampling be conducted to the base of the fill with adequate samples to characterise the fill. The consultant shall demonstrate that any impact has not impacted the underlying natural material.
3. Pending consultation with Council, the location of any tree that will be retained is to be confirmed. Any tree to be retained will require adequate assessment. The proposed assessment around any tree to be retained shall be provided to and endorsed by the Auditor prior to sampling.
4. Remaining impacts in the fill (if any) shall be assessed for potential leaching to groundwater.
5. Should contamination be retained onsite, details of proposed capping and capping validation strategy (quality and extent) are to be provided in a revised RAP. The revised RAP shall be provided to the Auditor for endorsement prior to the capping placement.
6. Should friable asbestos be identified at the site, or should significant asbestos containing fragments are identified, the need for air monitoring shall be assessed by a licenced asbestos assessor or a competent person in accordance with the SafeWork NSW (2016) Code of Practice How to Manage and Control Asbestos in the Workplace and SafeWork NSW (2016) Code of Practice How to Safely Remove Asbestos. Asbestos removal and validation shall be conducted as per these Code of Practices.
7. Material tracking be conducted for material remaining onsite and material disposed of offsite as per the RAP and NSW EPA (2017) requirements.

14. Other Relevant Information

This Audit relates only to those matters relevant to the CLM Act 1997 and CLM Amendment Act 2008, which describes that "The general object of this Act is to establish a process for investigating and (where appropriate) remediating land that the EPA considers to be contaminated significantly enough to require regulation under Division 2 of Part 3". The SAS and SAR do not seek to provide an opinion regarding other aspects of the environment not related to site contamination, to the suitability of the site in regard to the occupational health and safety legislation, or in regards to the suitability of the engineering design.

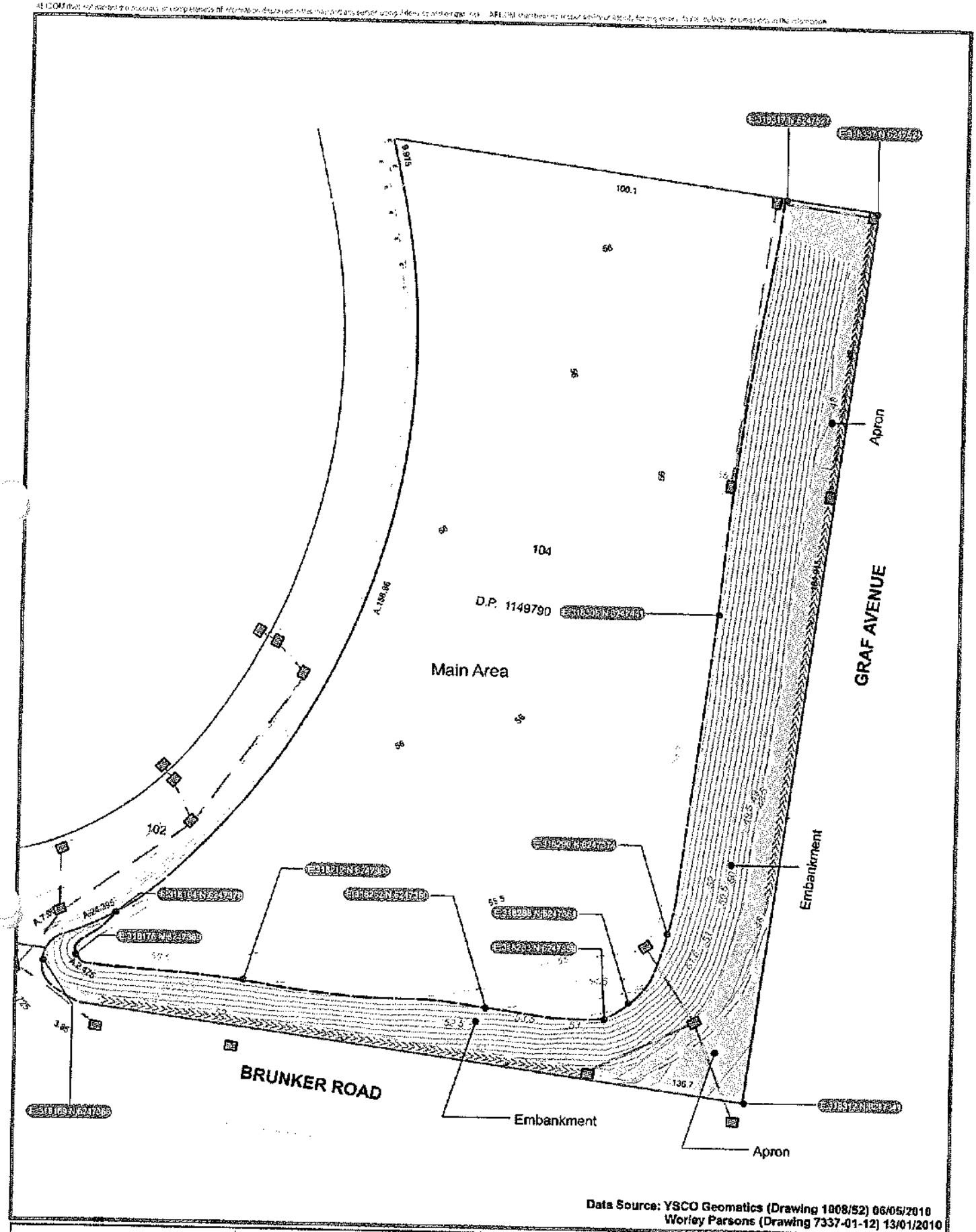
By definition, auditing involves the review and critique of Consultants' work, including site histories, site surveys, subsurface investigations, chemical and physical analyses, risk assessments and modelling. Accordingly, the Auditor relies on the experience, expertise and integrity of the relevant organisations. The information sources referenced have been used to determine site history and local subsurface conditions. While the Auditor has used reasonable care to avoid reliance on data and information that is inaccurate or unsuitable, the Auditor is not able to verify the accuracy or completeness of all information and data made available.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements and site history, not on sampling and analysis of all media at all locations for all potential contaminants.

Environmental sampling and laboratory analyses were undertaken as part of the investigations reviewed by the Auditor, as described herein. Ground conditions between sampling locations may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site which was not identified in the site history.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this site audit are based on the information provided at the time of the investigations.

Appendix A Figures



Data Source: YSCO Geomatics (Drawing 1008/52) 06/05/2010
Worley Parsons (Drawing 7337-01-12) 13/01/2010

AECOM

www.aecom.com

0 35m

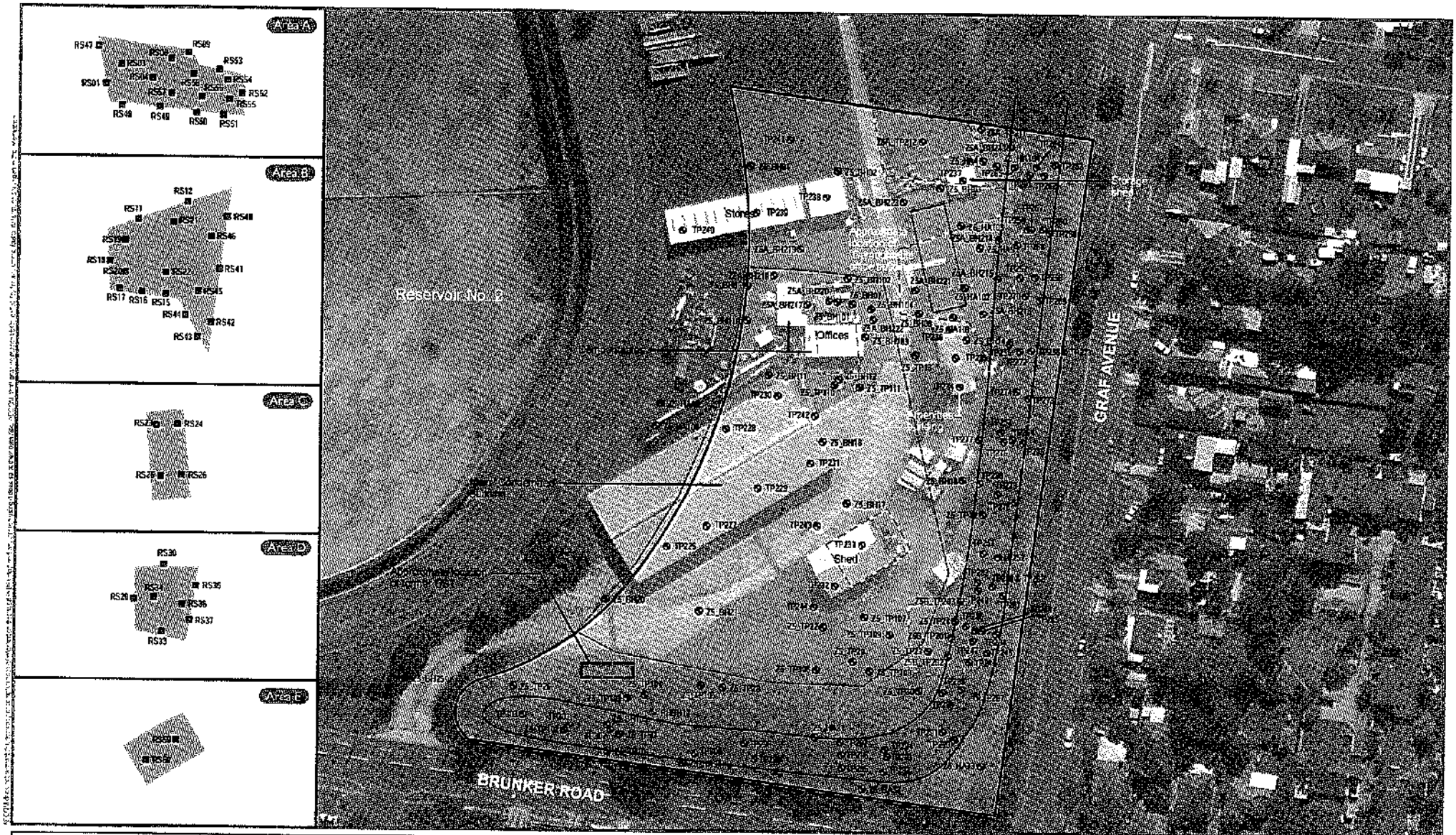
LEGEND

- Lot 104 boundary
- Top of embankment
- Stormwater line and pits
- Overland flow swale and subsoil drainage
- Management area (EMP applies)
- Surveyed coordinates, defining management area

Site Layout

Landcom
Environmental Management Plan - Lot 104
Potts Hill Reservoir
Potts Hill, NSW

Figure
F1



PROJECT ID: 60089128
CREATED BY: TO
LAST MODIFIED: TO 18.05.2010

AECOM
www.aecom.com

0 40m

- Site boundary (per YSCO Geomatics 1008/14E [30/1/09])
- Approximate location of embankments
- Extent of Unit 1A fill removal (per JKW survey data)
- Remediation excavations (per JKW survey data)
- Previous sample location (URS & Coffey)
- AECOM sample location (Test pits/Boreholes)
- AECOM remediation sample location
- Groundwater monitoring well (approximate)

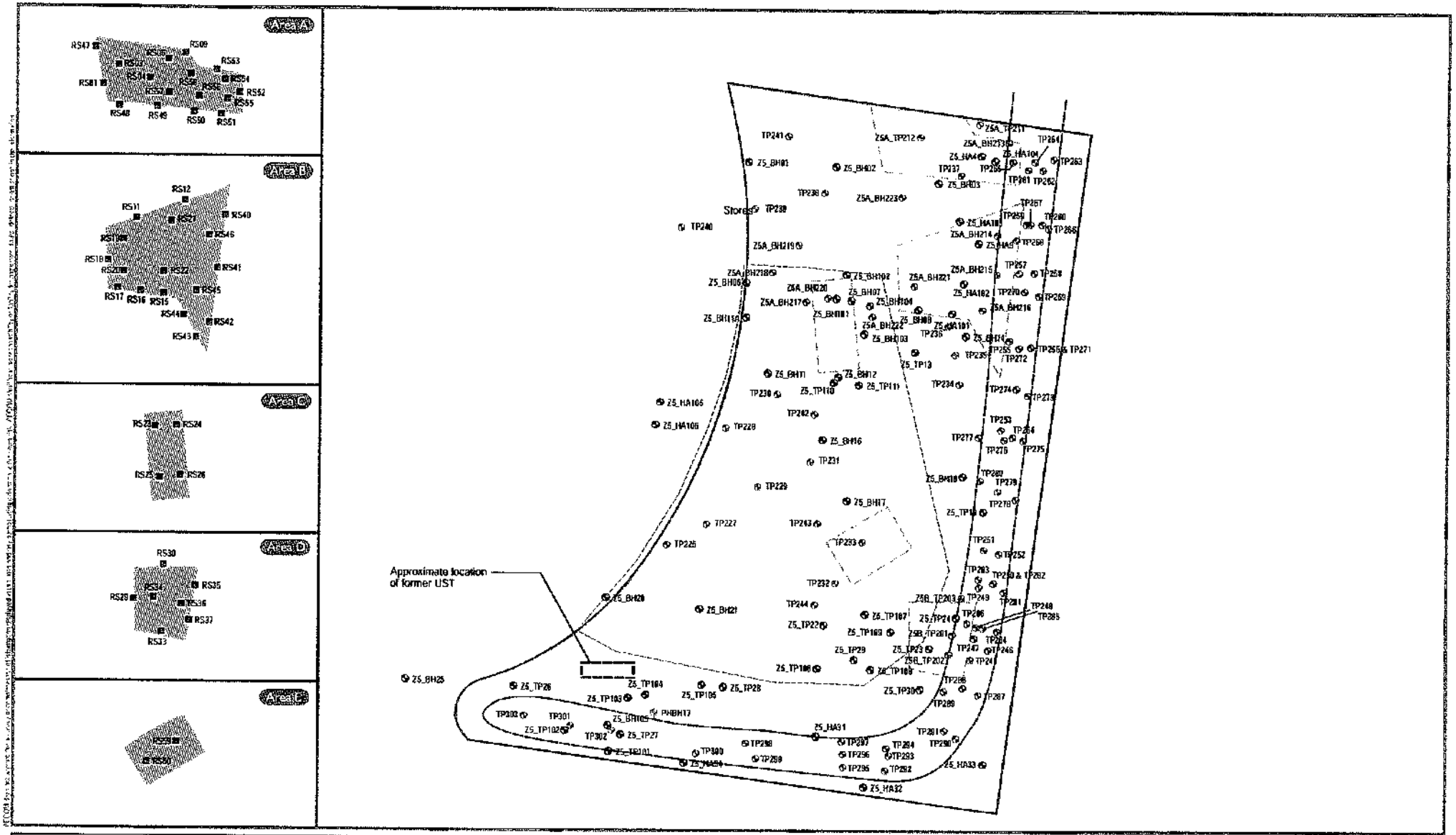
Site Layout (Pre-Demolition) and Sample Location Plan

Landcom
Environmental Management Plan - Lot 104
Potts Hill Reservoir
Potts Hill, NSW

Figure
F2

Map Document: G:\Projects\60089128\...\60089128_Lot 104 EMP\60089128 F2

A3 Size



PROJECT ID: 54089126
CREATED BY: TO
LAST MODIFIED: TO 18/05/2010

AECOM
www.aecom.com

0 40m

- Site boundary (per YSCO Geomatics 1008/14E [30/1/09])
- Approximate location of embankments
- Extent of Unit 1A fill removal (per JKW survey data)
- Remediation excavations (per JKW survey data)
- Previous sample location (URS & Coffey)
- AECOM sample location (Test pits/Boreholes)
- AECOM remediation sample location
- Groundwater monitoring well (approximate)

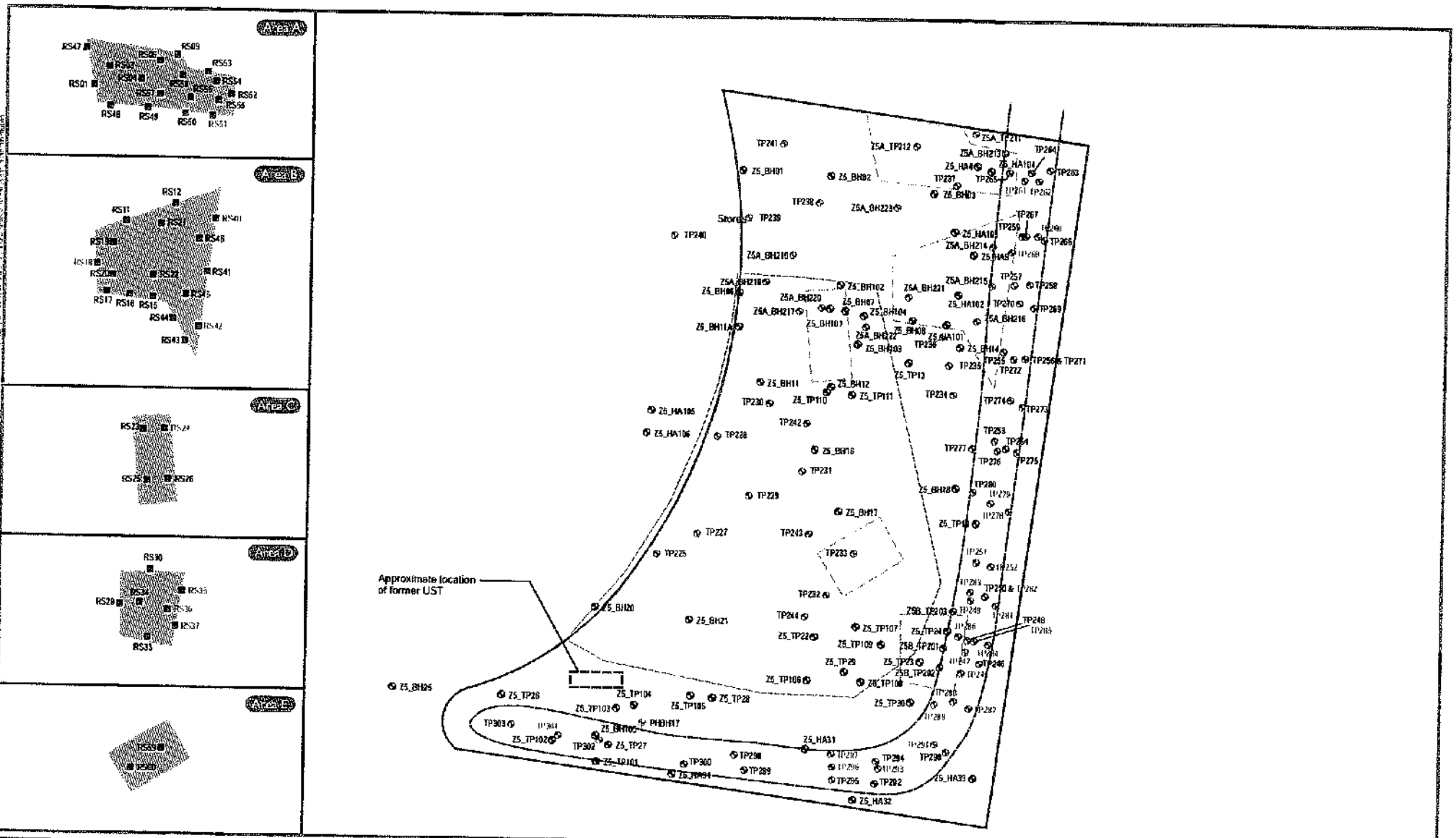
Site Layout (Post-Demolition) and Sample Location Plan

Landcom
Environmental Management Plan - Lot 104
Potts Hill Reservoir
Potts Hill, NSW

Figure
F3

Map Document: D:\Projects\54\54089\...

A3 Size



PROJECT ID: S4089128
CREATED BY: TO
LAST MODIFIED: TO 16 05 2010

AECOM
www.aecom.com

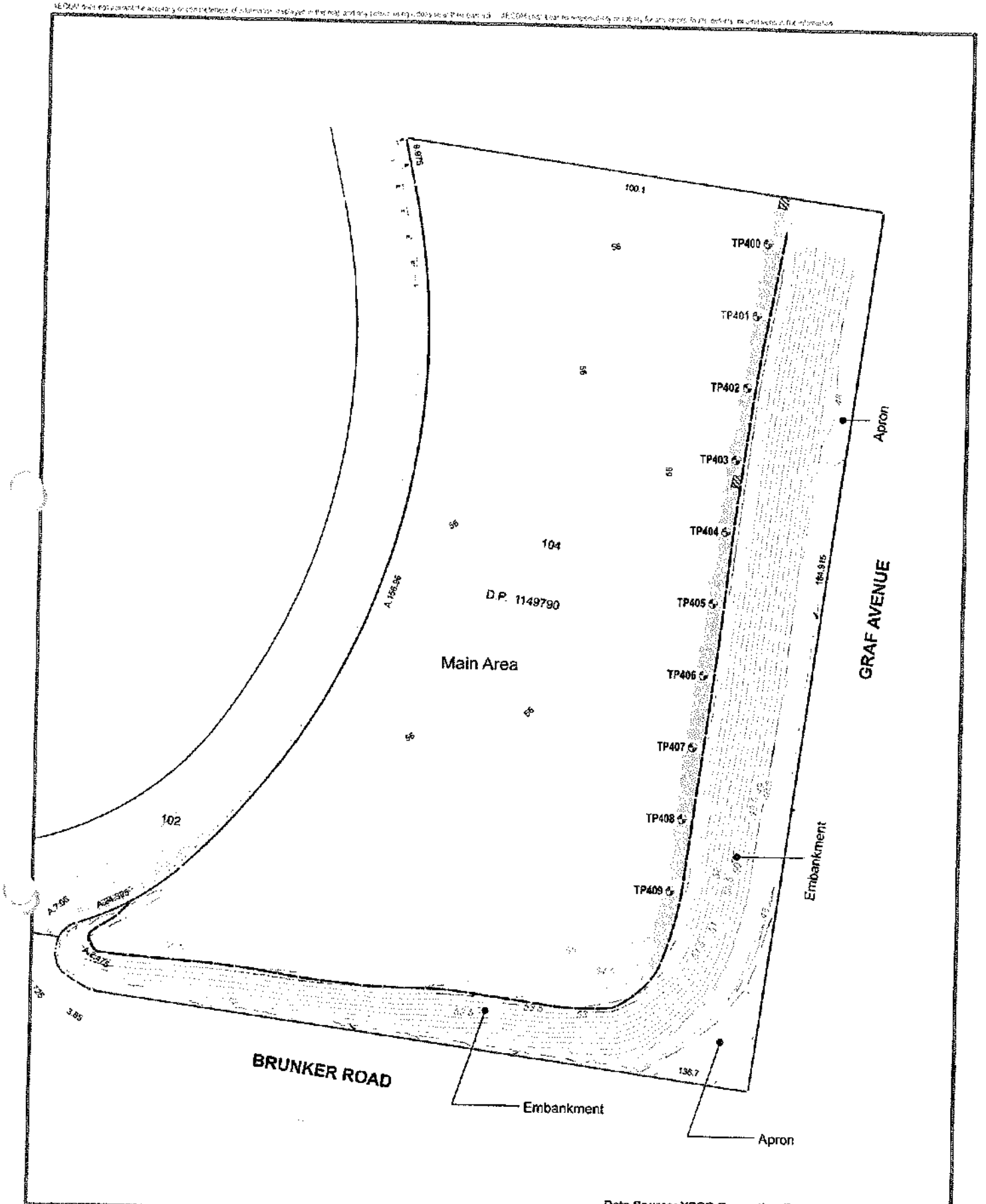
PAH in Soil Impact Plan (Pre-Slope Stability Works)

Landcom
Environmental Management Plan - Lot 104
Potts Hill Reservoir
Potts Hill, NSW

Figure
F4

Map Document: G:\Projects\S4\S4089...\S4089128\GIS\104 EMP\S4089128 F4

A1 Size



Data Source: YSCO Geomatics (Drawing 1008/52) 06/05/2010

AECOM

LEGEND

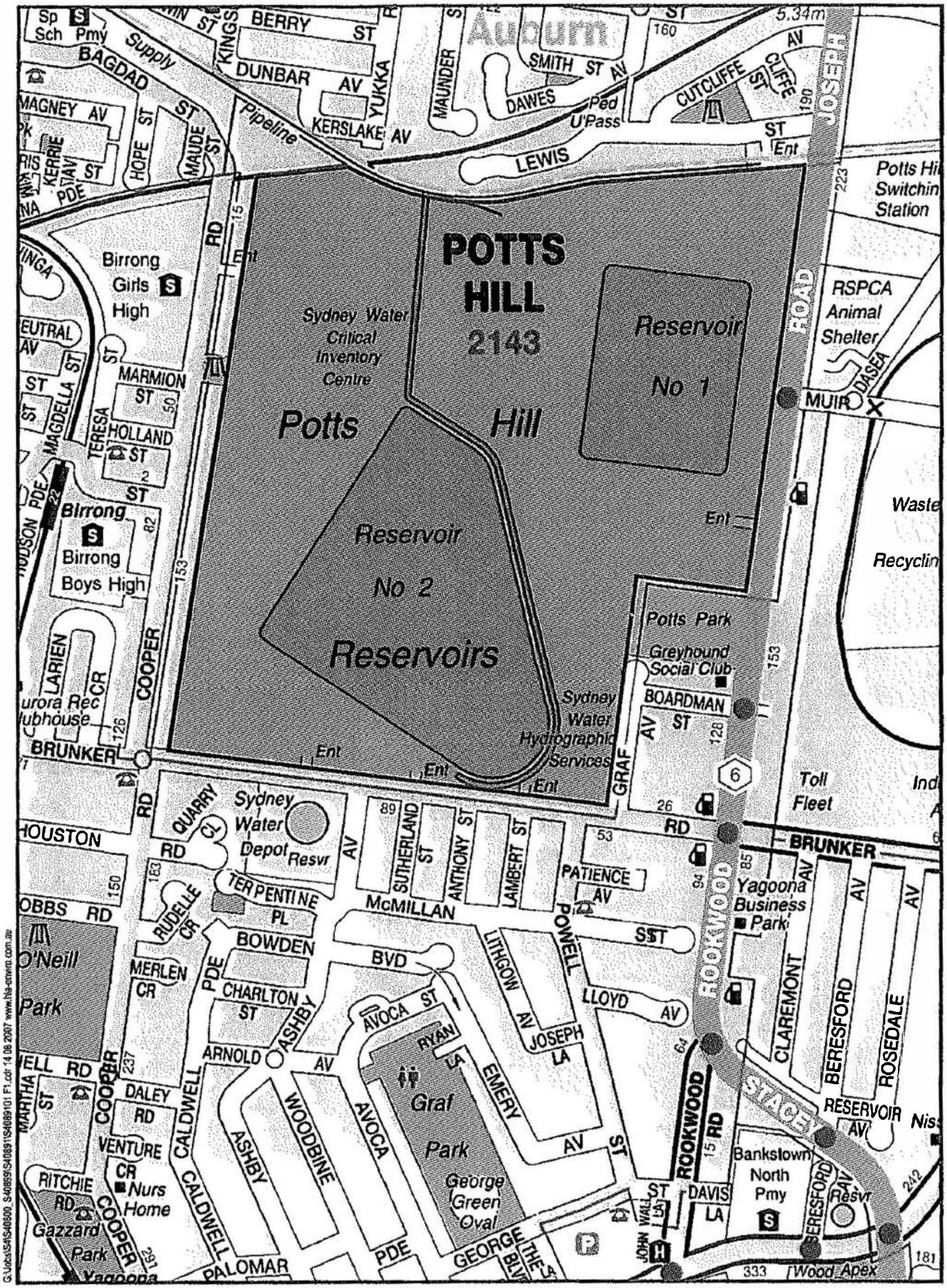
- Lot 104 boundary
- Top of embankment
- Skirt
- Stormwater pit
- AECOM sample locations, April 2010
- TP401 Sample location where B(a)P concentration exceeds Site Assessment Criteria

Sample Location Plan, Post-Slope Stability Works

Landcom
Environmental Management Plan - Lot 104
Potts Hill Reservoir
Potts Hill, NSW

Figure F5

A1 Size



Site Location
Landcom
Remedial Action Plan
Zone 5B Potts Hill Reservoir
Potts Hill, NSW

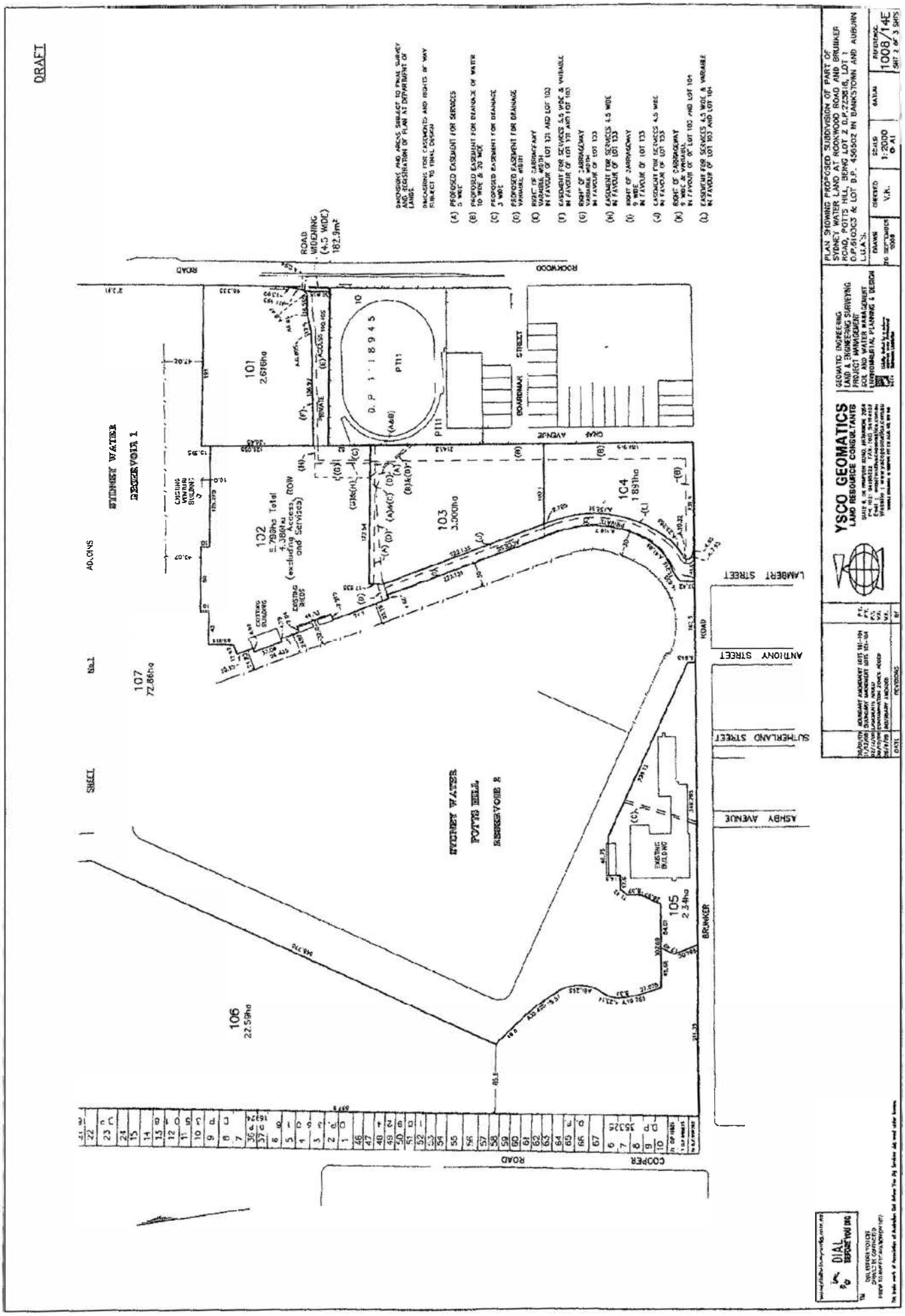
Potts Hill Reservoir

0 200m
Approximate

FIGURE 1

PROJECT-FILE NAME S4069101 DATE 14 August 2007 DRAWN TO APPROVED

G:\Jobs\S4\S40691\S40691\S40691\S40691 F1.cdr 14.08.2007 www.hla-enviro.com.au


DRAFT
PLAN SHOWING PROPOSED SUBDIVISION OF PART OF SYDNEY WATER LAND AT ROOKWOOD ROAD AND BRUNKER ROAD, POTTS HILL, BEING LOT 2 D.P.222816, LOT 1 D.P.610063 & LOT D.P. 456502 IN BANKSTOWN AND AUBURN L.G.A.'s.
YSCO GEOMATICS
LAND & RESOURCE CONSULTANTS
GEOMATIC ENGINEERING
LAND & ENGINEERING SURVEYING
PROJECT MANAGEMENT
SOIL AND WATER MANAGEMENT
ENVIRONMENTAL PLANNING & DESIGN
DRAWN
CHECKED
V.H.
SCALE
1:2000 @ A1
DATUM
REFERENCE
1008/14E
SHT 2 OF 3 SHTS
DIAL BEFORE YOU DIG
SYDNEY WATER POTTS HILL RESERVOIR 1
SYDNEY WATER POTTS HILL RESERVOIR 2
ROAD WIDENING (4.5 WIDE) 182.9m²
ROOKWOOD ROAD
BOARDMAN STREET
CRAIG AVENUE
LAMBERT STREET
ANTHONY STREET
SUTHERLAND STREET
ASHBY AVENUE
BRUNKER ROAD
COOPER ROAD
ADONIS STREET
EXISTING BUILDING
EXISTING SHEDS
EXISTING WATER BUILDING
101 2.676ha
102 5.793ha Total 4.380ha (excluding Access ROW and Services)
103 3.000ha
104 1.891ha
105 2.34ha
106 22.59ha
107 72.86ha
D.P. 1118945 P111
DIMENSIONS AND AREAS SUBJECT TO FINAL SURVEY AND REGISTRATION OF PLAN AT DEPARTMENT OF LANDS.
DIMENSIONS FOR EASEMENTS AND RIGHTS OF WAY SUBJECT TO FINAL DESIGN
(A) PROPOSED EASEMENT FOR SERVICES 5 WIDE
(B) PROPOSED EASEMENT FOR DRAINAGE OF WATER 10 WIDE & 20 WIDE
(C) PROPOSED EASEMENT FOR DRAINAGE 3 WIDE
(D) PROPOSED EASEMENT FOR DRAINAGE VARIABLE WIDTH
(E) RIGHT OF CARRIAGEWAY VARIABLE WIDTH IN FAVOUR OF LOT 121 AND LOT 102
(F) EASEMENT FOR SEWERS 4.5 WIDE & VARIABLE IN FAVOUR OF LOT 101 AND LOT 103
(G) RIGHT OF CARRIAGEWAY VARIABLE WIDTH IN FAVOUR OF LOT 133
(H) EASEMENT FOR SERVICES 4.5 WIDE IN FAVOUR OF LOT 133
(I) RIGHT OF CARRIAGEWAY 7 WIDE IN FAVOUR OF LOT 133
(J) EASEMENT FOR SERVICES 4.5 WIDE IN FAVOUR OF LOT 133
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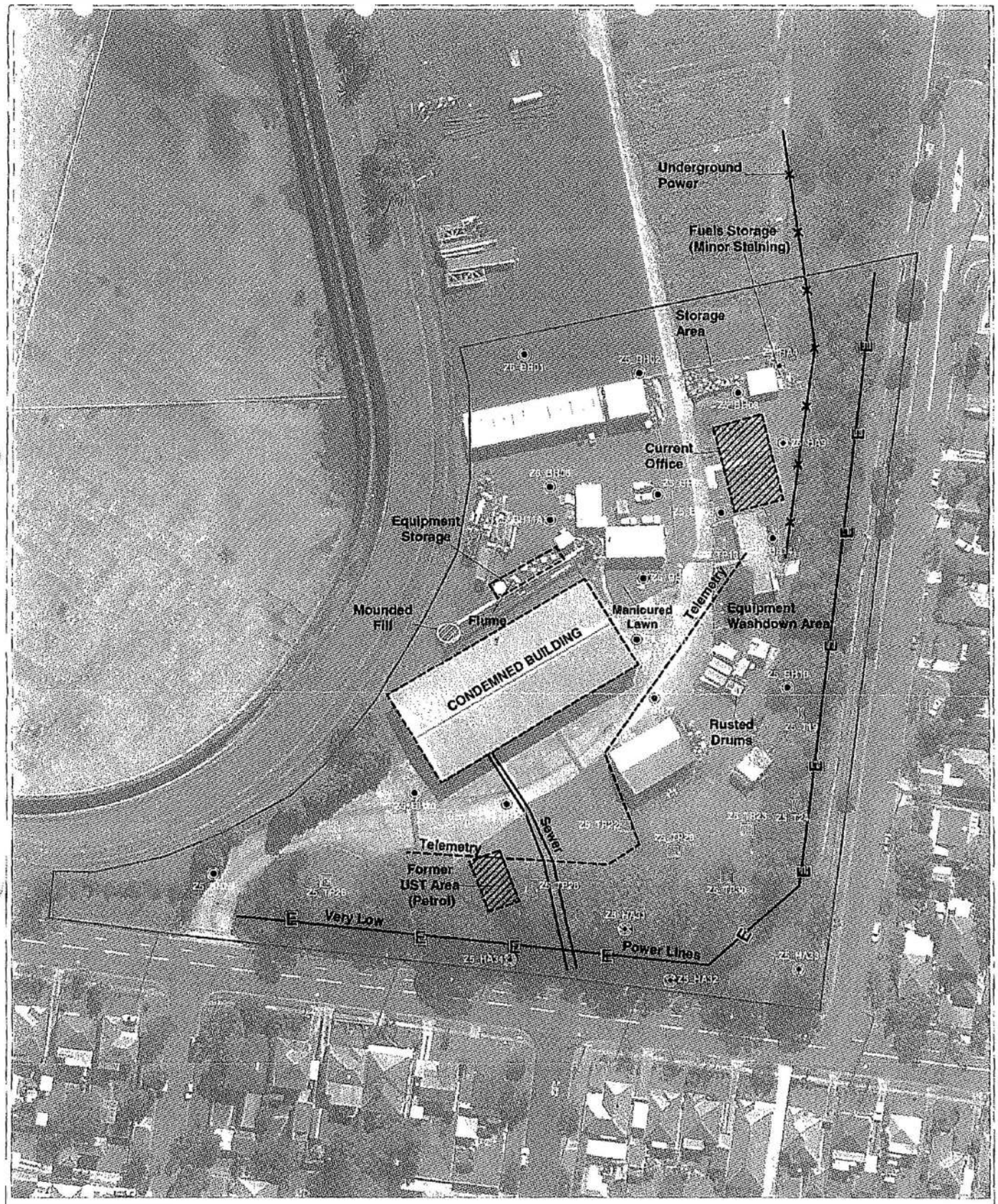
(L) EASEMENT FOR SERVICES 4.5 WIDE & VARIABLE IN FAVOUR OF LOT 103 AND LOT 104

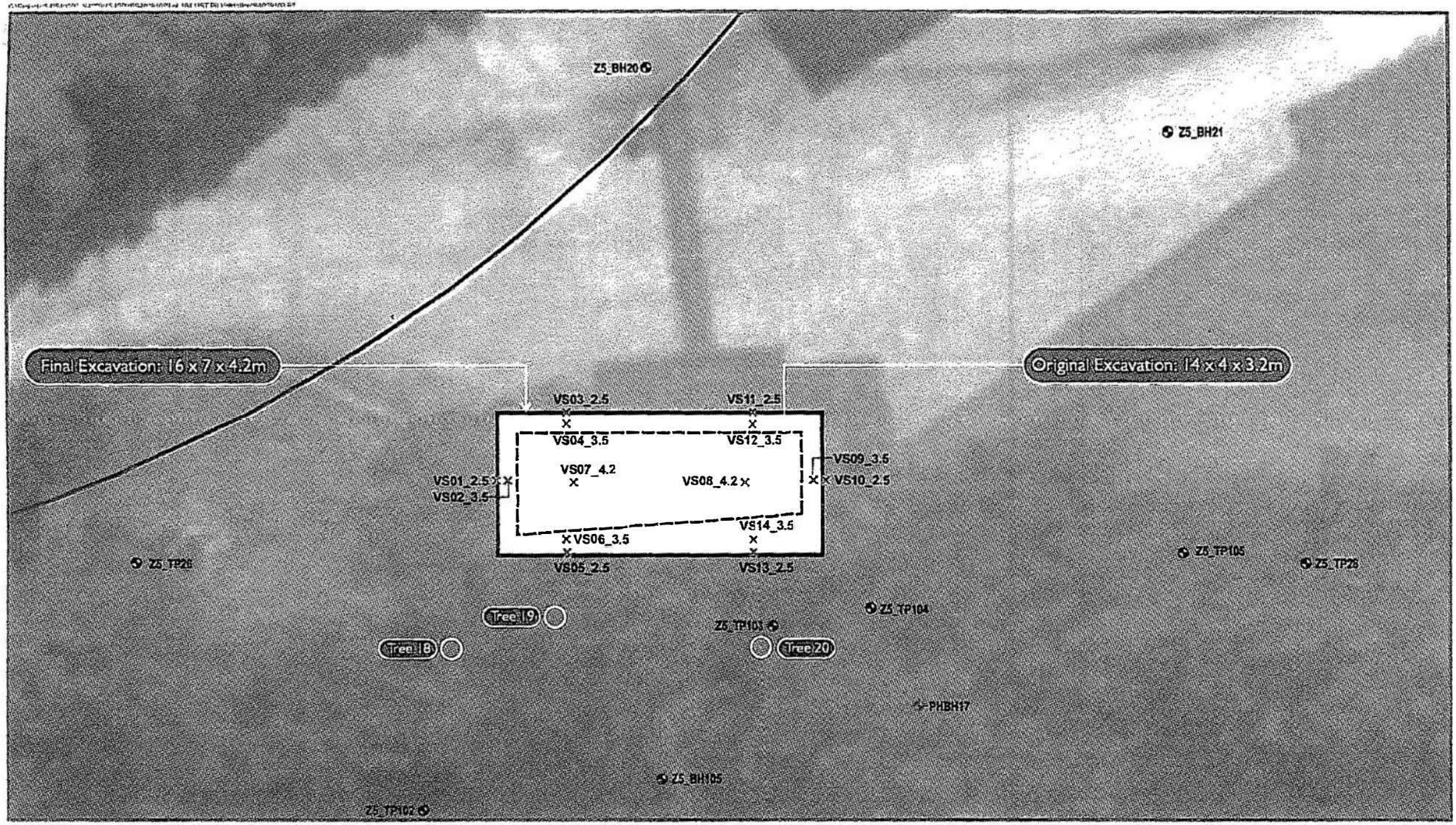


Legend

- Borehole
- Hand Auger
- Test Pit
- Trench

URS	URS Australia Pty Ltd	
Date Printed: 26/11/04	Author: CLD	Figure 3 Sample Locations Zone 5
	Approved: SC	
Figure 3	Status: FINAL	
Client: Sydney Water	Phase 2 Environmental Site Assessment Potts Hill Reservoir. Project No.: 18240-058	
T:\Proj\GIS\18240058\GIS\Wor\Nov04\Fig_3_Zone_5.WOR	0 25 50 metres	Projection: MGA Zone 56 Data Source: Sydney Water

Attachment 4: Combined Investigation Locations



ENVIRONMENT

PROJECT ID	54089108
CREATED BY	TO
LAST MODIFIED	TO 01 09 2009

AECOM

www.aecom.com

0 5m

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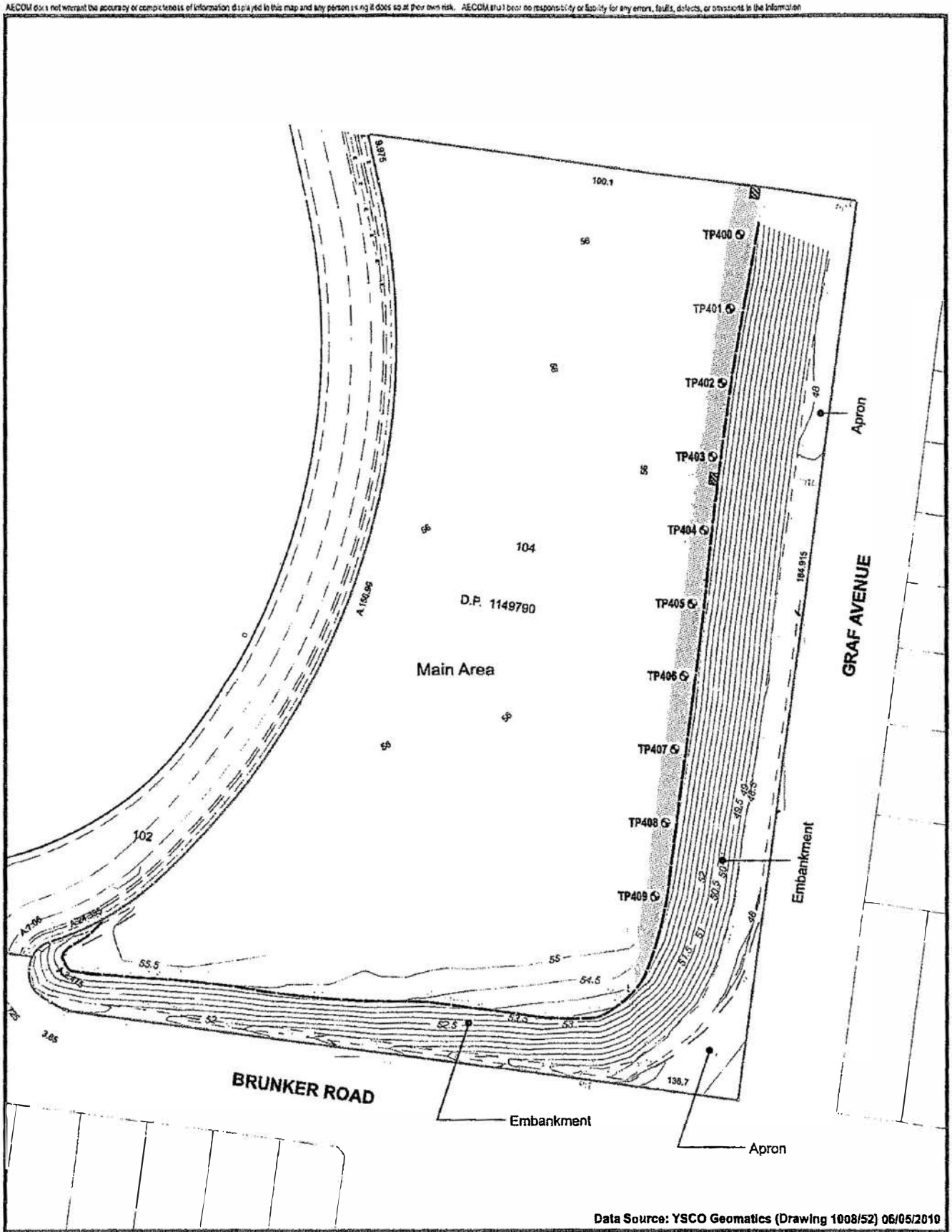
- Site boundary (per YSCO Geomatics 1008/14E [30/1/09])
- Previous sample location (URS & Coffey)
- Groundwater monitoring well (approximate)
- UST pit validation sample location

Sample Location Plan

Landcom
UST Pit Validation
Potts Hill Reservoir
Potts Hill, NSW

Figure
F2

Attachment 5: UST Pit Validation Sample Locations



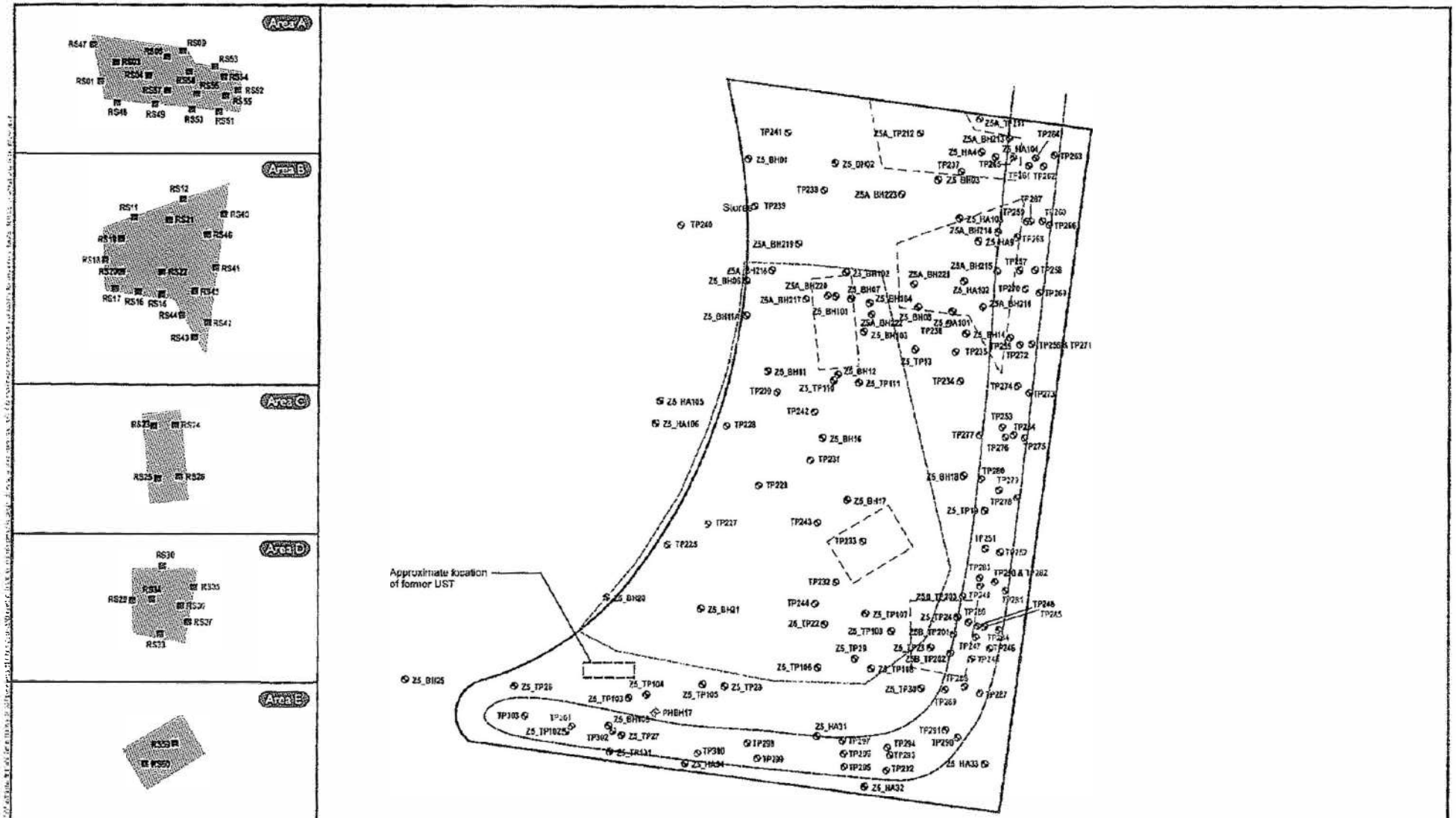
Data Source: YSCO Geomatics (Drawing 1008/52) 06/05/2010

PROJECT ID: S4089128 CREATED BY: TD LAST MODIFIED: TD 19.05.2010 AECOM www.aecom.com	LEGEND Lot 104 boundary Top of embankment Skirt Stormwater pit AECOM sample locations, April 2010 TP401 Sample location where B(a)P concentration exceeds Site Assessment Criteria	**Sample Location Plan, Post-Slope Stability Works** **Landcom** *Environmental Management Plan - Lot 104* Potts Hill Reservoir Potts Hill, NSW Figure **F5**

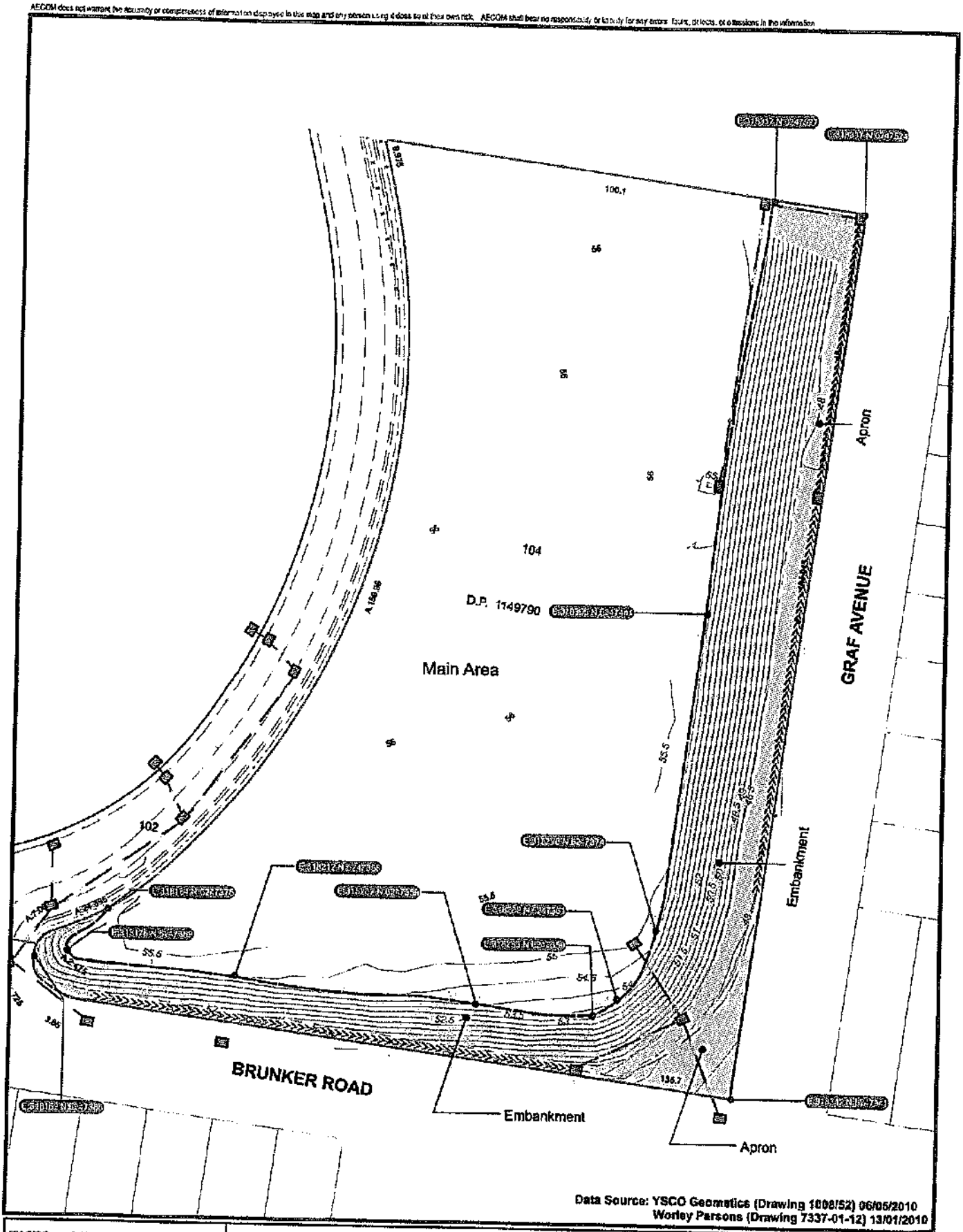
0 30m

Map Document: D:\Projects\S4\S40800_S40899\S40891\S4089128\Lot 104 EMP\S4089128 F5 Rev A

A4 Size



Attachment 7: Residual PAH Impacts



Data Source: YSCO Geomatics (Drawing 1008/52) 06/05/2010
Worley Parsons (Drawing 7337-01-12) 13/01/2010

PROJECT ID: 540599/28
CREATED BY: TD
LAST MODIFIED: TO 19.05.2010
AECOM www.aecom.com

0 30m

LEGEND

- Lot 104 boundary
- Top of embankment
- Stormwater line and pits
- >>>>> Overland flow swale and subsoil drainage
- Management area (EMP applies)
- Surveyed coordinates, defining management area

Site Layout

Landcom
Environmental Management Plan - Lot 104
Potts Hill Reservoir
Potts Hill, NSW

Figure F1

Map Document: G:\Projects\540599\540599_540599\540599128\Lot 104 EMP\540599128 F1 Rev B

A4 Size

CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55 Grandview Street, Pymble, NSW, 2073
ph 8569 2200 fax 9983 0582

Title:

Figure 1: Site Location Plan

CES Project ID:	Date:
CES170303-SD	09/08//2017
Prepared By:	Checked By:
I. Wong	D. Lowe

CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55 Grandview Street, Pymble, NSW, 2073
ph 8569 2200 fax 9983 0582

Title:

Figure 2: Borehole Location Plan

CES Project ID:	Date:
CES170303-SD	09/08//2017
Prepared By:	Checked By:
I. Wong	D. Lowe

CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55 Grandview Street, Pymble, NSW, 2073
ph 8569 2200 fax 9983 0582

Title:

Figure 1: Site Location Plan

CES Project ID:	Date:
CES170303-SD	09/08//2017
Prepared By:	Checked By:
I. Wong	D. Lowe

CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55 Grandview Street, Pymble, NSW, 2073
ph 8569 2200 fax 9983 0582

Title:

Figure 2: Site Layout Plan

CES Project ID:	Date:
CES170303-SD	17/08/2018
Prepared By:	Checked By:
T. Goodbody	D. Lowe

CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55 Grandview Street, Pymble, NSW, 2073
ph 8569 2200 fax 9983 0582

Title:

Figure 3: Proposed Borehole Location Plan

CES Project ID:	Date:
CES170303-SD	17/08/2018
Prepared By:	Checked By:
T. Goodbody	D. Lowe

AMENDMENTS

ISSUE	DESCRIPTION	APPROVED	DATE
P1	Preliminary Issue	JS	31/07/17
P2	Preliminary Issue for Consultant Co-ordination	JS	11/08/17
P3	Preliminary Issue for Consultant Co-ordination	JS	17/08/17
A	Issue for Development Application	JS	31/08/17
B	Incorporate Council comments	JS	23/02/18
C	Incorporate Council comments	JS	02/07/18

NOTE:

• FOR FURTHER INFORMATION ON EXISTING RL'S, REFER TO SURVEY REF:7304 'DETAIL AND LEVEL SURVEY OF LOT 104 IN DP 1149790' BY SDG.

SITE PLAN KEY

- EXISTING TREE TO BE RETAINED
- EXISTING TREE TO BE REMOVED
- CP COMMUNICATIONS PIT
- LP LIGHT POLE
- PP POWER POLE
- TS TRAFFIC SIGNAL

FOR DETAILS REFER TO LANDSCAPE ARCHITECTS TREE REMOVAL & RETENTION PLAN

NOTE:
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DRAWING
SITE PLAN

DATE	SCALE @ A1	DRAWN
31/08/17	1 : 400	CR,AK,CW,CT

PROJECT No.	DISCP.	DRAWING No.	ISSUE
2016097	A	DA-002	C

PROJECT
Potts Hill Seniors Living

Lot 1, Pier 8-9, 23 Hickson Road
Walsh Bay New South Wales 2000 Australia
T 61 2 9290 2722 F 61 2 9290 1150
E sydney@jacksonteece.com
Jackson Teece Chesterman Willis Pty Ltd
Trading as Jackson Teece
ABN 15 083 837 290
Nominated Architect Ian Brodie (4275)

JACKSON TEECE

Date generated:8/3/2018 3:33:46 PM C:\Revit_LOCAL\2016097-JT-0-SHT-DA-AR-_-17_zhan.rvt

AMENDMENTS

ISSUE	DESCRIPTION	APPROVED	DATE
P1	Preliminary Issue	JS	31/07/17
P2	Preliminary Issue for Consultant Co-ordination	JS	11/08/17
P3	Preliminary Issue for Consultant Co-ordination	CR	29/08/17
A	Issue for Development Application	JS	31/08/17
B	Revised Issue for Development Application	JS	6/09/17
C	Incorporate Council comments	JS	23/02/18
D	Incorporate Council comments	JS	02/07/18

Department Legend

- Amenities
- BOH
- Circulation
- Communal
- Communal Outdoor
- PARKING BUILDING A
- PARKING BUILDING A STAFF
- PARKING BUILDING B
- PARKING BUILDING B VISITOR
- PARKING BUILDING C
- PARKING BUILDING C VISITOR
- PARKING BUILDING D
- PARKING BUILDING D VISITOR
- PARKING BUILDING E
- PARKING BUILDING E VISITOR
- PARKING BUILDING F
- PARKING BUILDING F STAFF
- PARKING CAFE
- PARKING MEDICAL CENTRE
- PARKING RESTURANT
- PARKING RETAIL
- PARKING VISITOR
- Retail
- Service
- Store

PARKING SCHEDULE_Standard Parking Bays		
Building_No	Comments	Count
A	Standard Car Parking Bay	4
B	Standard Car Parking Bay	33
C	Standard Car Parking Bay	25
D	Standard Car Parking Bay	31
E	Standard Car Parking Bay	33
Surplus	Standard Car Parking Bay	12

Total Number of Standard Parking Spaces: 138

PARKING SCHEDULE_Visitor		
Building_No	Comments	Count
V-B	Visitor	7
V-C	Visitor	5
V-D	Visitor	7
V-E	Visitor	7

Total Number of Visitor Parking Spaces 26

PARKING SCHEDULE_Commercial		
Building_No	Comments	Count
D	Medical	5
D	Restaurant	12
D	Retail	1

Total Number of Parking Spaces: 18

PARKING SCHEDULE_RACF		
Building_No	Comments	Count
A	RACF STAFF	5
F	RACF STAFF	5

Total Number of RACF Staff Parking Spaces: 10

PARKING SCHEDULE_Accessible		
Building_No	Comments	Count
	Accessible Car Parking Bay	14
	3.8m Accessible Car Parking Bay	8

Total Number of Accessible Parking Spaces 22

Notes:
- SEPP Seniors: Schedule 3.5 Requires 5% of the total number of car parking spaces must be designated to enable the width of the space to be increased to 3.8m
- Minimum required parking Accessible Car Spaces 233 (total required car parking spaces) x 0.05 = 11.65 spaces
- Standard Car Parking Bay 2.4m x 5.4m to AS 2890.1:2004
- Storage Note: 3.2m³ overbonnet storage provided
- Visitor = 1 space per 5 ILU's
- 2.5m minimum clear height to accessible parking bays. Provide bollard in accordance with AS2890.6-2009 Figure 2.2 & 2.3

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DRAWING
FLOOR PLAN - BASEMENT 1

DATE	SCALE @ A1	DRAWN
31/08/17	1 : 250	CR,AK,CW,CT

PROJECT No.	DRAWING No.	ISSUE
2016097	DA-099	D

PROJECT
Potts Hill Seniors Living

Lot 1, Pier 8-9, 23 Hickson Road
Walsh Bay New South Wales 2000 Australia
T 61 2 9290 2722 F 61 2 9290 1150
E sydney@jacksonteece.com
Jackson Teece Chesterman Willis Pty Ltd
Trading as Jackson Teece
ABN 15 083 837 290
Nominated Architect Ian Brodie (4275)

JACKSON TEECE

SYDNEY WATER
POTTS HILL RESERVOIR
LOT 105
DP 1149790

No. 10
LOT 104
DP 1149790
1.892 ha

NELSON
SHORT
STREET

LOT 102
DP 1149790

BOUNDARY

Building D - ILU
Building C - ILU
Building B - ILU
Building E - ILU
Building A - RACF
Building F - RACF

EXISTING TREES TO BE RETAINED

NEW VEHICLE CROSSING IN ACCORDANCE WITH THE BANKSTOWN ENGINEERING STANDARDS

PORTE COCHERE AWNING OVER

DROP OFF

PATH

PAVILION

OUTDOOR DINING

AWNING SHOWN DASHED OVER

ENTRY

LANDSCAPED OPEN SPACE

OUTDOOR POOL

SLIDING SCREEN

SECURITY FENCE

ACCESIBLE WATER ENTRY/ EXIT AS PER NCC. C1 & D3.10 TO BE PROVIDED

GRADIENT OF ACCESS DRIVEWAY, GRADE CHANGE & GRADE TRANSITIONS TO BE IN ACCORDANCE WITH AS 2890.1

PEDESTRIAN SIGHTLINES TO BE PRESERVED IN ACCORDANCE WITH AS 2890.1:2004

FOR FULL EXTENT REFER TO SITE PLAN

COMMUNITY MEETING SPACE REMOVED

COURTYARD

LOUNGE ABOVE STAFF COURTYARD BELOW

PRIVACY SCREEN

PROVISION FOR FUTURE PEDESTRIAN PATH FROM GRAF AVE TO CONNECT TO ENTRANCE PLAZA OFF NELSON SHORT STREET. SUBJECT TO SEPERATE APPLICATION

KIOSK SUBSTATION

FENCE

SETBACK

SEPERATION

BUILDING DEPTH

CORRIDOR

TRANSITION FALL 1:20

FALL 1:16

CARPARK RAMP FALL 1:7

1 Floor Plan - Ground Floor

Date generated:8/9/2018 10:24:39 AMC:\Revit_LOCAL\2016097-JT-0-SHT-DA-AR-1.05-1_-17_zhan.rvt

NOTES: AREAS INDICATED ON THIS PLAN ARE MEASURED TO THE INTERNAL FACE OF EXTERNAL OR BOUNDING WALLS, OR FROM THE INTERNAL FACE OF WALLS SEPARATING THE BUILDING FROM ANY OTHER BUILDING, MEASURED AT A HEIGHT OF 1.4 METRES ABOVE THE FLOOR

BANKSTOWN CITY COUNCIL - PLANNING CONTROLS 8 POLICIES DEFINES GROSS FLOOR AREA IN BANKSTOWN LOCAL ENVIRONMENT PLAN 2015 (CURRENT VERSION FOR 14 JULY 2017 TO DATE (ACCESSED 14 AUGUST 2017 AT 14:29))

"GROSS FLOOR AREA MEANS THE SUM OF THE FLOOR AREA OF EACH FLOOR OF A BUILDING MEASURED FROM THE INTERNAL FACE OF EXTERNAL WALLS, OR FROM THE INTERNAL FACE OF WALLS SEPARATING THE BUILDING FROM ANY OTHER BUILDING, MEASURED AT A HEIGHT OF 1.4 METRES ABOVE THE FLOOR, AND INCLUDES:
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J) VOIDS ABOVE A FLOOR AT THE LEVEL OF A STOREY OR STOREY ABOVE."

AMENDMENTS

ISSUE	DESCRIPTION	APPROVED	DATE
P1	Preliminary Issue	JS	31/07/17
P2	Preliminary Issue for Consultant Co-ordination	JS	11/08/17
A	Issue for Development Application	JS	31/08/17
B	Incorporate Council comments	JS	23/02/18
C	Incorporate Council comments	JS	02/07/18
D	Updated Issue for Development Application	JS	09/08/18

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DRAWING
FLOOR PLAN - GROUND FLOOR

DATE	SCALE @ A1	DRAWN
09/08/18	1 : 250	CR,AK,CW,CT

PROJECT No. 2016097 A
DISCP.
DRAWING No. DA-100
ISSUE D

PROJECT
Potts Hill Seniors Living

Lot 1, Pier 8-9, 23 Hickson Road
Walsh Bay New South Wales 2000 Australia
T 61 2 9290 2722 F 61 2 9290 1150
E sydney@jacksonteece.com
Jackson Teece Chesterman Willis Pty Ltd
Trading as Jackson Teece
ABN 15 083 837 290
Nominated Architect Ian Brodie (4275)

JACKSON TEECE

NOTES: AREAS INDICATED ON THIS PLAN ARE MEASURED TO THE INTERNAL FACE OF EXTERNAL OR BOUNDING WALLS, OR FROM THE INTERNAL FACE OF WALLS SEPARATING THE BUILDING FROM ANY OTHER BUILDING, MEASURED AT A HEIGHT OF 1.4 METRES ABOVE THE FLOOR

BANKSTOWN CITY COUNCIL - PLANNING CONTROLS & POLICIES DEFINES GROSS FLOOR AREA IN BANKSTOWN LOCAL ENVIRONMENT PLAN 2015 (CURRENT VERSION FOR 14 JULY 2017 TO DATE (ACCESSED 14 AUGUST 2017 AT 14:29))

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AMENDMENTS

ISSUE	DESCRIPTION	APPROVED	DATE
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B	Incorporate Council comments	JS	23/02/18
C	Incorporate Council comments	JS	02/07/18
D	Updated Issue for Development Application	JS	09/08/18

1 FLOOR PLAN - LEVEL 1

Department Legend

- Amenities
- BOH
- Circulation
- Communal
- Communal Outdoor
- ILU - 1 bed
- ILU - 1 bed balcony
- ILU - 2 bed
- ILU - 2 bed balcony
- ILU - 3 bed
- ILU - 3 bed balcony
- Medical Centre
- R-Apartment Areas
- RACF
- RACF - 1 bed balcony
- RACF-Auxillary
- Retail
- Service
- Store

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DRAWING
FLOOR PLAN - LEVEL 1

DATE	SCALE @ A1	DRAWN
09/08/18	1 : 250	CR,AK,CW,CT

PROJECT No. 2016097 | DISCP. A | DRAWING No. DA-101 | ISSUE D

PROJECT
Potts Hill Seniors Living

Lot 1, Pier 8-9, 23 Hickson Road
Walsh Bay New South Wales 2000 Australia
T 61 2 9290 2722 F 61 2 9290 1150
E sydney@jacksonteece.com
Jackson Teece Chesterman Willis Pty Ltd
Trading as Jackson Teece
ABN 15 083 837 290
Nominated Architect Ian Brodie (4275)

JACKSON TEECE

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BANKSTOWN CITY COUNCIL - PLANNING CONTROLS & POLICIES DEFINES GROSS FLOOR AREA IN BANKSTOWN LOCAL ENVIRONMENT PLAN 2015 (CURRENT VERSION FOR 14 JULY 2017 TO DATE (ACCESSED 14 AUGUST 2017 AT 14:29))

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B	Incorporate Council comments	JS	23/02/18
C	Incorporate Council comments	JS	02/07/18
D	Updated Issue for Development Application	JS	09/08/18

Department Legend

- Amenities
- BOH
- Circulation
- Communal
- Communal Outdoor
- ILU - 1 bed
- ILU - 1 bed balcony
- ILU - 2 bed
- ILU - 2 bed balcony
- ILU - 3 bed
- ILU - 3 bed balcony
- Medical Centre
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CHECKED BY: JS

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DRAWING
FLOOR PLAN - LEVEL 2

DATE	SCALE @ A1	DRAWN
09/08/18	1 : 250	CR,AK,CW,CT

PROJECT No. 2016097 A | DISCP. | DRAWING No. DA-102 | ISSUE D

PROJECT
Potts Hill Seniors Living

Lot 1, Pier 8-9, 23 Hickson Road
Walsh Bay New South Wales 2000 Australia
T 61 2 9290 2722 F 61 2 9290 1150
E sydney@jacksonteece.com
Jackson Teece Chesterman Willis Pty Ltd
Trading as Jackson Teece
ABN 15 083 837 290
Nominated Architect Ian Brodie (4275)
JACKSON TEECE

1 FLOOR PLAN - LEVEL 2

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P1	Preliminary Issue	JS	31/07/17
P2	Preliminary Issue for Consultant Co-ordination	JS	11/08/17
A	Issue for Development Application	JS	31/08/17
B	Incorporate Council comments	JS	23/02/18
C	Incorporate Council comments	JS	02/07/18

1 FLOOR PLAN - LEVEL 3

Department Legend

- Amenities
- BOH
- Circulation
- Communal
- Communal Outdoor
- ILU - 1 bed
- ILU - 1 bed balcony
- ILU - 2 bed
- ILU - 2 bed balcony
- ILU - 3 bed
- ILU - 3 bed balcony
- Medical Centre
- R-Apartment Areas
- RACF
- RACF - 1 bed balcony
- RACF-Auxillary
- Retail
- Service
- Store

LEGEND:

CLERE STORY WINDOW

NOTE:
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DEVELOPMENT APPLICATION

APPROVED BY: JS
CHECKED BY: JS

CLIENT
Mushan Project Management

DRAWING
FLOOR PLAN - LEVEL 3

DATE	SCALE @ A1	DRAWN
31/08/17	As indicated	DH,AK,CW,CT

PROJECT No.	DISCP.	DRAWING No.	ISSUE
2016097	A	DA-103	C

PROJECT
Potts Hill Seniors Living

Lot 1, Pier 8-9, 23 Hickson Road
Walsh Bay New South Wales 2000 Australia
T 61 2 9290 2722 F 61 2 9290 1150
E sydney@jacksonteece.com
Jackson Teece Chesterman Willis Pty Ltd
Trading as Jackson Teece
ABN 15 083 837 290
Nominated Architect Ian Brodie (4275)

JACKSON TEECE

AMENDMENTS

ISSUE	DESCRIPTION	APPROVED	DATE
P1	Preliminary Issue	JS	31/07/17
P2	Preliminary Issue for Consultant Co-ordination	JS	11/08/17
A	Issue for Development Application	JS	31/08/17
B	Incorporate Council comments	JS	23/02/18
C	Incorporate Council comments	JS	02/07/18

SYDNEY WATER
POTTS HILL RESERVOIR
LOT 105
DP 1149790

No. 10
LOT 104
DP 1149790
1.892 ha

LOT 102
DP 1149790

NELSON
SHORT
STREET

BOUNDARY

Building D - ILU
Building E - ILU
Building C - ILU
Building B - ILU
Building F - RACF
Building A - RACF

BUILDING DEPTH 15365
8000 SETBACK
BUILDING DEPTH 56940
BUILDING DEPTH 49660
FOR FULL EXTENT REFER TO SITE PLAN
10000 SETBACK
BUILDING DEPTH 47400
6000 SETBACK
BUILDING DEPTH 23650
3750
BUILDING DEPTH 33400
BUILDING DEPTH 23800
BUILDING DEPTH 23800
BUILDING DEPTH 24305
BUILDING DEPTH 23405
BUILDING DEPTH 23800
BUILDING DEPTH 23800
BUILDING DEPTH 21510
12000 SEPERATION
12880 SEPERATION
BUILDING DEPTH 40780
BUILDING DEPTH 55050
BUILDING DEPTH 48205
20000 SETBACK
20000 SETBACK

PAVILLION ROOF BELOW
REFER TO LANDSCAPE
ARCHITECT FOR DETAILS

AWNING BELOW
AWNING BELOW

LIFT OVERRUN
+RL 71450
ROOF
CLERESTORY FOR VENTILATION AND SOLAR
5° FALL
PAVILLION ROOF
VOID
AWNING OVER ENTRY
[No Slope]
SEPARATION
VOID OVER STAFF COURTYARD BELOW
VOID OVER COURTYARD BELOW
ROOF TERRACE BELOW
LANDSCAPE TO LANDSCAPE ARCHITECTS DETAIL
+RL 67700
ROOF
+RL 67300
KIOSK SUBSTATION

1 DA-402
2 DA-402
1 DA-403
2 DA-403
1 DA-409

Date generated:8/3/2018 3:57:37 PM C:\Revit_LOCAL\2016097-JT-0-SHT-DA-AR-_-17_zhan.rvt

NOTE:
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THIS DRAWING ISSUE HAS BEEN REVIEWED FOR

DEVELOPMENT APPLICATION

APPROVED BY: JS
CHECKED BY: JS

CLIENT
Mushan Project Management

DRAWING
FLOOR PLAN - ROOF

DATE 31/08/17
SCALE @ A1 1 : 250
DRAWN CR,AK,CW,CT

PROJECT No. 2016097 A
DISCP.
DRAWING No. DA-104
ISSUE C

PROJECT
Potts Hill Seniors Living

Lot 1, Pier 8-9, 23 Hickson Road
Walsh Bay New South Wales 2000 Australia
T 61 2 9290 2722 F 61 2 9290 1150
E sydney@jacksonteece.com
Jackson Teece Chesterman Willis Pty Ltd
Trading as Jackson Teece
ABN 15 083 837 290
Nominated Architect Ian Brodie (4275)

JACKSON TEECE

AMENDMENTS

ISSUE	DESCRIPTION	APPROVED	DATE
P1	Preliminary Issue	JS	31/07/17
P2	Preliminary Issue for Consultant Co-ordination	JS	11/08/17
A	Issue for Development Application	JS	31/08/17
B	Incorporate Council comments	JS	23/02/18
C	Incorporate Council comments	JS	02/07/18

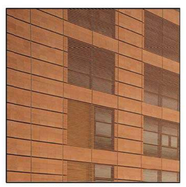
1 East Elevation - RACF - Building A

2 East Elevation - RACF - Building C & B

MATERIAL PALETTE


1. TERRACOTTA FINS


2. TERRACOTTA VERTICAL SCREENS

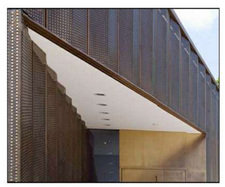

3. TERRACOTTA FACADE SYSTEM

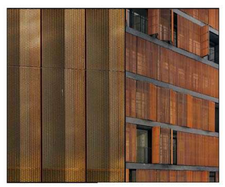

4. GLASS BALUSTRADE


5. EXPRESSED PFC TO SLAB EDGE MICACEOUS IORN OXIDE PAINT FINISH, NATURAL GREY


6. HORIZONTAL TERRACOTTA SUNSCREEN TO POOL FACADE


7. TEXTURED PRECAST CONCRETE


8. FIBRE CEMENT SOFFIT LINING PAINT FINISH: WHITE


9. PERFORATED METAL FOLDING SCREENS


10. HORIZONTAL ALUMININUM VENETIAN BLINDS

Date generated:8/3/2018 3:58:38 PM C:\Revit_LOCAL\2016097-JT-0-SHT-DA-AR-_-17_zhan.rvt

ABBREVIATIONS

BAL-01	Framed glass balustrade
CD-02	Cladding- Terracotta Facade System
CD-03	
COL	Column Off-form concrete finish
CONC-01	Precast concrete, paint finish.
D-01	Solid Core Fire Door
D-02	Glazed Sliding Door
D-03	Glazed Sliding Door
PFC-01	PFC Slab edge detail. Micaceous iron oxide paint finish. Natural Grey
R-01	Render / Plaster
SCE-01	External Screen - Vertical Terracotta Baguette 50x50mm
SCE-10	Perforated Metal Screen
STO	Storage
W-1	Window Type 1. - Full Height Glazed Window Aluminium Frame (size as shown on architectural drawings)
W-2	Window Type 2. - Full Height Shop Front Glazing Aluminium Frame (size as shown on architectural drawings)
W-4	Window Type 4. - Hinged Window (planter access) High level Vent Panel Aluminium Frame (1600w x1700h)
W-5	Window Type 5. - Hinged Window (planter access) High level Vent Panel Aluminium Frame (1600w x3100h)
W-6	Window Type 6. - Glazed Window Aluminium Frame with Spandrel Panel (900w x 2700h)
W-7	Window Type 7. - Glazed Window Aluminium Frame with Spandrel Panel (900w x 4100h)

NOTE:
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50mm on original

THIS DRAWING ISSUE HAS BEEN REVIEWED FOR

DEVELOPMENT APPLICATION

APPROVED BY: JS
CHECKED BY: JS

CLIENT
Mushan Project Management

DRAWING
ELEVATIONS - 01

DATE	SCALE @ A1	DRAWN
31/08/17	1 : 200	CR,AK,CW,CT

PROJECT No.	DRAWING No.	ISSUE
2016097	DA-300	C

PROJECT
Potts Hill Seniors Living

Lot 1, Pier 8-9, 23 Hickson Road
Walsh Bay New South Wales 2000 Australia
T 61 2 9290 2722 F 61 2 9290 1150
E sydney@jacksonteece.com
Jackson Teece Chesterman Willis Pty Ltd
Trading as Jackson Teece
ABN 15 083 837 290
Nominated Architect Ian Brodie (4275)

JACKSON TEECE

AMENDMENTS

ISSUE	DESCRIPTION	APPROVED	DATE
P1	Preliminary Issue	JS	31/07/17
P2	Preliminary Issue for Consultant Co-ordination	JS	11/08/17
A	Issue for Development Application	JS	31/08/17
B	Incorporate Council comments	JS	23/02/18
C	Incorporate Council comments	JS	02/07/18
D	Updated Issue for Development Application	JS	09/08/18

1 North Elevation- RACF -Building A & F

2 South Elevation- ILU -Building C & D - Brunker Road

ABBREVIATIONS

BAL-01	Framed glass balustrade
CD-02	Cladding- Terracotta Facade System
CD-03	
COL	Column Off-form concrete finish
CONC-01	Precast concrete, paint finish.
D-01	Solid Core Fire Door
D-02	Glazed Sliding Door
D-03	Glazed Sliding Door
PFC-01	PFC Slab edge detail. Micaceous iron oxide paint finish. Natural Grey
R-01	Render / Plaster
SCE-01	External Screen - Vertical Terracotta Baguette 50x50mm
SCE-10	Perforated Metal Screen
STO	Storage
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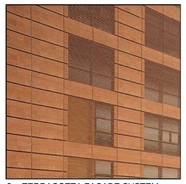
W-6	Window Type 6. - Glazed Window Aluminium Frame with Spandrel Panel (900w x 2700h)
W-7	Window Type 7. - Glazed Window Aluminium Frame with Spandrel Panel (900w x 4100h)

MATERIAL PALETTE


1. TERRACOTTA FINS


2. TERRACOTTA VERTICAL SCREENS

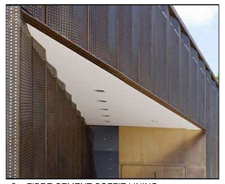

3. TERRACOTTA FACADE SYSTEM


4. GLASS BALUSTRADE


5. EXPRESSED PFC TO SLAB EDGE MICACEOUS IORN OXIDE PAINT FINISH, NATURAL GREY


6. HORIZONTAL TERRACOTTA SUNSCREEN TO POOL FACADE


7. TEXTURED PRECAST CONCRETE


8. FIBRE CEMENT SOFFIT LINING PAINT FINISH: WHITE


9. PERFORATED METAL FOLDING SCREENS


10. HORIZONTAL ALUMININUM VENETIAN BLINDS

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THIS DRAWING ISSUE HAS BEEN REVIEWED FOR

DEVELOPMENT APPLICATION

APPROVED BY: JS
CHECKED BY: JS

CLIENT
Mushan Project Management

DRAWING
ELEVATIONS - 02

DATE 09/08/18
SCALE @ A1 1 : 200
DRAWN CR,AK,CW,CT

PROJECT No. 2016097
DRAWING No. DA-301
ISSUE D

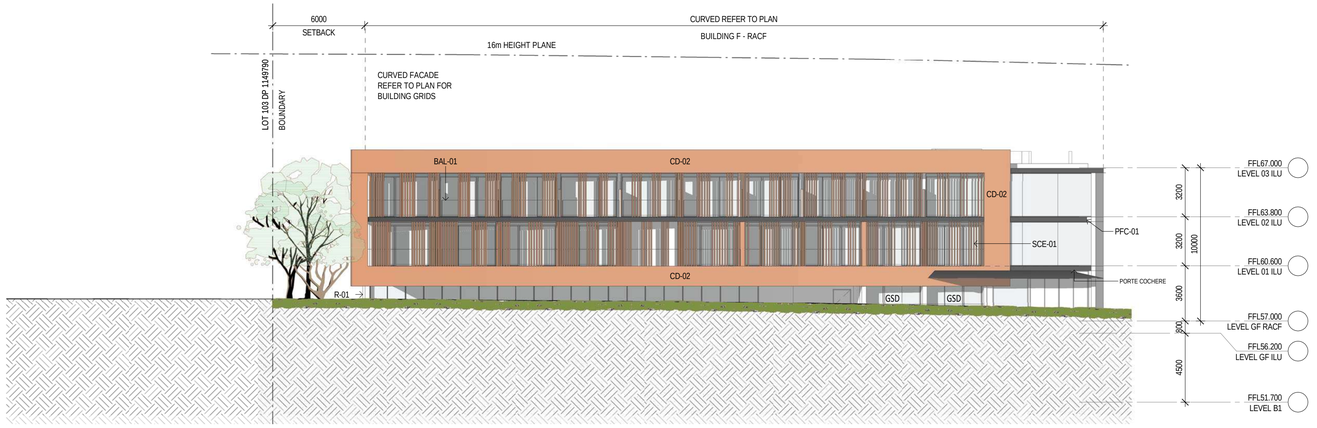
PROJECT
Potts Hill Seniors Living

Lot 1, Pier 8-9, 23 Hickson Road
Walsh Bay New South Wales 2000 Australia
T 61 2 9290 2722 F 61 2 9290 1150
E sydney@jacksonteece.com
Jackson Teece Chesterman Willis Pty Ltd
Trading as Jackson Teece
ABN 15 083 837 290
Nominated Architect Ian Brodie (4275)

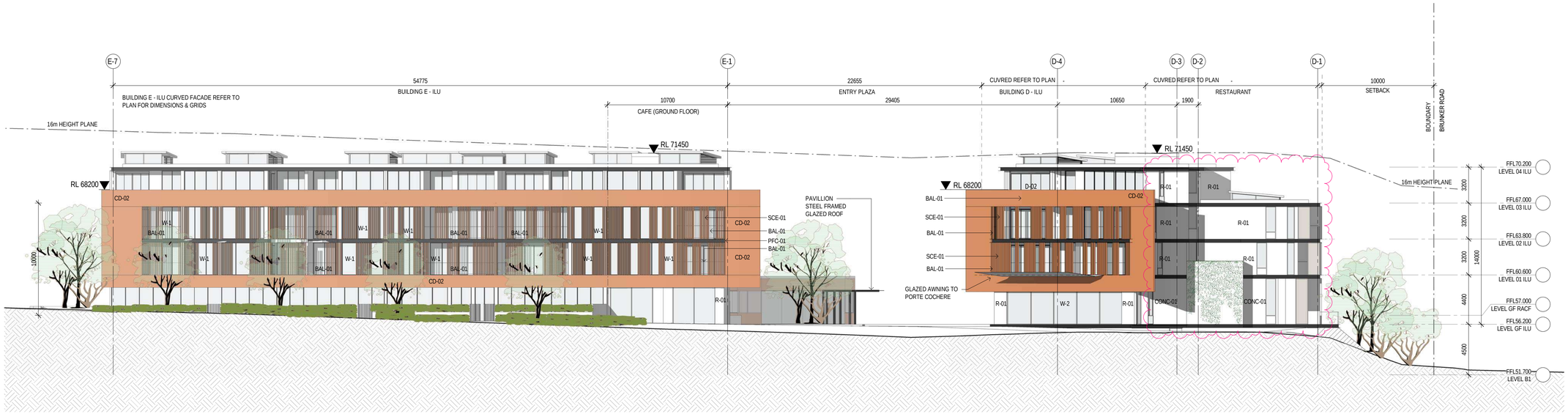
JACKSON TEECE

AMENDMENTS

ISSUE	DESCRIPTION	APPROVED	DATE
P1	Preliminary Issue	JS	31/07/17
P2	Preliminary Issue for Consultant Co-ordination	JS	11/08/17
A	Issue for Development Application	JS	31/08/17
B	Incorporate Council comments	JS	23/02/18
C	Incorporate Council comments	JS	02/07/18
D	Updated Issue for Development Application	JS	06/08/18



1 West Elevation - Building F- Nelson Short Street



2 West Elevation - Building D & E-Nelson Short Street

ABBREVIATIONS

BAL-01	Framed glass balustrade
CD-02	Cladding- Terracotta Facade System
CD-03	
COL	Column Off-form concrete finish
CONC-01	Precast concrete, paint finish.
D-01	Solid Core Fire Door
D-02	Glazed Sliding Door
D-03	Glazed Sliding Door
PFC-01	PFC Slab edge detail. Micaceous iron oxide paint finish. Natural Grey
R-01	Render / Plaster
SCE-01	External Screen - Vertical Terracotta Baguette 50x50mm
SCE-10	Perforated Metal Screen
STO	Storage
W-1	Window Type 1. - Full Height Glazed Window Aluminium Frame (size as shown on architectural drawings)
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W-6	Window Type 6. - Glazed Window Aluminium Frame with Spandrel Panel (900w x 2700h)
W-7	Window Type 7. - Glazed Window Aluminium Frame with Spandrel Panel (900w x 4100h)

MATERIAL PALETTE


1. TERRACOTTA FINS


2. TERRACOTTA VERTICAL SCREENS


3. TERRACOTTA FACADE SYSTEM

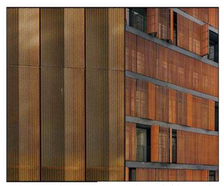

4. GLASS BALUSTRADE


5. EXPRESSED PFC TO SLAB EDGE MICACEOUS IORN OXIDE PAINT FINISH, NATURAL GREY


6. HORIZONTAL TERRACOTTA SUNSCREEN TO POOL FACADE


7. TEXTURED PRECAST CONCRETE


8. FIBRE CEMENT SOFFIT LINING PAINT FINISH: WHITE


9. PERFORATED METAL FOLDING SCREENS


10. HORIZONTAL ALUMININUM VENETIAN BLINDS

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DEVELOPMENT APPLICATION

APPROVED BY: JS
CHECKED BY: JS

CLIENT
Mushan Project Management

DRAWING
ELEVATIONS - 03

DATE 06/08/18
SCALE @ A1 1 : 200
DRAWN CR,AK,CW,CT

PROJECT No. 2016097
DRAWING No. DA-302
ISSUE D

PROJECT
Potts Hill Seniors Living

Lot 1, Pier 8-9, 23 Hickson Road
Walsh Bay New South Wales 2000 Australia
T 61 2 9290 2722 F 61 2 9290 1150
E sydney@jacksonteece.com
Jackson Teece Chesterman Willis Pty Ltd
Trading as Jackson Teece
ABN 15 083 837 290
Nominated Architect Ian Brodie (4275)

JACKSON TEECE

Date generated:8/6/2018 11:15:41 AMC:\Revit_LOCAL\2016097-JT-0-SHT-DA-AR-1.05-1_-17_zhan.rvt

AMENDMENTS

ISSUE	DESCRIPTION	APPROVED	DATE
P1	Preliminary Issue	JS	31/07/17
P2	Preliminary Issue for Consultant Co-ordination	JS	11/08/17
A	Issue for Development Application	JS	31/08/17
B	Incorporate Council comments	JS	23/02/18
C	Incorporate Council comments	JS	02/07/18

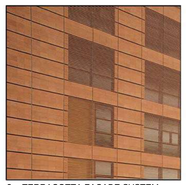
1 North Elevation-ILU- Building B & E

2 East Elevation-ILU-Building C & D

MATERIAL PALETTE


1. TERRACOTTA FINS


2. TERRACOTTA VERTICAL SCREENS

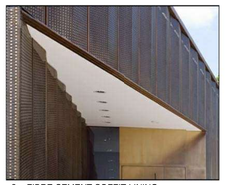

3. TERRACOTTA FACADE SYSTEM

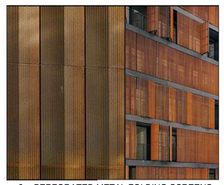

4. GLASS BALUSTRADE


5. EXPRESSED PFC TO SLAB EDGE MICACEOUS IORN OXIDE PAINT FINISH, NATURAL GREY


6. HORIZONTAL TERRACOTTA SUNSCREEN TO POOL FACADE


7. TEXTURED PRECAST CONCRETE


8. FIBRE CEMENT SOFFIT LINING PAINT FINISH: WHITE


9. PERFORATED METAL FOLDING SCREENS


10. HORIZONTAL ALUMININUM VENETIAN BLINDS

Date generated:8/3/2018 4:01:15 PM C:\Revit_LOCAL\2016097-JT-0-SHT-DA-AR-_-17_zhan.rvt

ABBREVIATIONS

BAL-01	Framed glass balustrade
CD-02	Cladding- Terracotta Facade System
CD-03	
COL	Column Off-form concrete finish
CONC-01	Precast concrete, paint finish.
D-01	Solid Core Fire Door
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STO	Storage
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W-7	Window Type 7. - Glazed Window Aluminium Frame with Spandrel Panel (900w x 4100h)

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50mm on original

THIS DRAWING ISSUE HAS BEEN REVIEWED FOR

DEVELOPMENT APPLICATION

APPROVED BY: JS
CHECKED BY: JS

CLIENT
Mushan Project Management

DRAWING
ELEVATIONS - 04

DATE 31/08/17
SCALE @ A1 1 : 200
DRAWN CR,AK,CW,CT

PROJECT No. 2016097
DRAWING No. DA-303
ISSUE C

PROJECT
Potts Hill Seniors Living

Lot 1, Pier 8-9, 23 Hickson Road
Walsh Bay New South Wales 2000 Australia
T 61 2 9290 2722 F 61 2 9290 1150
E sydney@jacksonteece.com
Jackson Teece Chesterman Willis Pty Ltd
Trading as Jackson Teece
ABN 15 083 837 290
Nominated Architect Ian Brodie (4275)

JACKSON TEECE

AMENDMENTS

ISSUE	DESCRIPTION	APPROVED	DATE
P1	Preliminary Issue	JS	31/07/17
P2	Preliminary Issue for Consultant Co-ordination	JS	11/08/17
A	Issue for Development Application	JS	31/08/17
B	Incorporate Council comments	JS	23/02/18
C	Incorporate Council comments	JS	02/07/18
D	Updated Issue for Development Application	JS	09/08/18

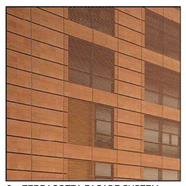
1 South Elevation- Building E & B

2 South Elevation- Building F & A

MATERIAL PALETTE


1. TERRACOTTA FINS


2. TERRACOTTA VERTICAL SCREENS


3. TERRACOTTA FACADE SYSTEM


4. GLASS BALUSTRADE


5. EXPRESSED PFC TO SLAB EDGE MICACEOUS IORN OXIDE PAINT FINISH, NATURAL GREY


6. HORIZONTAL TERRACOTTA SUNSCREEN TO POOL FACADE


7. TEXTURED PRECAST CONCRETE


8. FIBRE CEMENT SOFFIT LINING PAINT FINISH: WHITE


9. PERFORATED METAL FOLDING SCREENS


10. HORIZONTAL ALUMININUM VENETIAN BLINDS

Date generated:8/9/2018 10:38:13 AMC:\Revit_LOCAL\2016097-JT-0-SHT-DA-AR-1.05-1_-17_zhan.rvt

ABBREVIATIONS

BAL-01	Framed glass balustrade
CD-02	Cladding- Terracotta Facade System
CD-03	
COL	Column Off-form concrete finish
CONC-01	Precast concrete, paint finish.
D-01	Solid Core Fire Door
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PFC-01	PFC Slab edge detail. Micaceous iron oxide paint finish. Natural Grey
R-01	Render / Plaster
SCE-01	External Screen - Vertical Terracotta Baguette 50x50mm
SCE-10	Perforated Metal Screen
STO	Storage
W-1	Window Type 1. - Full Height Glazed Window Aluminium Frame (size as shown on architectural drawings)
W-2	Window Type 2. - Full Height Shop Front Glazing Aluminium Frame (size as shown on architectural drawings)
W-4	Window Type 4. - Hinged Window (planter access) High level Vent Panel Aluminium Frame (1600w x1700h)
W-5	Window Type 5. - Hinged Window (planter access) High level Vent Panel Aluminium Frame (1600w x3100h)
W-6	Window Type 6. - Glazed Window Aluminium Frame with Spandrel Panel (900w x 2700h)
W-7	Window Type 7. - Glazed Window Aluminium Frame with Spandrel Panel (900w x 4100h)

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DEVELOPMENT APPLICATION

APPROVED BY: JS
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CLIENT
Mushan Project Management

DRAWING
ELEVATIONS - 05

DATE 09/08/18
SCALE @ A1 1 : 200
DRAWN CR,AK,CW,CT

PROJECT No. 2016097
DRAWING No. DA-304
ISSUE D

PROJECT
Potts Hill Seniors Living

Lot 1, Pier 8-9, 23 Hickson Road
Walsh Bay New South Wales 2000 Australia
T 61 2 9290 2722 F 61 2 9290 1150
E sydney@jacksonteece.com
Jackson Teece Chesterman Willis Pty Ltd
Trading as Jackson Teece
ABN 15 083 837 290
Nominated Architect Ian Brodie (4275)

JACKSON TEECE

AMENDMENTS

ISSUE	DESCRIPTION	APPROVED	DATE
P1	Preliminary Issue	JS	31/07/17
P2	Preliminary Issue for Consultant Co-ordination	JS	11/08/17
A	Issue for Development Application	JS	31/08/17
B	Incorporate Council comments	JS	23/02/18
C	Incorporate Council comments	JS	02/07/18
D	Updated Issue for Development Application	JS	09/08/18

1 West Elevation-Building A

2 West Elevation-Building B & C

ABBREVIATIONS

BAL-01	Framed glass balustrade
CD-02	Cladding- Terracotta Facade System
CD-03	
COL	Column Off-form concrete finish
CONC-01	Precast concrete, paint finish.
D-01	Solid Core Fire Door
D-02	Glazed Sliding Door
D-03	Glazed Sliding Door
PFC-01	PFC Slab edge detail. Micaceous iron oxide paint finish. Natural Grey
R-01	Render / Plaster
SCE-01	External Screen - Vertical Terracotta Baguette 50x50mm
SCE-10	Perforated Metal Screen
STO	Storage
W-1	Window Type 1. - Full Height Glazed Window Aluminium Frame (size as shown on architectural drawings)
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W-7	Window Type 7. - Glazed Window Aluminium Frame with Spandrel Panel (900w x 4100h)

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DEVELOPMENT APPLICATION

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Mushan Project Management

DRAWING
ELEVATIONS - 06

DATE	SCALE @ A1	DRAWN
09/08/18	1 : 200	CR,AK,CW,CT

PROJECT No.	DRAWING No.	ISSUE
2016097	DA-305	D

PROJECT
Potts Hill Seniors Living

MATERIAL PALETTE


1. TERRACOTTA FINS


2. TERRACOTTA VERTICAL SCREENS


3. TERRACOTTA FACADE SYSTEM

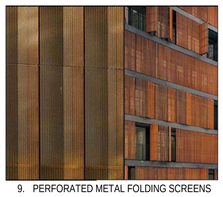

4. GLASS BALUSTRADE


5. EXPRESSED PFC TO SLAB EDGE MICACEOUS IORN OXIDE PAINT FINISH, NATURAL GREY


6. HORIZONTAL TERRACOTTA SUNSCREEN TO POOL FACADE


7. TEXTURED PRECAST CONCRETE


8. FIBRE CEMENT SOFFIT LINING PAINT FINISH: WHITE


9. PERFORATED METAL FOLDING SCREENS


10. HORIZONTAL ALUMININUM VENETIAN BLINDS

Lot 1, Pier 8-9, 23 Hickson Road
Walsh Bay New South Wales 2000 Australia
T 61 2 9290 2722 F 61 2 9290 1150
E sydney@jacksonteece.com
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1 East Elevation-Building F

2 East Elevation-Building D & E

ABBREVIATIONS

BAL-01	Framed glass balustrade
CD-02	Cladding- Terracotta Facade System
CD-03	
COL	Column Off-form concrete finish
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MATERIAL PALETTE


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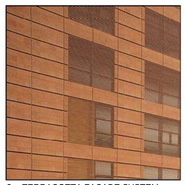
2. TERRACOTTA VERTICAL SCREENS

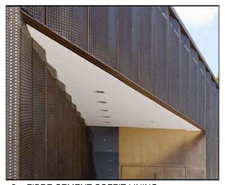

3. TERRACOTTA FACADE SYSTEM


4. GLASS BALUSTRADE


5. EXPRESSED PFC TO SLAB EDGE MICACEOUS IORN OXIDE PAINT FINISH, NATURAL GREY


6. HORIZONTAL TERRACOTTA SUNSCREEN TO POOL FACADE


7. TEXTURED PRECAST CONCRETE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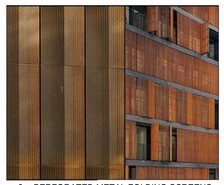
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10. HORIZONTAL ALUMININUM VENETIAN BLINDS

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DRAWING
ELEVATIONS - 07

DATE	SCALE @ A1	DRAWN
09/08/18	1 : 200	CR,AK,CW,CT

PROJECT No.	DRAWING No.	ISSUE
2016097	DA-306	D

PROJECT
Potts Hill Seniors Living

Lot 1, Pier 8-9, 23 Hickson Road
Walsh Bay New South Wales 2000 Australia
T 61 2 9290 2722 F 61 2 9290 1150
E sydney@jacksonteece.com
Jackson Teece Chesterman Willis Pty Ltd
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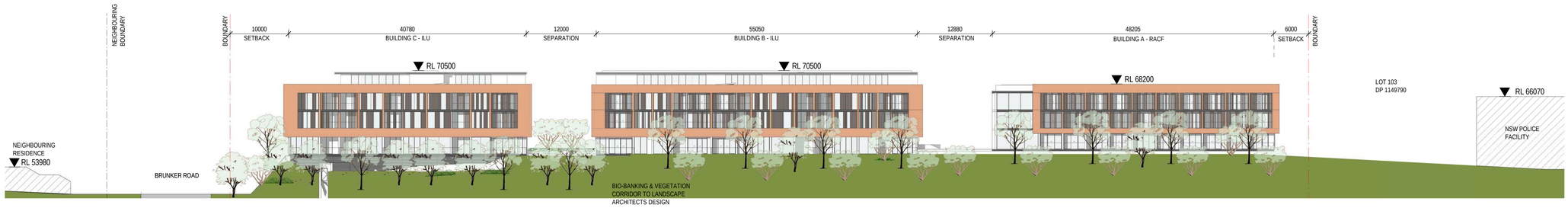
Nominated Architect Ian Brodie (4275)

JACKSON TEECE

AMENDMENTS

ISSUE	DESCRIPTION	APPROVED	DATE
A	Incorporate Council comments	JS	23/02/18
B	Incorporate Council comments	JS	02/07/18
C	Updated Issue for Development Application	JS	09/08/18

1 SOUTH ELEVATION - ILU -BUILDIN C & D - BRUNKER ROAD



2 EAST STREETSCAPE ELEVATION - NELSON SHORT STREET

3 WEST STREETSCAPE ELEVATION - BRUNKER ROAD

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DEVELOPMENT APPLICATION

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Mushan Project Management

DRAWING
STREETSCAPE ELEVATIONS

DATE	SCALE @ A1	DRAWN
09/08/18	1 : 400	Author

PROJECT No.	DRAWING No.	ISSUE
2016097	DA-310	C

PROJECT
Potts Hill Seniors Living

Lot 1, Pier 8-9, 23 Hickson Road
Walsh Bay New South Wales 2000 Australia
T 61 2 9290 2722 F 61 2 9290 1150
E sydney@jacksonteece.com
Jackson Teece Chesterman Willis Pty Ltd
Trading as Jackson Teece
ABN 15 083 837 290
Nominated Architect Ian Brodie (4275)

JACKSON TEECE

Appendix B Audit Correspondence

ZOIC Environmental Pty Ltd
ABN 23 154 745 525
Suite 1, Level 9
189 Kent Street Sydney 2000
Phone: +61 2 9251 8070
www.zoic.com.au

18140 IA1 6Aug18.docx

6 August 2018

Shener Dursun
Mushan Group Pty Ltd
17 Blackfriars Street
Chippendale
NSW 2008

Via email: shener.dursun@mushan.com.au

Dear Shener,

Re: Interim Advice 1 – Review of Existing Information, 10 Nelson Short Street, Potts Hill, NSW

1 Introduction

Mushan Group Pty Ltd (Mushan) has appointed Kylie Lloyd of Zoic Environmental Pty Ltd (Zoic), a NSW EPA Auditor accredited (No. 0302) under the Contaminated Land Management (CLM) Act 1997, to conduct an Audit at 10 Nelson Short Street, Potts Hill, NSW ("the site").

The aim of the engagement is to enable a site audit statement (SAS) and associated site audit report (SAR) to be prepared that confirms the suitability of the site for proposed redevelopment as high density residential development for seniors living comprising a four-storey apartment block above a single-level underground car park, in accordance with the NSW EPA (2017) Contaminated Land Management Guidelines for the NSW Site Auditor Scheme (3rd edition).

2 Scope of Audit and Nature of Interim Advice

NSW EPA (2017) describes the site assessment and audit process as:

i. *Consultant is commissioned to assess contamination*. The contaminated site consultant designs and undertakes the site assessment and, where required, all remediation and validation activities to achieve the objectives specified by the owner or developer; and

ii. *Site auditor reviews the consultant's work*. The site owner or developer commissions the Auditor to review the consultant's work. The Auditor then prepares a SAR and SAS at the conclusion of the review, which are given to the owner or developer.

Therefore, the contaminated land consultant and other relevant parties should be satisfied that the work to be conducted conforms to all appropriate regulations, standards and guidelines and is suitable based on the site history and the proposed land use.

It is understood that the Audit is currently non-statutory in nature. If Development Conditions are issued by Council, the Audit may become statutory in nature and require notification to NSW EPA.

3 Current Interim Advice

In preparing this interim audit advice, the Auditor has reviewed the following reports related to land contamination assessment:

- AECOM (2010) Lot 104, Environmental Management Plan, (Ref: S4089128, 20 May 2010).
- Environ (2010) Site Audit Statement & Site Audit Report, Proposed Lot 104, Potts Hill NSW (Ref: AS120712, GN221-7, May 2010).
- CES (16 August 2017) Stage I – Preliminary Site Investigation 10 Nelson Short Street, Potts Hill, New South Wales (Ref: CES170303-SD-AB).
- CES (7 March 2018) Stage 1 Preliminary Site Investigation 10 Nelson Short Street, Potts Hill, New South Wales (Ref: CES170303-SD-AD).
- CES (18 July 2018) Remedial Action Plan 10 Nelson Short Street, Potts Hill, New South Wales (Ref: CES170303-SD-AE).

The purpose of the current IA is to document Auditor findings following the review of existing information related to site conditions and contamination status. This advice also outlines any data gaps identified in the existing information which should be addressed by the appointed consultant as either part of any further investigation works, or as part of any remedial or validation works that may be required at the site.

4 Summary of Investigations

- Sydney Water with recent activities occupied the site from 1880s to the late 2000s. Recent activities were identified as being primary commercial including storage yard facilities and the operations of the reservoirs, which included the use of petroleum products such as fuels, oils, hydraulic oils, in addition to pesticides.
- Aecom reports that
  - Construction of the reservoirs completed between approximately 1880s and 1920s resulted in the placement of large volumes of bulk filling around the periphery of the reservoirs. This material comprised of clay and shale bedrock with some sandstone bedrock.
  - The bulk filling was identified as being 5m thick. Some ash and coal wastes associated with steam-driven machinery used during construction of the reservoirs were incorporated into the bulk filling.
  - The ash waste can typically be present as thin (5cm thick) discontinuous seams within the bulk filling. Coal waste was identified as being less prevalent than ash and occurred typically as small fragments to finely ground particles. This historical filling resulted in contamination with PAHs.
  - Aecom identifies that the embankments were not used for any purpose but rubbish material (ash, bricks, timber, plastic, bitumen fragments, scrap steel, terracotta pipe fragments, glass, ceramic, rubber and fragments of bitumen sealant) suggests the Embankments were used for disposal of wastes, with the majority of this rubbish being removed as part of the geotechnical stability work.
  - More recently Sydney Water used the main area for storage of equipment and machinery, maintenance activities and general administrative purposes.
  - An Underground Storage Tank (UST) for petroleum fuel was identified on the southern portion of the main area. This UST was formerly removed and validated acceptable for commercial/industrial land use.

- Soil samples were collected from 181 sampling locations, with samples exceeding the commercial industrial criteria for benzo(a)pyrene, Total PAHs, TPH C_6-C_9. Asbestos was identified in one location (using pre-NEPM 2013 methodology). Leachate testing was reported as being absent or very low.

- Potentially contaminating activities at the site included a former underground storage tank (UST) in the south-western portion of the site, storage of shipping containers and drums, above ground fuel storage area in the north-western corner of the site, the presence of drums on the middle of the eastern boundary of the Main area, equipment wash down area, potential building waste materials in the embankment, distribution of excavated spoil which could potentially contain ash waste, fly ash, waste associated with the removal of bitumen-based pipe linings (including within the embankment).
- Previous investigations indicated elevated heavy metals (primarily arsenic, lead, zinc), TPH C_{10}-C_{36} within the Main area and a fragment of asbestos containing cement bonded sheeting within the embankment.
- Remediation works previously conducted at the site included re-excavation and validation of the UST pit area, the excavation and offsite disposal of the PAH impacted fill from five locations, the screening and removal of the top one metre of surface material from a portion of the Main Area with the screened soil validated for re-use to backfill remediation excavations at the site and adjoining sites, and the excavation, screening and re-emplacement of soils for the stabilisation of the Embankment.
- The previous Environ (2010) site audit report and site audit statement concluded that the remedial works and validation sampling was adequate to demonstrate the Main Area of the site suitable for commercial/industrial use. The Embankment area however was deemed not suitable for commercial/industrial use but could be maintained in a condition suitable for commercial/ industrial use with the provision of an Environmental Management Plan (EMP) to manage PAH contaminated fill at the site.
- CES (16 August 2017) conducted systematic sampling across the site, which included soil sampling from 15 locations and groundwater sampling from two wells and compared the soil results with criteria for residential with minimal opportunities for soil access (NEPM (2013) HIL B, HSL A/B, EIL for urban residential and public open space) and the groundwater results against NEPM (2013) groundwater investigation level (GIL) for fresh and marine waters.
- CES indicated that fill was encountered to a maximum depth of 7.2mbgl.
- Soil results from CES (16 August 2017) sampling indicated results were below criteria, with the exception of one sample exceeding ESL for benzo(a)pyrene (at 1.4mg/kg), noting this location is located in an area likely to be excavated for basement excavation. Asbestos was not detected in the samples. It is noted that no investigation was conducted within the embankment (where the EMP applies) due to accessibility.
- Groundwater samples from CES (16 August 2017) sampling indicated results were below criteria with the exception of copper, nickel and zinc exceeding marine and/or freshwater GILs. O-xylene was detected at PQL in one sample.

A summary of key information is found in the Tables following the letter.

5 Review of the Remedial Strategy

The remedial action plan (RAP) has been audited in accordance with the requirements outlined in EPA (2017) Contaminated Land Management Guidelines for the NSW Site Auditor Scheme (3rd edition), OEH (2011) Guidelines for Consultants Reporting on Contaminated Sites and with consideration of the amended NEPC (1999) National Environment Protection (Assessment of Site

Contamination) Measure, Schedule A and Schedules B(1)-B(9) by National Environment Protection Council, Adelaide (April 2013). A summary of the document review is presented in the following table.

Table 1: Summary of CES (18 July 2018) RAP

Requirement	Consultant Consideration	Auditor Comment
Remediation Goal:	Section 7.1 states that the goal is to provide sufficient engineering and management controls to make the site suitable (with respect to soil contamination) for the proposed development with accessible soils, to ensure protection of human health and the environment during and post remediation works, and to manage soils in a cost-effective manner.	Acceptable
Extent of remediation required as outlined in RAP:	Section 7.2 states that extent of remediation includes fill from the top 3m from the entire footprint of the proposed development (which is proposed to be excavated for construction of a basement car park). Further remediation is considered required for the embankment.	**Clarification of depth of basement should be included**.
Discussion of possible remediation options:	Section 7.4 provides discussion of the following remediation options: • Onsite treatment of PAH impacted soils and reuse onsite • Offsite treatment of PAH impacted soils • Excavation, transport and disposal of PAH impacted soils • Onsite containment of PAH impacted soils • Onsite relocation of PAH impacted soils • Onsite containment of asbestos • Excavation, transport and disposal of asbestos impacted soils	Acceptable
Rationale for selected remedial option:	Section 7.4 provides a remedial assessment. The selected remedial options were excavation, transportation and offsite disposal to a licensed facility, with a contingency of excavation, reuse and onsite encapsulation of impacted soils in an area of the site which has a less sensitive landuse.	**If 'onsite containment' remains a selected remedial option, please include a remedial strategy in Section 8.**
Basis for selected remediation criteria:	Section 4 provides the following criteria: • NEPM (2013) HIL B and HSL A/B • NEPM (2013) EIL and ESL. • NEPM (2013) HSL B for asbestos • CL:AIRE (2013) TOC values • NEPM (2013) freshwater and marine water GILs • NSW EPA (2014) Waste Classification Guidelines	Generally acceptable, noting that development plans have not been provided and this may need to be revised depending on development plans. See other comments.
Proposed testing to validate the site after remediation:	Section 8.7.2 provides stockpile assessment: • PID screening for minimum 10 samples for the first 200m^3, and then 1 sample per 25m^3 within a stockpile. • Stockpile sampling as per Vic EPA IWRG 702 (reproduced in Table 4 Schedule B2 NEPM 2013) – **COPCs not provided** Sections 8.12, 9.1.5, 9.1.6, 9.1.7 provide requirement of imported material, which requires only VENM or ENM be imported. Landscaping material will require approval by site auditor and environmental consultant. Validation samples	Acceptable, **noting the Auditor understands that validation of suitable fill is required for 3m from the base of the basement as per Section 7.2.** CES states the RAP will be amended once further sampling results are received and assessed.

Requirement	Consultant Consideration	Auditor Comment
	will be analysed at a rate of minimum 3 samples, for heavy metals, TRH, BTEX, PAH, OCP, asbestos. Section 9 provides validation plan: • Samples will be analysed from walls and base at a frequency of 1 sample per 25m^2. • Stockpile footprint may be analysed at 1 sample per 25m^2 where deemed required. • Waste classification samples will be analysed for heavy metals, PAH, moderately harmful pesticides, TRH, BTEX, scheduled chemicals.	
Contingency plan for remediation:	Section 8.13 provides remedial contingencies: • Excavation becomes unmanageable due to mud • Excessive stormwater runoff • Excessive dust • Heavy rain, wind, or inclement weather • Equipment failures • Unexpected contamination • Neigbour or community complaints Selected remedial options are not effective.	Acceptable
Interim site management plan prior to implementation of remediation (health, safety & environment):	Section 3.6.2 provides a summary of the current Environmental management plan.	The site is currently under an EMP which is considered adequate to manage risk prior to remediation.
Site management plan for remediation works (environment)	Section 8.6 provides site access and Section 8.7 provides soil stockpile management. Section 8.8 provides requirements for construction environmental management plan (CEMP). Section 11 provides site management, which includes: • Site signage and contacts • Site access • Sediment and runoff • Air quality (dust control, odour, potential vapour exposure) • Noise	**See comments on these sections**
Site management plan for remediation works (health & safety)	Section 8.5 states that prior to undertaking works, the nominated remediation contractor should prepare health, safety and environment plans and safe work method statements. The remediation contractor is to confirm that all necessary environmental management, notifications, permits and safety controls are in place. Section 10 also provides work health and safety requirements.	Acceptable
Remediation schedule	Section 8.4 provides remediation sequencing, including: 1. Notifications and permits 2. Installation of environmental, safety, traffic management, construction utilities, site boundary and waste management controls 3. Mobilisation of site amenities 4. Investigation of areas identified for further assessment in the RAP 5. Update of the RAP 6. Remediation works executed in accordance with the RAP and the preferred remediation approach	Acceptable, noting the proposed development is not yet finalised.

Requirement	Consultant Consideration	Auditor Comment
	7. Validation sampling and analyses of remediated areas	
Hours of operation	Section 11.1 states hours of operation are: • 7am – 6pm Monday to Friday • 8am – 1pm Saturday • No work permitted on Sundays or public holidays	Generally acceptable, noting that hours of operation shall meet DA requirements.
Contingency plans for incidents:	Section 10 states that the WHS plan should include response to incidents occurring at the site and emergency contact numbers.	Acceptable
Licenses and approvals:	Section 6 provides the following applicable legislation/regulation and guidelines: • CLM Act 1997 • PoEO Act 1997 • PoEO (Waste) Regulation 2005 • SEPP55 – Remediation of Land • WHS Act 2011 • WHS Regulation 2011 • SafeWork NSW requirements • Various guidelines	Acceptable
Contact persons	Not provided, however Section 11.2 states signage at the main access points will include after-hours contact details of the remediation contractor and site manager.	Acceptable
Community relations (where applicable)	Not provided, but Table 7 provides contingency should complaints are received.	Acceptable, noting community consultations will be required as part of DA approval.
Staged progress reporting (where applicable)	Not provided	Not anticipated for the site
Long term site management plan	Section 8.11 states that ongoing monitoring or management is not required if contaminated material is removed.	Acceptable, noting that long term site management plan will be required should contamination be retained onsite.

6 Auditor Comments

The Auditor has reviewed the reports listed in Section 3 against relevant guidelines made or approved by NSW EPA. The report/s largely meets the guideline requirements, however, the Auditor provides the following comments:

CES PSI (16 August 2017)

1. Section 3.1. It is noted that previous contaminated sites audits identify the site as being owned by 'Sydney Water' (or its predecessors) since 1888. Confirmation would be beneficial.
2. Section 4.4: Sensitive receptor should include surface water receptor (i.e. Cooks River)
3. It is noted no comments are made on the following items required in the current guidelines. As such, address the following:
    a. Soil map condition
    b. Product spill and loss history
    c. Discharges to land, air and water

d. Complaint history

e. Local site knowledge

4. Data quality objectives (DQOs) were not provided. Further assessment/validation should include statement of DQOs.

5. Section 5.2: While wells were screened only from 10m to 12mbgl at BH02 and 7m to 10mbgl at BH03, this section states that gravel pack was placed from depth of the well to 1mbgl. Is there any reason? Would this have caused dilution of concentration?

6. Section 5.3: Sampling and Analytical Programme

    a. The number of sampling locations (15) does not meet NSW EPA (1995) requirement of a 1.5ha site (only of the Main area) or of a 1.8ha site (entire site), while the results were used to assess suitability for the Main area. However, following completion of additional investigation, adequacy of sampling should be assessed.

    b. Please provide groundwater development, purging and sampling methodology.

7. The following boreholes and depths were noted to have organic odour but were not analysed/sampled: BH05 (3.7-4.2m), BH06 (6.5-6.6m), BH10 (5.6-5.8m), BH14 (5.7-5.8m). Please assess in additional investigation or provide justification.

8. Asbestos assessment was not conducted as per NEPM (2013) requirement. Given the historical presence of fill, the Auditor considers asbestos assessment as per NEPM (2013) would be required for fill remaining at the site (beneath and outside building footprint) following basement excavation. Please provide assessment strategy in the RAP.

9. Section 7: QA/QC:

    a. LOR > criteria for some OCPs and PCBs in groundwater. Please provide justification.

    b. Please provide sample receipt advice documents for all laboratory reports.

    c. Would interface meter/water quality meter have been decontaminated? If so, please decontamination procedure and justify the absence of rinsate blank.

    d. Please provide ALS QA/QC report so the Auditor can check the laboratory QA/QC.

10. The conclusions made by CES do not appear to consider the results from the previous audit, noting that previous results identified BaP up to 8.2mg/kg within the Main Area, which may be associated with BaP TEQ exceeding 250% of HIL B. Please provide assessment. While the full results are not provided in the previous site audit, the impacts were listed as being <1.1mbgl within the Main Area, which would likely be removed during basement excavation. The Auditor would require that development plans be provided to confirm that basement excavation includes the entire Main area, otherwise the potential risk of BaP may need to be further assessed.

11. The Auditor also requires that assessment of leachability be conducted on the PAHs from the site to assess potential migration from soil to groundwater (from the limited results in the previous site audit, this appears to be acceptable).

12. Section 9.2: As per advice by NSW EPA, available data should be included for waste classification purposes, unless there is evidence why they will not be relevant. Therefore, waste classification should include previous investigation results.

13. Appendix G: Please provide groundwater monitoring well logs for BH02 and BH03. Please provide log for BH01 if available.

14. SWL for BH02 (9.202mbtoc) was above the screen depth (10mbtoc). How would this affect the result, particularly potential LNAPL? What depth was water encountered during drilling?

CES (18 July 2018) RAP

15. Section 3.6.2 provides a summary of the current EMP. It would be beneficial to have a section identifying that the current site management requires the implementation of this EMP.
16. Section 4.1.2: EIL/ESL
    a. The Auditor assumes that EIL/ESL for urban residential and public open space will be used.
    b. The Auditor requires site-specific soil property data be collected during additional investigation to obtain site-specific EIL/ESL.
17. Section 7.4 – Please update this section to confirm that the extent of remediation includes fill from the top 3m from the entire footprint of the proposed development and this includes from the basement depth.
18. Section 8 should provide remediation strategy for onsite containment, as this was recommended as being a contingency. This should include proposed capping thickness.
19. Section 8.1, the previous investigations indicated significant PAH concentrations within the embankment and previous work indicated the material had been mixed during rework of the embankment. Given the height of the embankment, will it be practical to have excavation and offsite disposal as remedial strategy?
20. Section 8.4 states that the RAP should be reviewed and updated if required to suit the proposed staging plan. The Auditor agrees with this.
21. Section 8.7: Stockpile management: Potentially asbestos impacted stockpile shall be kept moist and shall be covered by plastic sheet if left overnight.
22. Section 8.7.5: Please provide COPCs to be analysed for stockpiles.
23. Section 8.9:
    a. Does the exemption for requirement of waste tracking during offsite disposal for excavated soil contaminated with asbestos waste still apply?
    b. The Auditor will require reconciliation of material excavated onsite and disposed of offsite/reuse onsite.
    c. The Auditor will require tracking of material reused onsite as well.
24. Section 9: Validation Plan:
    a. This section states that the impacts are only present on the eastern embankment. The Auditor notes that CES has not considered the exceedances in the previous investigations within the main area as per previous comment. Please update to consider validation sampling if basement excavation remains in fill (Section 7.2)
    b. Please also consider comment on validation of asbestos as per NEPM (2013) requirement beneath basement excavation if basement finishes in fill.
    c. Validation for asbestos within and outside the area of basement shall be conducted as per NEPM (2013) requirement. Please provide sampling strategy for these, noting that the Auditor would require at least collection of 10L samples, and justification on whether 500mL samples will be required.
    d. This section shall include validation plan for capping (thickness and quality), should capping strategy be recommended.
25. Section 10: Is there any demolition work proposed at the site?
26. Section 11.5.3: Please provide PID trigger levels for further action.

27. Given the impacts requiring management includes asbestos, please provide management of asbestos during remediation in accordance with appropriate guidelines and codes of practices. This should include at least: licence requirements, air monitoring, etc.
28. Figure 3: It would appear that most of the sampling locations for the embankment area (BH16 to BH28) are located within the "embankment" and not "apron". Given previous audit states that only limited samples had been collected within the "apron", please consider conducting some samples within the "apron" area.

We request that CES provide responses to the above comments, as appropriate. I don't know if you need a revised report.

7 Closure

This interim advice does not constitute a SAS or a SAR, but rather is provided to assist the Client in the assessment and management of contamination issues at the site. The information provided herein should not be considered pre-emptive of the final Audit conclusions. It represents the Auditor's opinion based on the review of currently available information.

Should you have any queries or wish to discuss any points, please do not hesitate to contact the undersigned.

Yours sincerely,

Kylie Lloyd
Site Auditor
Zoic Environmental Pty Ltd

Cheryl Halim
Senior Environmental Engineer
Zoic Environmental Pty Ltd

Attachments: Attachment A – Tables

Attachment A – Tables

Table 2: Summary of Site Information

Title	Details
Street Address:	10 Nelson Short Street, Potts Hill, NSW
Property Description:	Lot 104 DP1149790
Current Site Ownership:	Potts Hill Group Pty Ltd **(to be confirmed)**
Geographical Coordinates:	Lat: -33.898° Long: 151.035°
Property Size:	1.9 hectares
Local Government Area:	City of Canterbury Bankstown
Zoning – Existing:	B7 – Business Park
Zoning – Previous:	Previous Audit reports that the site was previously zoned as 'Special A' (water, sewerage and drainage)

Table 3: Immediate Site Surrounds

Title	Details
North:	Potts Hill NSW Police Facility within the Potts Hill Business Park, with residential areas beyond. The previous audit identifies the site was previously used for equipment storage.
East:	Graf Avenue, with low density residential properties of Yagoona beyond, and the industrial areas of Chullora further east.
South:	Brunker Road, with low density residential properties of Yagoona beyond.
West:	Elson Short Ridge and the Sydney Water reservoir 'Reservoir 2' beyond.

Table 4: General Site Condition

Title	Details
Topography and Drainage:	Section 2.4 of CES (16 August 2017) states that the site does not have preferential slope, with fill embankments along the eastern and southern boundaries of the site. It is noted that the appendix included within this report identifies that the site drops from 56m AHD to 54m AHD, across the site, with a biger drop on the eastern boundary of the property (48m AHD).
Boundary Condition:	The site was reported as being fenced by chain link or metal fence, with gates on the southern and northern boundary.
Visible Signs of Contamination:	Section 2.3 of CES (16 August 2017) states there was no surface staining observed.
Visible Signs of Plant Stress:	Section 2.3 of CES (16 August 2017) states there were signs of dry and brown vegetation, however vegetation was not considered distressed.
Presence of Drums, Wastes and Fill Materials:	Section 2.3 of CES (16 August 2017) states there was no evidence of above ground or below ground fuel storage tanks on the site.
Odours:	Section 3.6 of CES (16 August 2017) states there were no significant odours detected.
Condition of Buildings & Roads:	Section 3.6 of CES (16 August 2017) states no building was present onsite.

Title	Details
Quality of Surface Water:	No surface water is present onsite.
Flood Potential:	Section 149 planning certificate indicates flooding is not a potential issue at the site.
Relevant Local Sensitive Environments:	The nearest surface water feature is the Cooks River, located approximately 262m north-east of the site. Section 4.4 states that potential sensitive receptors (onsite and offsite) include: • Future construction workers during the construction of the proposed redevelopment • Future residents and employees • Groundwater beneath the site • Neighbouring residents
Other Relevant Information:	None identified.

Table 5: Site History

Title	Details
Previous Land Use & Chronological List:	Section 3.1 of CES (16 August 2017) indicates the site would have been utilised for works and operations of the Sydney Water reservoirs (mostly as storage yard), with the construction of the reservoir (outside the site) likely conducted around 1911.
Land Titles:	3.1 of CES (16 August 2017) indicates the following titles • 1911 – 1988: Metropolitan Water Sewerage and Drainage Board, with various leases • 1988 – 2005: Sydney Water Board • 2005 – 2016: Sydney Water Corporation • 2016 – todate: Potts Hill Group Pty Ltd It is noted that Section 3 of Graeme Nyland's Audit report identifies that the site was owned by Sydney Water (or it's predecessors) since 1888.
Summary of Council Records:	CES reports that the Section 149 Planning certificate indicates: • The land is not significantly contaminated; • The land is not subject to a management order; • The land is not subject of an approved voluntary management proposal; • The land is not subject of an approved voluntary management proposal; • The land is not subject to an on-going maintenance order; and • The land is not subject to an audit statement. • The site is subject to the AECOM (2010) EMP, which provides management of PAHs during construction and operational phase of the site. It is noted despite an EMP being listed on the 149(5) certificate, and being part of an audit, an Audit is not identified on the certificate.
EPA Records:	Section 2.11 of CES (16 August 2017) states that the site is located within proximity to six sites listed under the NSW EPA contaminated lands list: • Shell Coles Express Service Station Chullora located 165m east • Galserv Galvanising Services Chullora located 259 north-east • Former Plating Works Greenacre located 336m south-east • Sydney Water Potts Hill Complex located 336m west • BP Potts Hill Service Station and Truckstop located 470m north-east • 7-Eleven (former Mobil) Service Station Greenacre located 930m south-east The Auditor also conducted a search of the NSW EPA contaminated land record for the suburb Potts Hill and the search did not indicate any contaminated land records in Potts Hill. A search of the PoEO registered of environment protection licences, applications, notices, audits or pollution studies and reduction programs

Title	Details
	indicates the former Sydney Water Potts Hill Reservoir on Brunker Street and Copper Street had licence registered for Landcom land-based extractive activity, but this licence was surrendered in 2011. The Auditor confirmed this information in August 2018 and notes the following: • CLM Act - No site is currently being regulated within the suburb of Potts Hill; - No site has recently been reported to NSW EPA within Potts Hill. The former plating works and 7-Eleven properties do not require regulation, no other previously mentioned properties are included on the current list. • POEO Act – In addition to the POEO licence surrendered by Landcom for the Brunker Street and Cooper Street Property, Western Earthmoving Pty Ltd contains a current S58 licence for a property located at 146 Rookwood Road Potts Hill.
SafeWork NSW Dangerous Goods Licenses/ USTs/ ASTs:	Section 3.3 of CES (16 August 2017) states that a search of the SafeWork NSW Stored Chemical Information Database and microfiche records did not indicate records pertaining to the site. CES reports that the Environ Audit (2010) recorded a former 45,000L petrol underground storage tank (UST) was present in the south-western portion of the site, which was decommissioned in 1996 by Fluor Daniel GTI. At the time of decommissioning, the UST was stated to be in very good condition, with no significant corrosion or visible leaks, however petrol contamination was noted. The remaining pit was backfilled with sand originally surrounding the UST and topped with imported fill. Coffey (as documented in Environ (2010)) noted a small above ground fuel storage area in the north-western corner of the site and some rusted drums on the middle of the eastern boundary of the Main Area, directly south of an equipment wash down area.
Summary of Aerial Photographs (on site and adjacent sites):	• 1943: The site consisted of open space with coverage of trees along the southern boundary and the northern half of the site. Tracks were visible across the centre of the site. The area surrounding the site was occupied by Sydney Water reservoirs to the west and open space and open space with a number of properties located south of Brunker Road and west of Rookwood Road occupying the area to the south. Residential properties appeared to occupy the area east of the site. Surrounding area to the north appeared to be utilized as a storage yard. • 1955: The trees at the centre of the site appeared to have been cleared and the central area appeared to be used as a storage yard for construction materials. The remaining area along the southern boundary appeared to remain unchanged. The area occupied by storage yard appeared to have extended to the boundary of the site. The residential areas to the east and south also appeared to have expanded since the previous aerial photograph. The remaining surrounding area to the west remained unchanged. • 1961: The site appeared largely unchanged with the exception of a large building (warehouse/shed) in the centre. Residential development appeared to have increased with in the areas to the south and east of the site since the previous aerial photograph was taken. Increased storage activities were apparent to the north of the site. • 1965: The site appeared unchanged with the exception of the construction of a small shed adjacent to the large shed. Increase residential development occurred in the area south of the site. • 1970: The site appeared unchanged. A large building was constructed north-east of the site. • 1982: The site appeared unchanged. Further development occurred to the large building north-east of the site. A sporting pitch/greyhound racing track was constructed north-east of the site. • 1991: The area formerly used for storage of construction materials appeared to be used as a car park. The surrounding area to the north of the site

Title	Details
	appeared to be used for car park in addition to the storage of construction materials. • 2003: The site appeared largely unchanged, with the exception of additional buidings in the north-western corner. The surrounding area to the site occupied by Sydney Water reservoir appeared to have a cover installed. The area to the north of the site (previously occupied by construction materials) had been cleared. The United Service Station also appeared to have been constructed off Rookwood Road to the south-east. • 2009: The site appeared largely unchanged, with the exception of the removal of a number of small buildings from the site. Surrounding area appeared largely unchanged. • 2010: Remediation and earth moving were apparent across the majority of the site. The area to the north appeared to be undergoing earthworks for the construction of the Potts Hill NSW Police Facility. • 2014: The site appeared to be open space and used as a storage yard. The Potts Hill NSW Police Facility had been completed to the north. • 2015: The site and surrounding areas appeared largely unchanged. The Auditor considers that the although CES identifies that the 1961 historical aerial photograph identifies a warehouse and the site 'largely unchanged' in the Auditors opinion the site has been significantly changed and clearly contains machinery storage across the site.
Summary of Historical Site Photos (where available):	Not provided. The absence of this information will not impact the outcome of the audit.
Description of Manufacturing / Industrial Processes and Location:	Based on the historical desktop review, no manufacturing or industrial processes were identified Not applicable, noting the site was mainly used as a storage yard.
Inventory of Chemicals and Wastes and their Location:	Section 3.6 of CES (16 August 2017) states no evidence of chemical storage was observed. Environ (2010) states there was no evidence of bulk chemical storage noted in the area, although several drums were present. AECOM (as documented in Environ (2010)) states that potential building materials such as concrete, bitumen, ballast gravels and terracotta pipe were observed in the accessible areas of the southern embankment. Steel and conrete wastes were encountered within the eastern embankment.
Product Spill and Loss History:	**Not provided. Please provide**.
Discharges to Land, Air & Water:	**Not provided. Please provide**.
Complaint History:	**Not provided. Please provide**.
Sewer & Service Plans:	Section 3.5 of CES (16 August 2017) states that a review of Dial Before You Dig (DBYD) plans indicate the presence of 225mm PVC sewer mains long the entire southern and eastern boundaries of the property, including three maintenance holes located in the south-eastern corner of the site and two maintenance shafts, each located along the mid-southern boundary and upper third of the eastern boundary of the site which may service as a preferential pathway of contaminant migration of the site. Two large (2m by 2m) concrete pits covered by metal grates were identified in the north-eastern and south-eastern corners of the main investigation area. It is expected that these pits are connected by means of concrete-cased conduits.
Local Site Knowledge:	**Not provided. Please provide**.
Local Literature Review:	Not provided, but not considered to affect the outcome of the audit.
Permits, Licenses and Approvals:	Not provided. The Auditor notes that a search of the PoEO registered of environment protection licences, applications, notices, audits or pollution studies and reduction programs indicates the former Sydney Water Potts Hill Reservoir on Brunker Street and Copper Street had licence registered for Landcom land-based extractive activity, but this licence was surrendered in 2011.

Title	Details
Other Relevant Information:	Although not included in the discussion within the body of the report, the appendix CES (16 August 2017) identifies some historical maps rom 1917 and 1949 confirming no buildings on the site and the property holding being associated with the Reservoir.

Table 6: Subsurface Conditions

Title	Details
Geology Map Conditions	Section 2.6 of CES (16 August 2017) states that the Sydney 1:100,000 Geological Series Sheet 9130 (1983) indicates that the majority of the site is underlain by Bringelly Shale of the Wianamatta Group, of Triassic Age, which typically comprises shale, carbonaceous claystone, claystone, laminate, fine to medium-grained lithic sandstone, rare coal and tuff. The nature of the formation is considered alluvial and estuarine.
Soil Map Conditions	Although not discussed in the body of CES (16 August 2017), information provided in the appendix of the report identifies that the site is located within disturbed terrain surrounded by Blacktown soil landscape associated with residual soils.
Acid Sulfate Soils:	Section 2.9 of CES (16 August 2017) states that there is no acid sulfate soil risk mapped for the site in the Bankstown LEP (2015) Acid Sulfate Soils Map (Sheet ASS-004).
Salinity:	CES reports electrical conductivity values of the groundwater indicate groundwater at the site is saline. It is noted that although not discussed in the body of the CES (16 August 2017) report, the appendix at the rear of the report identifies that the site is located in an area of moderate salinity potential, with the southern tip associated with high salinity potential.
Soil Classification Method:	Not provided. It is considered
Ground Conditions Summary from boreholes records:	The sub-surface profiles described in Environ (2010) are as follows: • 0-0.1/0.2m: Asphalt/bitumen or concrete • 0.1-0.6m: Road base gravels or fill with high gravel content, occasional asphalt • 0.0-6.3m: Fill: mixed clay, shale, silt, sand, gravel, with ironstone fragments and ecayed organic matter at depth. Waste materials present primarily in embankments and some ash, slag, bitumen, etc. Coffey inferred that the highly variable fill material designated Unit 1A (containing materials such as slag, ash, roots, concrete, bricks, glass, asphalt, tiles, domestic refuse etc.) was present tuypically to depths Kof <1mbgl, but locally up to 2mbgl in the Main Area of the site. • 1.1-7.5m: Residual silty clay – clayey silt • 4.2-6.6m: Residual clay • 1.6-5.3m+: Shale with interbedded sandstone Environ (2010) states that URS estimated that the fill depth ranged from about 5m on the western boundary to greater than 7m on the eastern boundary (top of embankment). The clayey/shale fill is consistent with material excavated during construction of the reservoirs. Subsequent to the majority of the investigations, Unit 1A material was excavated from a portion of the Main Area to a depth of 0.2m to 0.85mbgl (average 0.5mbgl) for geotechnical purpose. The extent of the excavation is provided in Environ (2010) but it is not legible for our review. The investigation by CES (7 March 2018) indicates the site comprised fill to a maximum depth of 7.2mbgl, underlain by clay. The fill comprised gravelly clay, clay, silty clay, with shale cobbles, sandstone cobbles, mudstone. Cobbles of concrete were recorded to be on the surface. No evidence of visual or olfactory evidence of contamination was recorded, with the exception of organic odour identified at approximately 3.7mbgl at BH05, at 6.0mbgl at BH06, at 5.0mbgl at BH09, at 5.6mbgl at BH10, at 5.7mbgl at BH14.

Title	Details
	The following PAH-contaminated fill materials were identified in the embankments: • Ash: generally dark grey to light silver grey, slightly porous to vesicular matrix. Could be present in thin, discontinuous bands or randomly dispersed as small fragments/granules within the fill material. • Coal: black, carbonaceous material. Could occur as gravel sized fragments to fine particles, randomly dispersed in fill materials. • Roadbase gravels: grey to blue-grey volcanic type gravels which have shiny appearance as a result of sprayed tar. Could be mildly odorous (tar-like odour). • Black resin-like materials: fragments of black (shiny to dull) material with a resin or hard plastic-like appearance. Randomly distributed in the fill material. Fragments could be large (e.g. tennis ball sized) to finely granulated. • Asphalt/bitumen: pieces of former hardstand/road pavement surfaces. Ranged in size from visible obvious (e.g. slabs up to 1m diameter) to finely granulated. Randomly distributed in the fill material. Sections 2.6 to 2.8 of AECOM (2010) provides the following information for the embankment: • Slope stability works were conducted on the embankments, which involved the excavation of fill and the subsequent placement of 200mm lifts, each of which were compacted. The top of the Eastern Embankment was positioned 20m to the west of the eastern site boundary and the top of the Southern Embankment was positioned 10m to the north of the southern site boundary. A drainage swale and subsoil drainage infrastructure were installed near the base of each embankment. As a result of the slope stability works, a strip of land approximately 5m to 7m width to the west of the Eastern Embankment comprised reworked Embankment fill materials (and referred to as the 'Skirt'). • The Skirt material comprised BaP of 8.8mbg/kg in one sample (TP401 (0.0-0.2m)), exceeding the NEPM (1999) HIL D at the time. The 95% UCL of BaP in the Skirt material was 1.5mg/kg and total PAHs was 9.7mg/kg. • The embankment landscaping plan indicates landscaping works within the embankment included: - Installation of jute matting (hessian-like material) on the embankment faces. - Planting of vegetation through the jute matting and/or directly into the ground, which includes a mix of trees, shrubs, grasses, and ground covers. The plants were expected to be self-mulching.
Location of Fill Materials:	As reported by Environ (2010) , prior to previous remediation, a large amount of fill (approximately 5m thick) was present at the site. The fill also contained ash and coal wastes associated with steam-driven machinery used during construction of the reservoirs. The ash waste could typically be present as thin (e.g. 5cm thick) discontinuous seams within the bulk filling. Coal waste appeared to be less prevalent than ash, and typically occurred as small fragments to finely ground particles. Environ (2010) notes that excavated reservoir spoil was present across the Potts Hill reservoir area, which could have potentially contained ash waste, fly ash and waste associated with the removal of bitumen-based pipe linings. Significant placement of the spoil is believed to have occurred at the site creating the steep embankments in the south and east. Section 2.2 of AECOM (2010) states that rubbish materials such as ash, bricks, timber, plastic, bitumen fragments, scrap steel, terracotta pipe fragments, glass, ceramic, rubber, fragments of bitumen-based sealant materials and concrete were identified within the embankments. The majority of the visible obvious rubbish materials were likely removed during slope stability works. One fragment of asbestos containing cement-bonded sheeting was previously identified on the surface of the eastern embankment (at TP249).

<table>
<tr><th>Title</th><th>Details</th></tr>
<tr><td>Regional Hydrogeology:</td><td>Section 2.7 states groundwater is expected to flow away from the reservoirs to the south-east towards the Cooks River.
Groundwater investigations were not conducted during previous audit of Lot 104 (Environ, 2010) but Environ (2010) notes that groundwater was encountered during intrusive soil investigations. Environ (2010) also states that a number of wells were installed around Reservoir 1 to the north-west of the site and sampled in 1993 and groundwater was found to be present at depths of greater than 8mbgl. Prior to its drainage, it was found that the reservoirs influenced the groundwater flow.
Groundwater flow across Lot 104 is expected to be towards the south and east following natural topography and being away from the two reservoirs. Environ (2010) also notes that water encountered at the fill/natural interface is likely to be perched groundwater. True groundwater at the site likely occurs below 8mbgl within clay. The groundwater would be expected to be saline and low yielding, with limited potential for beneficial use.</td></tr>
<tr><td>Summary of Monitoring Wells:</td><td>A summary of the monitoring wells at the site is as follows.
<table>
<tr><th>Well ID</th><th>Well depth (mbtoc)</th><th>Well screen (mbtoc)</th><th>Screened lithology</th><th>SWL (mbtoc)</th></tr>
<tr><td>BH02</td><td>12m</td><td>10m to 12m</td><td>Please provide</td><td>9.202m</td></tr>
<tr><td>BH03</td><td>10m</td><td>7m to 10m</td><td>Please provide</td><td>8.206m</td></tr>
</table></td></tr>
<tr><td>Depth to Groundwater:</td><td>Groundwater depth in the nine registered groundwater abstraction wells in the vicinity of the site ranged between 1.8m and 9.1mbgl.</td></tr>
<tr><td>Direction and Rate of Groundwater Flow:</td><td>Section 2.7 of CES (16 August 2017) states that groundwater flow direction is expected to be to the south-east towards the Cooks River.</td></tr>
<tr><td>Use of Water Abstraction:</td><td>A search of the Department of Primary Industries Office of Water database in July 2016 indicated there were nine registered groundwater abstraction wells located between 941m and 972m from the site boundary. All nine wells were registered for monitoring purposes and extend between 3.7m and 13mbgl.</td></tr>
<tr><td>Nearest Water Body:</td><td>The nearest surface water receptor is the Cooks River located 262m north-east of the site.</td></tr>
<tr><td>Direction of Surface Water Run Off:</td><td>Not provided, considered likely to penetrate vegetation onsite and flows to the east and south into the drains at the base of the embankments.</td></tr>
<tr><td>Background Water Quality:</td><td>Not provided</td></tr>
<tr><td>Preferential Water Courses:</td><td>Not present at the site.</td></tr>
<tr><td>Summary of Local Meteorology:</td><td>Section 2.10 of CES (16 August 2017) states that meteorological information from the Bankstown Airport states:
• Mean annual temperature is 23.3°C.
• Mean annual lowest temperature is 12°C.
• Mean annual rainfall is 996.7mm.</td></tr>
</table>

Table 7: Summary of Works Completed

Date	Report Objectives, Scope and Outcomes
AECOM (2010) Lot 104, Environmental Management Plan (Ref: S4089128, 20 May 2010)	This document was prepared to address PAH contamination related risks and appropriate management of those risks during the construction and operational phase of the site. The EMP defines the following three areas: • **Main Area**: the flat or developable portion of the site, comprising 1.5ha and the fill was observed to comprise reservoir-derived spoil. BaP was

Date	Report Objectives, Scope and Outcomes
	identified at up to 8.2mg/kg, with 95% UCL of BaP and total PAHs to 1.1mbgl below the site criteria. This area was considered to be suitable for commercial/industrial landuse. • **Embankments**: steeply sloping land positioned below and to the east and south of the Main Area. This area was contaminated witih PAHs but was considered to be able to be suitable for commercial/industrial alnduse provided the EMP is adopted. The locations were PAH contamination were identified had been substantially reworked. • **Apron**: a strip of land between the base of the Embankments and the eastern and southern site boundary. The Apron is part of the Embankments and is known as the Management Area for the purpose of the EMP. Limited investigation data was available, however no PAH was identified at the locations tested. The objectives of the report were to: • Summarise background environmental information and conditions at the site, particularly the Management Area. • Outline methods to mitigate any adverse effects of the Management Area on the environment and human health. • Provide measures for the management of PAH contaminated fill material in the Management Area. • Provide monitoring and maintenance measures for the Management Area The EMP applies for the construction works and operational phase of the site and provides strategy for the following activities: • Excavations into the Management Area (e.g. for the installation and/or repair of services, gardening/landscaping purposes). • The stockpiling, storage, movement and general handling of the excavated Management Area materials. • The onsite reuse or offsite disposal of excavated Management Area fill materials. • General disturbance of the Management Area during routine maintenance works (e.g. lawn-mowing and gardening contractors). • The importation and use of soil fill materials on the Management Area. • Routine inspections of the Management Area (i.e. monitoring of Management Area conditions).
Environ (2010) Site Audit Statement & Site Audit Report, Proposed Lot 104, Potts Hill NSW (Ref: AS120712, GN221-7, May 2010)	The objective of the audit is to assess site suitability for commercial/industrial use. The Audit concluded "the site is suitable for the purposes of "commercial or industrial" land use subject to compliance with the following environmental management plan which specifies controls for the Embankments: • *'Lot 104, Environmental Management Plan' dated 20 May 2010 by AECOM Australia Pty Ltd.* Groundwater has not been assessed and no contamination has detected in soil that would be expected to lead to groundwater contamination. Abstraction of groundwater would not be expected at the site given the saline and low yield nature of the aquifer. Any future groundwater abstraction would require investigation of the groundwater resource and approval from the NSW Office of Water."
CES (16 August 2017) Stage I – Preliminary Site Investigation 10 Nelson Short Street, Potts Hill, New South Wales (Ref: CES170303-SD-AB)	The objective of this report was to assess whether the site is likely to be suitable for the proposed high density residential development designed for seniors living, or whether further investigation or remediation is required. Scope of work included: • Desktop study, including review of previous investigation, remediation and validation reports and site audit report/site audit statement; review of historical title records, aerial photographs, Section 149 planning certificates, NSW EPA records, groundwater bore data records, SafeWork NSW records. • Site inspection and soil sampling from 15 boreholes (BH01 to BH15). All locations were conducted from the Main Area (not within the Embankments).

Date	Report Objectives, Scope and Outcomes
	• Groundwater sampling from 2 wells (BH02 and BH03). The outcomes of the report were as follows: • All samples were below health-based criteria. One location exceeded BaP ESL, however CES considers this to be acceptable given the entire footprint of the proposed development will be excavated for the construction of a basement carpark. • Groundwater concentrations were below criteria, with the exception of copper, nickel and zinc which exceeded NEPM (2013) marine water groundwater investigation level (GIL). CES considers the heavy metal concentrations to be background concentrations and are unlikely to impact the receiving water body of Cooks River. • The total organic carbon (TOC) content of fill and natural soil samples below 3m indicates a Characteristic Situation 1 and was considered to be a very low ground gas risk. • CES considers the main site (flat area) is likely to be suitable for the proposed high rise residential seniors living development. However, the area of the embankment (currently subject to EMP) has not been investigated due to access issue. The Embankment area will require investigation and potentially remediation to address previously identified contaminants for the proposed landuse. • Preliminary waste classification indicates the fill material was expected to be classified as general solid waste (GSW).
CES (7 March 2018) Stage 1 Preliminary Site Investigation 10 Nelson Short Street, Potts Hill, New South Wales (Ref: CES170303-SD-AD)	This document provides response to comment made by City of Canterbury-Bankstown Council regarding site suitability for the proposed residential seniors living development. Council states that "*Based on the PSI and historical records, Council's Environmental Health Unit is not satisfied that the land is suitable for the proposed use in accordance with SEPP 55 and that a detailed site investigation is required.*" CES provides the following information/justifications: • The concentration of BaP at BH12 (0.5-0.6m) (1.4mg/kg is below the CRC Care (2017) high reliability ESL of 33mg/kg and therefore CES considers that BaP at this location does not pose an unacceptable risk to ecological receptors. • The proposed development includes a single level basement car park extending the entire footprint of the site. Based on the proposed development, soil at BH12 (0.5-0.6m) would be excavated and disposed of offsite. • CES did not encounter any of the materials (Ash, coal, road base, black resin-like materials, asphalt/bitumen) associated with previous PAH impacts in the fill soils and no exceedance occurred above health-based criteria. • The 95% UCL of BaP in the CES investigation was calculated to be 0.68mg/kg, which is below the NEPM (2013) ESL. • CES considers the site in its current state is likely to be suitable for the proposed development, noting that further investigation is required in the embankments at the eastern and southern boundary of the site.
CES (18 July 2018) Remedial Action Plan 10 Nelson Short Street, Potts Hill, New South Wales (Ref: CES170303-SD-AE)	The objectives of this report were to: • Set remediation goals which will assist in making the site suitable for the proposed residential use and will pose no unacceptable risk to human health or to the environment; • Document all procedures and plans to be implemented to reduce risks to acceptable levels for the proposed high density residential land use; and • Establish the environmental safeguards required to complete the remediation in an environmentally acceptable manner. The RAP includes: • a review and summary of the previous environmental site assessment report; • identification of reported impacts, data gaps and areas that require further investigation or remediation; • preparation of site conceptual model characterising the known contamination sources, pathways and (current and future) receptors;

Date	Report Objectives, Scope and Outcomes
	• evaluation of remediation options and rationale for the recommended remedial option including contingency plan and setting of remediation goals and acceptance criteria; • preparation of validation procedures for the site; • setting of Construction Site Management Plan requirements for stormwater, soil management, noise control, dust control, odour control and WHS plan for the operational phase of remediation; • preparation of Contingency Plans to respond to site incidents that may affect site workers or surrounding site environments or communities; • identification of regulatory compliance requirements such as licences or approvals identification of a remediation timeline and schedule and hours of remedial work operations; • identification of appropriate personnel, reporting requirements; and long-term site management plan (if required). The goal of the remediation is to provide sufficient engineering and management controls to make the site suitable (with respect to soil contamination) for the proposed development with accessible soils, to ensure protection of human health and the environment during and post remediation works, and to manage soils in a cost-effective manner. The contamination requiring remediation is PAH and asbestos impacts.

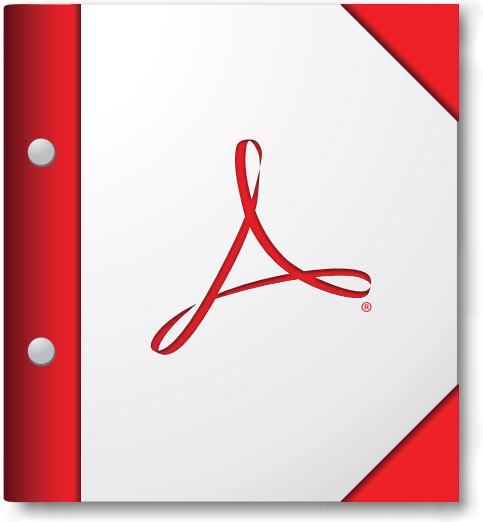
CES (16 August 2017) identified the following potentially contaminating activities and contaminants of concern associated with past and present activities across the site.

Table 8: Summary of Potentially Contaminating Activities

Area	Activity	Potential Contaminants
Entire site	Commercial activity as Sydney Water storage yard facility (through the use of petroleum products such as fuels, oils and hydraulic oils, in addition to pesticides)	Heavy metals, total recoverable hydrocarbon (TRH), benzene, toluene, ethylbenzene, xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), organochlorine pesticides (OCPs)
Entire site	Uncontrolled fill, potentially associated with reservoir spoil	Heavy metals, TRH, BTEX, PAHs, OCPs, PCBs, asbestos

The consultant has considered the contaminants of potential concern (COPC) in the following media:

- Soil
- Groundwater



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	Auditor Comment (Letter 06 August 2018)	CES Response (17 August 2018)	Report Section
	Re: Interim Advice No. 1 – Review of Existing Information, 10 Nelson Short Street, Potts Hill, NSW	Based on the comments and responses the PSI (CES170303-SD-AB) and the RAP (CES170303-SD-AE) have been updated	
1	Section 3.1. It is noted that previous contaminated sites audits identify the site as being owned by 'Sydney Water' (or its predecessors) since 1888. Confirmation would be beneficial.	Available historical title information is provided in Section 3.1 of the PSI report, which indicates that the site was owned by the Metropolitan Water Sewerage and Drainage Board from 1911 to 1969 and Sydney Water Board/Corporation from 1969 to 2016. Historical title information from prior to 1911 was not provided by Lotsearch. The information is available on https://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?id=5051434 (accessed 10 august 2018) states that the site was developed by the Board of Water Supply Sewerage and Sydney Water, with construction works commencing in 1887, with the construction of the first reservoir. Based on this information the site is likely to have been owned by 'Sydney Water' (or its predecessors) since before 1888.	NA
2	Section 4.4: Sensitive receptor should include surface water receptor (i.e. Cooks River)	Noted. CSM updated.	4.4 and 9.4.4
3	It is noted no comments are made on the following items required in the current guidelines. As such, address the following:		
	a. Soil map condition	Updated. *Reference to the Sydney 1:100 000 Soil Landscape Series Sheet 9130 indicates that the site is underlain by disturbed terrain. Disturbed terrain indicates the soils at the site are likely to be highly modified from their natural condition.*	2.7
	b. Product spill and loss history	No details available, however a spill is discussed in the sites SAR, which occurred in the vicinity of the UST. The impact associated with the spill has been remediated, with no detections reported in validation samples, as stated in the SAR.	NA

	c. Discharges to land, air and water	No details available.	NA
	d. Complaint history	No details available.	NA
	e. Local site knowledge	No details available.	NA
4	Data quality objectives (DQOs) were not provided. Further assessment/validation should include statement of DQOs.	Noted.	NA
5	Section 5.2: While wells were screened only from 10m to 12mbgl at BH02 and 7m to 10mbgl at BH03, this section states that gravel pack was placed from depth of the well to 1mbgl. Is there any reason? Would this have caused dilution of concentration?	Error in text. Sand pack was installed from the base of the well to 0.7 m above the screen. A 1 m thick bentonite plug was then installed, and wells were completed to surface with cement bentonite grout. Well design is presented on borehole logs presented in the updated report.	5.2
6	Section 5.3: Sampling and Analytical Programme		
	a. The number of sampling locations (15) does not meet NSW EPA (1995) requirement of a 1.5ha site (only of the Main area) or of a 1.8ha site (entire site), while the results were used to assess suitability for the Main area. However, following completion of additional investigation, adequacy of sampling should be assessed.	Noted.	NA
	b. Please provide groundwater development, purging and sampling methodology.	Groundwater fieldwork was undertaken in accordance with documented CES procedures by experienced staff. Well development was carried out by surging and pumping manually with a dedicated bailer. Following development of the wells, the wells were allowed to recover for approximately one week before purging and sampling. The purging process was undertaken by the low-flow method using a decontaminated bladder pump with drawdown control to limit drawdown to less than 0.05 m. This was done using a low flow pump with inlet tubing (Teflon free) set at the midpoint of the response zone (slotted pipe).	5.2

		A calibrated (and decontaminated) water quality meter was used during the purging process to assess chemical equilibrium by measuring pH, redox potential (Eh), electrical conductivity, dissolved oxygen and temperature. The parameters were considered stable and at equilibrium when two consecutive readings were within ±10 %. Stabilisation of the water quality parameters was considered to represent formation specific (at the point of sampling) water being drawn into the parameter measurement cup. As such, the field parameter stabilisation was used to assess when water that is representative of the formation is to be sampled. Sampling commenced after the parameters stabilised.	
7	The following boreholes and depths were noted to have organic odour but were not analysed/sampled: BH05 (3.7-4.2m), BH06 (6.5-6.6m), BH10 (5.6-5.8m), BH14 (5.7-5.8m). Please assess in additional investigation or provide justification.	Soil with noted organic odours in BH05, BH06, BH10 and BH14 was not sampled and analysed. Organic odours were recorded in similar soils, described as black/dark brown clay, which was generally identified immediately overlying the natural soils at the site. PID readings from the soils did not detect significant VOC concentrations in headspace samples analysed from the soils. One sample of the material was collected and analysed, BH09 5.3-5.4. Sample BH09 5.3-5.4 did not detect vTRH, BTEX or naphthalene concentrations in excess of the laboratory PQL. Based on the field observations, laboratory analysis results and location of the soils, it is likely that the soils represent the former topsoil layer present onsite prior to filling and the organic odour noted on the borehole logs are a result of decomposing organic matter rather that a result form organic impact in the soils.	NA
8	Asbestos assessment was not conducted as per NEPM (2013) requirement. Given the historical presence of fill, the Auditor considers asbestos assessment as per NEPM (2013) would be required for fill remaining at the site (beneath and outside building footprint) following basement excavation. Please provide assessment strategy in the RAP.	Noted. Provided in the updated RAP.	NA
9	Section 7: QA/QC:		
	a. LOR > criteria for some OCPs and PCBs in groundwater. Please provide justification.	No PCB or OCP were detected in soil samples analysed. PCB and OCP are likely to adsorb to soils. In the absence, therefore of gross soil impacts, significant impacts to groundwater are unlikely. In addition, no sources of PCB or OCP were identified in the sites historical information or the previous SAR. In consideration of the above, the LOR > screening criteria for PCB and OCP are not considered to have a material effect on the site assessment.	NA

	b. Please provide sample receipt advice documents for all laboratory reports.	Provided in updated report.	Appendix H
	c. Would interface meter/water quality meter have been decontaminated? If so, please decontamination procedure and justify the absence of rinsate blank.	The interface meter and the water quality meter were decontaminated in accordance with CES standard procedures. No rinsate blank was carried out as dedicated equipment (bladders and tubing) was used for sample collection. Water quality readings were collected from the water quality meter installed in a flow cell. Once the water quality readings were stable the sample was collected by breaking the sample tube before the flow cell, therefore the water quality meter was no in contact with the sample collected.	NA
	d. Please provide ALS QA/QC report so the Auditor can check the laboratory QA/QC.	Included in the updated report.	Appendix H
10	The conclusions made by CES do not appear to consider the results from the previous audit, noting that previous results identified BaP up to 8.2mg/kg within the Main Area, which may be associated with BaP TEQ exceeding 250% of HIL B. Please provide assessment. While the full results are not provided in the previous site audit, the impacts were listed as being <1.1mbgl within the Main Area, which would likely be removed during basement excavation. The Auditor would require that development plans be provided to confirm that basement excavation includes the entire Main area, otherwise the potential risk of BaP may need to be further assessed.	Development plans provided in the updated PSI.	Appendix J
11	The Auditor also requires that assessment of leachability be conducted on the PAHs from the site to assess potential migration from soil to groundwater (from the limited results in the previous site audit, this appears to be acceptable).	It should be noted that significant PAH concentrations were not detected in the analysis undertaken during the PSI, and PAH impact to groundwater were not detected. Leachate testing by ASLP is proposed in the updated RAP to assess potential migration from soils to groundwater, where significant contaminant concentrations are detected in the further assessment and validation required by the RAP.	NA
12	Section 9.2: As per advice by NSW EPA, available data should be included for waste classification purposes, unless there is evidence why they will not	Further waste classification analysis will be required to confirm the preliminary waste classification of materials. CES notes that the concentrations presented in the previous report are not provided with laboratory certificates of analysis, any other verification method, or with other results as only the maximum detection is presented.	NA

	be relevant. Therefore, waste classification should include previous investigation results.	Without the above information the representativeness of the quoted detection cannot be assessed.	
13	Appendix G: Please provide groundwater monitoring well logs for BH02 and BH03. Please provide log for BH01 if available.	Provided in the updated report. No well was installed in BH01. A soil log is provided.	Appendix G
14	SWL for BH02 (9.202mbtoc) was above the screen depth (10mbtoc). How would this affect the result, particularly potential LNAPL? What depth was water encountered during drilling?	Water was observed at approximately11 m bgl during drilling. The well screen was placed 1 m either side of the observed water strike, from 12 to 10 m bgl, however as noted stabilised water level in the well was recorded to be 9.27 m bgl, which is above the well screen. In consideration of this, the well is likely to be unsuitable for detecting or monitoring phase separated hydrocarbons in groundwater. It should be noted however that dissolved phase hydrocarbons were not detected in laboratory analysis in BH02 at concentrations that would indicate the possibility of free phase hydrocarbons in groundwater. In consideration of this, the detection of standing water level above the screen in BH02 is unlikely to have a material effect on the site assessment.	NA
	CES (18 July 2018) RAP		
15	Section 3.6.2 provides a summary of the current EMP. It would be beneficial to have a section identifying that the current site management requires the implementation of this EMP.	Noted.	3.7
16	Section 4.1.2: EIL/ESL		
	a. The Auditor assumes that EIL/ESL for urban residential and public open space will be used.	Confirmed. Stated in updated RAP	4.1.2
	b. The Auditor requires site-specific soil property data be collected during additional investigation to obtain site-specific EIL/ESL.	Noted. Provided in updated RAP.	5.5
17	Section 7.4 – Please update this section to confirm that the extent of remediation includes fill from the top 3m from the entire footprint of the proposed	It is noted that based on the proposed development, the top 4.5 m of the main area of the site is to be excavated for the construction of a basement carpark. The driver of this work is considered to be development design, rather than site suitability. The following text has been added to Section 7.2:	7.2

	development and this includes from the basement depth.	*While remediation of the main area is not considered to be required, 4.5 m of fill is to be excavated from the main area of the site for basement carparking. This should be assessed in accordance with the data gap assessment in Section 5.5 and disposed of offsite at a waste facility licenced to and capable of accepting the waste. In accordance with the requirements of Section 4.3.7 of the NSW EPA 2017 Guidelines for the NSW Site Auditor Scheme (3rd Edition) the auditor is required to assess this waste, in consideration of this the material should be managed, handled and tracked in accordance with Sections 8.8, 8.10 and 8.11 of the RAP.*	
18	Section 8 should provide remediation strategy for onsite containment, as this was recommended as being a contingency. This should include proposed capping thickness.	Noted. Provided in updated RAP. Thickness of capping suitable is not defined as this will be determined at a later date based on contamination to be managed and receptor type and sensitivity. *Onsite containment of the impacted material consists of excavation of the impacted soil and placement of the soil at a suitable location onsite or retention of impacted material insitu and management of human health or environmental risks by disrupting contaminant migration or exposure pathways. Onsite containment will require consultation with the site auditor, Council and other stakeholders, and may require an Environmental Management Plan to be prepared for the site.* *Onsite containment is currently employed at the site under the EMP (Aecom 2010), for the embankment and apron areas of the site. The containment is provided by a jute layer, overlain by mulch derived from planted vegetation. Based on aerial photograph review from the construction phase of the embankment, it appears that the jute layer was overlain by a growing medium during the works.* *Where excavation and relocation is undertaken the impacted soil excavation will require validation in accordance with the validation requirements outlined in Section 9 and the impacted soils may require further assessment.* *Onsite containment is considered likely to be suitable for the PAH and/or asbestos impacted soils*	8.4
19	Section 8.1, the previous investigations indicated significant PAH concentrations within the embankment and previous work indicated the material had been mixed during rework of the embankment. Given the height of the embankment,	The embankment height is variable and ranges from 3 m (south of site) to 7m (north of site). The proposed development includes a basement excavation of 4.5 m. Excavation and offsite disposal is included as a remediation option for the embankment as investigations have not defined the remediation required in the area. If localised hotspot remediation is required, excavation and offsite disposal may be a suitable methodology.	NA

	will it be practical to have excavation and offsite disposal as remedial strategy?		
20	Section 8.4 states that the RAP should be reviewed and updated if required to suit the proposed staging plan. The Auditor agrees with this.	Noted.	NA
21	Section 8.7: Stockpile management: Potentially asbestos impacted stockpile shall be kept moist and shall be covered by plastic sheet if left overnight.	Updated.	8.8
22	Section 8.7.5: Please provide COPCs to be analysed for stockpiles.	TRH, PAH, Asbestos, Metals. OCP.	8.8.5
23	Section 8.9:		
	a. Does the exemption for requirement of waste tracking during offsite disposal for excavated soil contaminated with asbestos waste still apply?	No. RAP updated.	8.10
	b. The Auditor will require reconciliation of material excavated onsite and disposed of offsite/reuse onsite.	Noted.	NA
	c. The Auditor will require tracking of material reused onsite as well.	Noted. Section 8.11 added to updated RAP	8.11
24	Section 9: Validation Plan:		
	a. This section states that the impacts are only present on the eastern embankment. The Auditor notes that CES has not considered the exceedances in the previous investigations within the main area as per previous comment. Please update to consider validation sampling if basement excavation remains in fill (Section 7.2)	CES notes that the concentrations presented in the previous report are not provided with laboratory certificates of analysis, any other verification method, or with other results as only the maximum detection is presented. Without the above information the representativeness of the quoted detection cannot be assessed. However previous investigations detected elevated PAH in near surface soils (<1.1 m bgl) only, with no PAH detections at depths greater than 1.2 m bgl. In addition, elevated PAH were not detected in samples collected in the PSI. The proposed development includes excavation of approximately 4.5 m to construct a basement car park, which is likely to	5.5

		remove the shallow PAH impacts. Limited sampling of the base of the excavation is proposed in the updated RAP.	
	b. Please also consider comment on validation of asbestos as per NEPM (2013) requirement beneath basement excavation if basement finishes in fill.	Sampling and analysis included in Section 5.5 of the RAP	5.5
	c. Validation for asbestos within and outside the area of basement shall be conducted as per NEPM (2013) requirement. Please provide sampling strategy for these, noting that the Auditor would require at least collection of 10L samples, and justification on whether 500mL samples will be required.	Sampling and analysis included in Section 5.5 of the RAP. 10 L screen and 500ml laboratory analysis proposed.	5.5
	d. This section shall include validation plan for capping (thickness and quality), should capping strategy be recommended.	Capping to be confirmed once detail of the contamination to be capped is known.	NA
25	Section 10: Is there any demolition work proposed at the site?	No demolition works. Reference removed from RAP	10
26	Section 11.5.3: Please provide PID trigger levels for further action.	Workplace air monitoring would be the responsibility of the Contractor and should be included in standard Work Health and Safety requirements.	NA
27	Given the impacts requiring management includes asbestos, please provide management of asbestos during remediation in accordance with appropriate guidelines and codes of practices. This should include at least: licence requirements, air monitoring, etc.	The previous report indicates that extensive asbestos in soil analysis (236 samples) did not detect asbestos fibres, however one piece of bonded ACM was observed in the site surface of the Embankment Area. In consideration the risk of asbestos in the soils of the site is likely to be low. In the event that asbestos impacts are detected in the data gap assessments or validation sampling, Section 11.6 added to the RAP	11.6
28	Figure 3: It would appear that most of the sampling locations for the embankment area (BH16 to BH28) are located within the “embankment” and not “apron”. Given previous audit states that only limited samples had been collected within the “apron”, please consider conducting some samples within the “apron” area.	Two sample points have been relocated to target the ‘apron’ area of the site.	Figure 3

	By email 08 August 2018		
1	The fill that remains has to be appropriately assessed. At the moment the boundary area adjacent to Graf Avenue is missing that incorporates a 20m setback has limited information. Can you update the RAP to include this noting the proposed excavation and fill retention.	The RAP includes assessment of this area, the embankment and apron area in Section 5.5 of the RAP.	5.5
2	Shener indicated a tree and associated fill on the Brunker Street Boundary is likely to remain. Could you confirm this location and confirm suitability of retained fill	TBC.	Figure 2, Section 5.5
3	A figure overlay of the previous UST boundary and current sampling would be helpful.	Presented as Figure 2 in the updated RAP.	Figure 2
4	Could you add classification and offsite disposal for fill that has been illegally dumped	Included in Section 5.5 of the RAP.	5.5

Appendix C Result Summary Tables

8.3.1 Main Area Fill

Table 8.2, below, presents a summary of the results for shallow fill from the Main Area (≤1.1mBGL) in comparison to the environmental quality criteria. The data is for 126 samples from 83 locations.

This is the primary validation data set for the site to demonstrate suitability of the Main Area for commercial/ industrial land use, and excludes data from:

- stockpiled Unit 1A material (refer Section 10.4)
- remediation excavation spoil (from excavations A to E, disposed offsite)
- sample locations inferred by AECOM to have been removed by the excavation of Unit 1A material
- additional sampling along Skirt (post embankment stabilisation), refer Section 10.5.

Table 8.2: Evaluation of Fill Analytical Results – Main Area ≤1.1mBGL (mg/kg)

Analyte	n	Detections	Maximum	n > EPA (1994)	n > SIL Column 4 (DEC 2006)
BaP	126	30	8.2	-	3
Total PAH	126	38	71.8	-	0
TPH C6-C9	24	0	<10	0	-
TPH C10-C36	126	8	712	0	-
Heavy Metals (8)	120	nc	nc	-	0
Asbestos	1	0	ND	-	-
BTEX	13	1	0.2	0	-
OCP	11	0	<0.2	-	0
OPP	5	0	<0.2	-	-
Phenol	1	0	<1	-	0
SVHC	1	0	<3	-	-
Herbicides	1	0	<0.02	-	-

Note:

n number of samples
nc not calculated
ND not detected
- no criteria available/used

The results indicate a limited number of exceedances of the site criterion for BaP. AECOM performed statistical analysis of these results, and the resulting data set of 126 samples (including duplicates) yielded a 95% Upper Confidence Limit (UCL) on the mean as follows:

- BaP = 1.3mg/kg (maximum 8.2mg/kg), compared to SIL 4 = 5mg/kg
- Total PAH = 13.2mg/kg (maximum 71.8mg/kg), compared to SIL 4 = 100mg/kg

The results indicate the material is suitable for commercial/ industrial usage.

Table 8.3, below, presents a summary of the results for deep fill from the Main Area (≥1.2mBGL) in comparison to the environmental quality criteria. The data is for 15 samples from 15 locations.

Table 8.3: Evaluation of Fill Analytical Results – Main Area ≥1.2mBGL (mg/kg)

Analyte	n	Detections	Maximum	n > EPA (1994)	n > SIL Column 4 (DEC 2006)
BaP	8	0	<0.5	-	0
Total PAH	8	0	<0.5	-	0
TPH C6-C9	14	0	<2	0	-
TPH C10-C36	14	0	<50	0	-
Heavy Metals (8)	15	nc	nc	-	0
BTEX	14	1	0.2	0	-
OCP	4	0	<0.2	-	0
OPP	4	0	<0.2	-	-
Phenol	3	1	1	-	0

Note:

n number of samples
nc not calculated
ND not detected
- no criteria available/used

The results indicate the material is suitable for commercial/ industrial usage.

8.3.2 Embankments and Apron Fill

Table 8.4, below, presents a summary of the results for the Embankment fill (pre-stability works) in comparison to the environmental quality criteria. The data is for 296 samples from 74 locations.

AECOM state that "It is reasonable to assume that the slope-stability works resulted in the mixing and/or dilution of the PAH contamination previously identified in the Embankments". Previous contaminant exceedances within the Embankments are unlikely to be found in their

original locations (shown on Attachment 7, Appendix A). However, the data is still valid as a statistical representation of the overall quality of Embankment fill.

Table 8.4: Evaluation of Fill Analytical Results – Embankments (mg/kg)

Analyte	n	Detections	Maximum	n > EPA (1994)	n > SIL Column 4 (DEC 2006)
BaP	296	155	77.8	-	59
Total PAH	296	171	987	-	38
TPH C6-C9	16	0	<10	0	-
TPH C10-C36	89	26	2260	5	-
Heavy Metals (8)	88	nc	nc	-	0
Asbestos	206	1	D [1]	-	-
BTEX	11	2	0.2	0	-
OCP	11	1	0.47	-	0
OPP	6	0	<0.2	-	-
PCB	6	0	<0.5	-	0
Phenol	2	0	<1	-	0
Herbicides	1	0	<0.02	-	-

Note:

n number of samples
nc not calculated
ND not detected
- no criteria available/used
1 small fragment of cement bonded sheeting in TP249_0-0.2 containing chyrysotile, amosite and crocidolite asbestos

The significant quantities of residual PAH contamination within the Embankment fill require ongoing management to prevent contact with site occupants. The minor amounts of TPH and asbestos impact are also amenable to management.

Table 8.5, below, presents a summary of the results for fill from the Apron in comparison to the environmental quality criteria. The data is for four samples from four locations.

Table 8.5: Evaluation of Fill Analytical Results – Apron (mg/kg)

Analyte	n	Detections	Maximum	n > EPA (1994)	n > SIL Column 4 (DEC 2006)
TPH C6-C9	4	0	<5	0	-
TPH C10-C36	4	2	180	0	-

Table 8.5: Evaluation of Fill Analytical Results – Apron (mg/kg)					
Analyte	n	Detections	Maximum	n > EPA (1994)	n > SIL Column 4 (DEC 2006)
Heavy Metals (8)	4	nc	nc	-	0
BTEX	3	0	<0.2	0	-

Note:

n number of samples
nc not calculated
ND not detected
- no criteria available/used

The results indicate the material is suitable for commercial/ industrial usage, however, due to the low frequency of sampling and lack of PAH analyses, this Apron area will also be subject to ongoing management.

8.3.3 Natural Soil

Table 8.6, below, presents a summary of the results from natural soil from the entire site in comparison to the environmental quality criteria. The data is for 28 samples from 25 locations.

Table 8.6: Evaluation of Natural Soil Analytical Results – Entire Site (mg/kg)					
Analyte	n	Detections	Maximum	n > EPA (1994)	n > SIL Column 4 (DEC 2006)
BaP	28	0	<0.5	-	0
Total PAH	28	0	<0.5	-	0
TPH C6-C9	9	0	<5	0	-
TPH C10-C36	9	0	<10	0	-
Heavy Metals (8)	11	nc	nc	-	0
Asbestos	19	0	ND	-	-
BTEX	6	0	<0.2	0	-
Phenol	2	1	3	-	0

Note:

n number of samples
nc not calculated
ND not detected
- no criteria available/used

The results indicate the natural material is free of any contamination impact and is suitable for commercial/ industrial usage.

LabMark
ENVIRONMENTAL LABORATORIES

Laboratory Report No: E041883
Client Name: ENSR Australia Pty Ltd
Contact Name: Alex Latham
Client Reference: Potts Hill (Zone 5 / Lot 104) S40891

Date: 03/03/09
This report supercedes reports issued on: N/A

Final
Certificate of Analysis

Laboratory Identification		199231	199232	199241	199242	199260	199264	199265	199266	199267	199268
Sample Identification		TP233	TP233	TP237	TP237	DUP 508	VS01	VS02	VS03	VS04	VS05
Depth (m)		0.5-0.6	0.7-0.9	0.0-0.05	0.25-0.35	--	2.5	3.5	2.5	3.5	2.5
Sampling Date recorded on COC		26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	27/2/09	27/2/09	27/2/09	27/2/09	27/2/09
Laboratory Extraction (Preparation) Date		2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09
Laboratory Analysis Date		2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09
Method : E002.2											
BTEX by P&T	**EQL**										
Benzene	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
meta- and para-Xylene	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
ortho-Xylene	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylene	--	--	--	--	--	--	--	--	--	--	--
CDFB (Surr @ 10mg/kg)	--	*83%*	*85%*	*87%*	*86%*	*84%*	*77%*	*84%*	*86%*	*84%*	*86%*
Method : E003.2											
Volatile TPH by P&T (vTPH)	**EQL**										
C6 - C9 Fraction	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E003.2: 8-10g soil extracted with 20ml methanol. Analysis by P&T/GC/FID.
E002.2: 8-10g soil extracted with 20ml methanol. Analysis by P&T/GC/PID/MSD.

LabMark

ENVIRONMENTAL LABORATORIES

Laboratory Report No: E041883

Client Name: ENSR Australia Pty Ltd

Contact Name: Alex Latham

Client Reference: Potts Hill (Zone 5 / Lot 104) S40891

plus cover page

Date: 03/03/09

Final

Certificate

of Analysis

This report supercedes reports issued on: N/A

Laboratory Identification		199225	199226	199231	199232	199234	199235	199236	199237	199238	199239
Sample Identification		TP232	TP232	TP233	TP233	TP234	TP234	TP235	TP235	TP235	TP236
Depth (m)		0.2-0.25	0.4-0.5	0.5-0.6	0.7-0.9	0.0-0.15	0.7-0.8	0.05-0.1	0.6-0.8	1.0-1.1	0.05-0.1
Sampling Date recorded on COC		26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09
Laboratory Extraction (Preparation) Date		2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09
Laboratory Analysis Date		2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09
Method : E006.2											
Petroleum Hydrocarbons (TPH)	**EQL**										
C10 - C14 Fraction	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
C15 - C28 Fraction	100	<100	<100	1520	<100	<100	<100	<100	<100	<100	<100
C29 - C36 Fraction	100	<100	<100	730	<100	<100	<100	<100	<100	<100	<100
Sum of TPH C10 - C36	--	--	--	2250	--	--	--	--	--	--	--

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E006.2: 8-10g soil extracted with 20ml DCM/Acetone/Hexane (10:45:45). Analysis by GC/FID.

Laboratory Identification		199225	199226	199229	199231	199232	199234	199235	199236	199237	199238
Sample Identification		TP232	TP232	TP233	TP233	TP233	TP234	TP234	TP235	TP235	TP235
Depth (m)		0.2-0.25	0.4-0.5	0.2-0.3	0.5-0.6	0.7-0.9	0.0-0.15	0.7-0.8	0.05-0.1	0.6-0.8	1.0-1.1
Sampling Date recorded on COC		26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09
Laboratory Extraction (Preparation) Date		2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09
Laboratory Analysis Date		2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09
Method : E007.2											
Polyaromatic Hydrocarbons (PAH)	**EQL**										
Naphthalene	0.5	<0.5	<0.5	<0.5	29.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	0.5	<0.5	<0.5	0.8	6.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	0.5	<0.5	<0.5	<0.5	7.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	0.5	<0.5	<0.5	0.7	11.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	0.5	<0.5	0.5	10.1	80.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	0.5	<0.5	<0.5	2.5	25.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	0.5	<0.5	<0.5	29.0	161	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	0.5	<0.5	<0.5	26.8	147	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	0.5	<0.5	<0.5	8.3	48.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	0.5	<0.5	<0.5	7.2	58.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b)&(k)fluoranthene	1	<1	<1	12	75	<1	<1	<1	<1	<1	<1
Benzo(a) pyrene	0.5	<0.5	<0.5	9.0	46.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	0.5	<0.5	<0.5	5.1	23.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene	0.5	<0.5	<0.5	1.2	6.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g,h,i)perylene	0.5	<0.5	<0.5	6.4	26.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sum of reported PAHs	--	--	0.5	119.1	752.4	--	--	--	--	--	--
2-FBP (Surr @ 5mg/kg)	--	*92%*	*87%*	*81%*	*86%*	*96%*	*80%*	*83%*	*86%*	*83%*	*95%*
TP-d14 (Surr @ 5mg/kg)	--	*90%*	*88%*	*81%*	*99%*	*94%*	*80%*	*81%*	*86%*	*81%*	*90%*

Results expressed in mg/kg dry weight unless otherwise specified

Comments: # Percent recovery not available due to significant background levels of analyte in sample. ^^ Low recovery due to matrix interference.

E007.2: 8-10g soil extracted with 20ml DCM/Acetone/Hexane (10:45:45). Analysis by GC/MS.

Laboratory Identification		199225	199229	199234	199239	199245	199262	199225d	199225r	199239d	199239r
Sample Identification		TP232	TP233	TP234	TP236	TP238	DUP 511	QC	QC	QC	QC
Depth (m)		0.2-0.25	0.2-0.3	0.0-0.15	0.05-0.1	0.05-0.1	–	–	–	–	–
Sampling Date recorded on COC		26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	–	–	–	–
Laboratory Extraction (Preparation) Date		2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	–	2/3/09	–
Laboratory Analysis Date		3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	–	3/3/09	–
Method : E013.2											
Organochlorine Pesticides (OC)	**EQL**										
a-BHC	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	–	<0.05	–
Hexachlorobenzene	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	–	<0.05	–
b-BHC	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	–	<0.05	–
g-BHC (Lindane)	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	–	<0.05	–
d-BHC	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	–	<0.05	–
Heptachlor	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	–	<0.05	–
Aldrin	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	–	<0.05	–
Heptachlor epoxide	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	–	<0.05	–
trans-chlordane	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	–	<0.05	–
Endosulfan I	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	–	<0.05	–
cis-chlordane	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	–	<0.05	–
Dieldrin	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	–	<0.05	–
4,4-DDE	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	–	<0.05	–
Endrin	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	–	<0.05	–
Endosulfan II	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	–	<0.05	–
4,4-DDD	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	–	<0.05	–
Endosulfan sulphate	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	–	<0.05	–
4,4-DDT	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	–	<0.2	–
Methoxychlor	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	–	<0.2	–
DBC (Surr @ 0.2mg/kg)	–	*91%*	*75%*	*94%*	*92%*	*104%*	*98%*	*97%*	*6%*	*78%*	*16%*

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E013.2: 8-10g soil extracted with 20ml DCM/Acetone/Hexane (10:45:45). Analysis by GC/dual ECD.

Laboratory Identification		199225	199231	les	mb						
Sample Identification		TP232	TP233	QC	QC						
Depth (m)		0.2-0.25	0.5-0.6	--	--						
Sampling Date recorded on COC		26/2/09	26/2/09	--	--						
Laboratory Extraction (Preparation) Date		2/3/09	2/3/09	2/3/09	2/3/09						
Laboratory Analysis Date		3/3/09	3/3/09	3/3/09	2/3/09						
Method : E013.2											
Polychlorinated Biphenyls (PCB)	**EQL**										
Arochlor 1016	0.5	<0.5	<0.5	--	<0.5						
Arochlor 1232	0.5	<0.5	<0.5	--	<0.5						
Arochlor 1242	0.5	<0.5	<0.5	--	<0.5						
Arochlor 1248	0.5	<0.5	<0.5	123%	<0.5						
Arochlor 1254	0.5	<0.5	<0.5	--	<0.5						
Arochlor 1260	0.5	<0.5	<0.5	--	<0.5						
Sum of reported PCBs	--	--	--	--	--						
DBC (Surr @ 0.2mg/kg)	--	*91%*	*115%*	*105%*	*108%*						

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E013.2: 8-10g soil extracted with 20ml DCM/Acetone/Hexane (10:45:45). Analysis by GC/dual ECD.

Laboratory Identification		199225	199226	199229	199231	199232	199234	199235	199236	199237	199238
Sample Identification		TP232	TP232	TP233	TP233	TP233	TP234	TP234	TP235	TP235	TP235
Depth (m)		0.2-0.25	0.4-0.5	0.2-0.3	0.5-0.6	0.7-0.9	0.0-0.15	0.7-0.8	0.05-0.1	0.6-0.8	1.0-1.1
Sampling Date recorded on COC		26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09
Laboratory Extraction (Preparation) Date		2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09
Laboratory Analysis Date		3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09
Method : E022.2											
Acid extractable metals (M7)	**EQL**										
Arsenic	1	<1	8	4	51	4	25	2	20	3	7
Cadmium	0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	1	9	12	9	11	10	13	5	6	9	10
Copper	2	70	34	57	24	24	34	14	41	19	35
Nickel	1	94	22	59	19	7	18	10	19	8	22
Lead	2	<2	20	5	49	10	17	9	25	7	19
Zinc	5	49	94	46	69	40	72	36	96	39	95

Results expressed in mg/kg dry weight unless otherwise specified

Comments: # Percent recovery not available due to significant background levels of analyte in sample.

E022.2: 0.5g digested in nitric/hydrochloric acid. Analysis by ICP-MS.

Laboratory Identification		199225	199226	199229	199231	199232	199234	199235	199236	199237	199238
Sample Identification		TP232	TP232	TP233	TP233	TP233	TP234	TP234	TP235	TP235	TP235
Depth (m)		0.2-0.25	0.4-0.5	0.2-0.3	0.5-0.6	0.7-0.9	0.0-0.15	0.7-0.8	0.05-0.1	0.6-0.8	1.0-1.1
Sampling Date recorded on COC		26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09
Laboratory Extraction (Preparation) Date		2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09
Laboratory Analysis Date		3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09
Method : E026.2											
Acid extractable metals - mercury	**EQL**										
Mercury	0.05	0.05	0.05	0.07	0.05	<0.05	0.07	<0.05	0.09	<0.05	0.08

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E026.2: 0.5g digested with nitric/hydrochloric acid. Analysis by CV-ICP-MS or FIMS.

Laboratory Identification		199239	199240	199241	199242	199243	199245	199246	199247	199248	199250
Sample Identification		TP236	TP236	TP237	TP237	TP237	TP238	TP238	TP238	TP239	TP239
Depth (m)		0.05-0.1	0.45-0.55	0.0-0.05	0.25-0.35	0.5-0.6	0.05-0.1	0.4-0.5	0.9-1.0	0.1-0.15	0.2-0.25M
Sampling Date recorded on COC		26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09
Laboratory Extraction (Preparation) Date		2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09
Laboratory Analysis Date		3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09
Method : E026.2											
Acid extractable metals - mercury	**EQL**										
Mercury	0.05	0.07	<0.05	0.05	0.06	0.05	<0.05	<0.05	<0.05	<0.05	0.08

Results expressed in mg/kg dry weight unless otherwise specified

Comments:

E026.2: 0.5g digested with nitric/hydrochloric acid. Analysis by CV-ICP-MS or FIMS.

Laboratory Identification		199225	199226	199229	199231	199232	199234	199235	199236	199237	199238
Sample Identification		TP232	TP232	TP233	TP233	TP233	TP234	TP234	TP235	TP235	TP235
Depth (m)		0.2-0.25	0.4-0.5	0.2-0.3	0.5-0.6	0.7-0.9	0.0-0.15	0.7-0.8	0.05-0.1	0.6-0.8	1.0-1.1
Sampling Date recorded on COC		26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09
Laboratory Extraction (Preparation) Date		2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09
Laboratory Analysis Date		3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09
Method : E005.2											
Moisture											
Moisture	EQL --	6	11	9	14	19	8	15	12	14	11

Results expressed in % w/w unless otherwise specified

Comments:

E005.2: Moisture by gravimetric analysis. Results are in % w/w.

Laboratory Identification		199239	199240	199241	199242	199243	199245	199246	199247	199248	199250
Sample Identification		TP236	TP236	TP237	TP237	TP237	TP238	TP238	TP238	TP239	TP239
Depth (m)		0.05-0.1	0.45-0.55	0.0-0.05	0.25-0.35	0.5-0.6	0.05-0.1	0.4-0.5	0.9-1.0	0.1-0.15	0.2-0.25M
Sampling Date recorded on COC		26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09	26/2/09
Laboratory Extraction (Preparation) Date		2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09	2/3/09
Laboratory Analysis Date		3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09	3/3/09
Method : E005.2											
Moisture											
Moisture	EQL --	13	11	8	10	10	11	18	18	5	6

Results expressed in % w/w unless otherwise specified

Comments:

E005.2: Moisture by gravimetric analysis. Results are in % w/w.

LabMark

ENVIRONMENTAL LABORATORIES

Laboratory Report No: E041956
Client Name: ENSR Australia Pty Ltd
Contact Name: Alex Latham
Client Reference: Potts Hill (Zone 5/Lot104) S40891

Date: 13/03/09
This report supercedes reports issued on: N/A

Final
Certificate
of Analysis

Laboratory Identification		199849	199850								
Sample Identification		TP233	TP233								
Depth (m)		0.2-0.3	0.5-0.6								
Sampling Date recorded on COC		26/2/09	26/2/09								
Laboratory Extraction (Preparation) Date		9/3/09	9/3/09								
Laboratory Analysis Date		--	--								
Method : E019.2											
TCLP Preparation	**EQL**										
TCLP Fluid No.	--	1	1								
Initial pH (pH units)	--	9.1	8.9								
pH after HCl (pH units)	--	2.8	2.5								
Final pH (pH units)	--	5.0	4.9								

Results expressed in pH units unless otherwise specified

Comments:

E019.2: Soil leached for 18 hours with fluid as specified above . Refer to relevant water method for results. TCLP preparation is equivalent to AS4439.3 (also known as ASLP).

LabMark
ENVIRONMENTAL LABORATORIES

Laboratory Report No: E041956
Client Name: ENSR Australia Pty Ltd
Contact Name: Alex Latham
Client Reference: Potts Hill (Zone 5/Lot104) S40891

Date: 13/03/09
This report supercedes reports issued on: N/A

Final
Certificate
of Analysis

Laboratory Identification		199849	lcs	mb							
Sample Identification		TP233	QC	QC							
Depth (m)		0.2-0.3	--	--							
Sampling Date recorded on COC		26/2/09	--	--							
Laboratory Extraction (Preparation) Date		10/3/09	10/3/09	10/3/09							
Laboratory Analysis Date		10/3/09	10/3/09	10/3/09							
Method : E022.1											
TCLP metals											
Nickel	EQL 50	160	87%	<50							

Results expressed in ug/l unless otherwise specified

Comments:

E022.1: Filtered TCLP leachate acidifed with nitric/hydrochloric acid. Analysis by ICP/MS. Results are expressed as in the leachate.

LabMark
ENVIRONMENTAL LABORATORIES

Laboratory Report No: E041956
Client Name: ENSR Australia Pty Ltd
Contact Name: Alex Latham
Client Reference: Potts Hill (Zone 5/Lot104) S40891

Date: 13/03/09
This report supercedes reports issued on: N/A

Final
Certificate
of Analysis

Laboratory Identification		199849	199850	lcs	mb						
Sample Identification		TP233	TP233	QC	QC						
Depth (m)		0.2-0.3	0.5-0.6	--	--						
Sampling Date recorded on COC		26/2/09	26/2/09	--	--						
Laboratory Extraction (Preparation) Date		12/3/09	12/3/09	12/3/09	12/3/09						
Laboratory Analysis Date		12/3/09	12/3/09	12/3/09	12/3/09						
Method : E007.1											
TCLP PAHs	**EQL**										
Benzo(a) pyrene	1	<1	<1	88%	<1						
2-FBP (Surr @ 250ug/l)	--	*97%*	*89%*	*101%*	*96%*						
TP-d14 (Surr @ 250ug/l)	--	*92%*	*90%*	*87%*	*91%*						

Results expressed in ug/l unless otherwise specified

Comments:

E007.1: Triple extraction with DCM. Analysis by GC/MS. Results expressed as in the leachate.

Amdel Ltd
ABN 30 008 127 802

Unit 2, 35 Cormack Road, Wingfield SA, 5013
PO Box 552, Port Adelaide BC, SA 5015
Phone: (08) 8440 7145 Facsimile: (08) 8440 7197

ASBESTOS IDENTIFICATION REPORT

CLIENT: LabMark

ADDRESS: 8 Leighton Place, Asquith NSW 2077

PROJECT NO: E042963

RESULTS:

DATE: 1 June 2009

REPORT NO: 9AA0507A

LabMark ID	Sample	Sample Depth	Sample size (e) g	Description	Asbestos detected*
210329	TP245	0.0-0.2	45	Pale grey and dark grey silt-to gravel-sized particles	No
210330	TP245	0.4-0.5	51	Pale grey silt-to gravel-sized particles and grey and pink gravel-sized particles	No
210332	TP246	0.0-0.2	68	Pale grey and dark grey silt-to gravel-sized particles and grey clay lumps	No
210335	TP247	0.0-0.2	38	Grey and white rock fragments (mudstone)	No
210336	TP247	0.4-0.5	78	Grey sand-sized particles and black gravel-sized slag-like particles	No
210338	TP248	0.0-0.2	41	Grey and brown rock fragments (mudstone)	No
210339	TP248	0.4-0.5	45	Grey and brown rock fragments (mudstone)	No
210341	TP249	0.0-0.2	(a) 50x30x5	Bleached-white fibrous sheeting	Chrysotile, amosite, crocidolite
210342	TP249	0.4-0.5	197	Grey sand-sized particles and black gravel-sized slag-like particles	No
210344	TP250	0.0-0.2	59	Grey rock fragments (mudstone)	No
210345	TP250	0.4-0.5	49	Grey rock fragments (mudstone)	No
210347	TP251	0.0-0.2	59	Pale brown and dark grey sand-and gravel-sized particles	No

APPROVED IDENTIFIER: Michael Till

APPROVED SIGNATORY: Michael Till

The approximate dimensions (in mm) stated above refer to the size of (a) a single piece (b) largest of several particles (c) largest of many particles (d) volume in ml of unconsolidated particles (e) weight in grams of unconsolidated particles

* Detected by polarized light microscopy. ** No asbestos was detected by polarized light microscopy, but identification may not be possible due to adhering resins. Confirmation by another analytical technique is advised. ^Synthetic mineral fibre was detected by polarized light microscopy.

Note: Chrysotile is a fibrous silicate mineral commonly known as white asbestos, amosite is a fibrous silicate commonly known as brown or grey asbestos and crocidolite is a fibrous silicate commonly known as blue asbestos. SMF is commonly known as glass fibre.

The results contained in this report relate only to the sample(s) submitted for testing. Amdel Ltd accepts no responsibilities for the representivity of the sample(s) submitted. When SMF (Synthetic Mineral Fibre) commonly known as glass fibre and OF (Organic Fibre) natural fibres (eg cellulose) are not mentioned it implies that they were not detected.

The results contained in this report relate only to the sample(s) submitted for testing. Amdel Ltd accepts no responsibilities for the representivity of the sample(s) submitted.

SCOPE OF ACCREDITATION: Class 7.82.31: Qualitative identification of asbestos types in bulk samples by polarized light microscopy, *including dispersion staining.*

NATA

Analytical Results

Sub-Matrix: SOIL

Compound	CAS Number	LOR	Unit	Client sample ID: DUP609	DUP607	DUP601	DUP603	—
				Client sampling date / time: 26-FEB-2009 16:00	26-FEB-2009 16:00	27-FEB-2009 15:00	27-FEB-2009 15:00	—
				ES0902947-001	ES0902947-002	ES0902947-003	ES0902947-004	—
EA055: Moisture Content								
^ Moisture Content (dried @ 105°C)	—	1.0	%	16.6	20.1	16.9	24.7	—
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	12	9	—	<5	—
Cadmium	7440-43-9	1	mg/kg	<1	<1	—	<1	—
Chromium	7440-47-3	2	mg/kg	10	15	—	12	—
Copper	7440-50-8	5	mg/kg	39	19	—	14	—
Lead	7439-92-1	5	mg/kg	16	10	—	12	—
Nickel	7440-02-0	2	mg/kg	16	4	—	12	—
Zinc	7440-66-6	5	mg/kg	66	29	—	39	—
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	0.1	<0.1	—	<0.1	—
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	—	—	—	—
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	—	—	—	—
beta-BHC	319-85-7	0.05	mg/kg	<0.05	—	—	—	—
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	—	—	—	—
delta-BHC	319-86-8	0.05	mg/kg	<0.05	—	—	—	—
Heptachlor	76-44-8	0.05	mg/kg	<0.05	—	—	—	—
Aldrin	309-00-2	0.05	mg/kg	<0.05	—	—	—	—
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	—	—	—	—
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	—	—	—	—
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	—	—	—	—
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	—	—	—	—
Dieldrin	60-57-1	0.05	mg/kg	<0.05	—	—	—	—
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	—	—	—	—
Endrin	72-20-8	0.05	mg/kg	<0.05	—	—	—	—
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	—	—	—	—
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	—	—	—	—
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	—	—	—	—
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	—	—	—	—
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	—	—	—	—
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	—	—	—	—
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	—	—	—	—
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	—
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	—
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	—
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	—

Analytical Results

Sub-Matrix: SOIL

Compound	CAS Number	LOR	Unit	Client sample ID: DUP509	DUP507	DUP601	DUP603	—
				Client sampling date / time: 26-FEB-2009 15:00	26-FEB-2009 15:00	27-FEB-2009 15:00	27-FEB-2009 15:00	—
				ES0902947-001	ES0902947-002	ES0902947-003	ES0902947-004	—
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	—
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	—
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	—
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	—
Benz[a]anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	—
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	—
Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	—
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	—
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	—
Indeno(1.2.3-cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	—
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	—
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	—
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	—	10	mg/kg	—	—	<10	<10	—
C10 - C14 Fraction	—	50	mg/kg	<50	<50	<50	<50	—
C15 - C28 Fraction	—	100	mg/kg	<100	<100	<100	<100	—
C29 - C36 Fraction	—	100	mg/kg	<100	<100	<100	<100	—
EP080: BTEX								
Benzene	71-43-2	0.2	mg/kg	—	—	<0.2	<0.2	—
Toluene	108-88-3	0.5	mg/kg	—	—	<0.5	<0.5	—
Ethylbenzene	100-41-4	0.5	mg/kg	—	—	<0.5	<0.5	—
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	—	—	<0.5	<0.5	—
ortho-Xylene	95-47-6	0.5	mg/kg	—	—	<0.5	<0.5	—
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.1	%	94.5	—	—	—	—
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.1	%	102	—	—	—	—
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	94.0	94.7	77.6	80.9	—
2-Chlorophenol-D4	93951-73-6	0.1	%	78.8	80.1	67.2	68.5	—
2.4.6-Tribromophenol	118-79-6	0.1	%	82.7	85.8	70.7	74.8	—
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	91.8	93.9	78.6	81.6	—
Anthracene-d10	1719-06-8	0.1	%	87.5	91.0	74.8	79.7	—
4-Terphenyl-d14	1718-51-0	0.1	%	91.3	92.8	76.1	80.4	—
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.1	%	—	—	92.7	96.6	—

Analytical Results

Sub-Matrix: SOIL

Compound	CAS Number	LOR	Unit	Client sample ID: DUP608	DUP607	DUP601	DUP603	—
				Client sampling date / time: 26-FEB-2009 15:00	26-FEB-2009 15:00	27-FEB-2009 15:00	27-FEB-2009 15:00	—
				ES0902947-001	ES0902947-002	ES0902947-003	ES0902947-004	—
EP080S: TRH(C6-C10)/BTEXS (Surrogate) - Continued								
Toluene-D8	2037-26-5	0.1	%	—	—	95.7	84.1	—
4-Bromofluorobenzene	460-00-4	0.1	%	—	—	83.3	82.2	—

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055-103	SOIL	A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (1999) Schedule B(3) (Method 102)
Total Metals by ICP-AES	EG005T	SOIL	(APHA 21st ed., 3120; USEPA SW 846 - 6010) (ICPAES) Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (1999) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	AS 3550, APHA 21st ed., 3112 Hg - B (Flow-Injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (1999) Schedule B(3)
Pesticides by GCMS	EP068	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (1999) Schedule B(3) (Method 504,505)
TPH - Semivolatile Fraction	EP071	SOIL	(USEPA SW 846 - 8015A) Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (1999) Schedule B(3) (Method 506.1)
PAH/Phenols (SIM)	EP075(SIM)	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Method 502 and 507)
TPH Volatiles/BTEX	EP090	SOIL	(USEPA SW 846 - 8260B) Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (1999) Schedule B(3) (Method 501)
Preparation Methods	**Method**	**Matrix**	**Method Descriptions**
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	USEPA 200.2 Mod. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (1999) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	* ORG16	SOIL	(USEPA SW 846 - 5030A) 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids (Option A - Concentrating)	ORG17A	SOIL	In-house, Mechanical agitation (tumbler). 20g of sample, Na2SO4 and surrogate are extracted with 150mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Tumbler Extraction of Solids (Option B - Non-concentrating)	ORG17B	SOIL	In-house, Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 20mL 1:1 DCM/Acetone by end over end tumble. The solvent is transferred directly to a GC vial for analysis.

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

* Asbestos Identification

Samples were analysed by Polarised Light Microscopy including dispersion staining

Legend for Asbestos Type
Am Amosite (brown asbestos) detected
Ch Chrysotile (white asbestos) detected
Cr Crocidolite (blue asbestos) detected
UMF Unknown mineral fibres detected
- No asbestos fibres detected
(t) Trace levels detected

Confirmation by alternative techniques is recommended for samples where unknown mineral fibres are detected.

Analytical Results

Sub-Matrix: SOIL

265-0.4-1.0 268-1.9-2.0

Compound	CAS Number	LOR	Unit	Client sample ID: DUP 800	Client sample ID: DUP 802			
				Client sampling date / time: 10-SEP-2009 15:00	10-SEP-2009 15:00			
				ES0913607-001	ES0913607-002			
ASB60 - 2004 Identification of Asbestos in soil Samples								
Asbestos Detected	1332-21-4	0.1	g/kg	No	No			
Asbestos Type	132207-33-1	0.1	g/kg	-	-			
Sample weight (dry)	---	0.01	g	102	97.8			
APPROVED IDENTIFIER:	---	-	-	P.RENNIE	P.RENNIE			
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	---	1.0	%	11.0	8.7			
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5			
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5			
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5			
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5			
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5			
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5			
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5			
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5			
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5			
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5			
Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5			
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5			
Benzo(e)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5			
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5			
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5			
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5			
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	97.0	93.0			
2-Chlorophenol-D4	93951-73-6	0.1	%	95.2	91.2			
2,4,6-Tribromophenol	118-79-6	0.1	%	80.9	79.4			
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	96.5	91.0			
Anthracene-d10	1719-06-8	0.1	%	98.7	93.5			
4-Terphenyl-d14	1718-51-0	0.1	%	102	96.4			

Analytical Results

Descriptive Results

Sub-Matrix: SOIL

Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
AS 4964 - 2004: Identification of Asbestos in bulk samples		
EA200: Description	DUP 800 - 10-SEP-2009 15:00	Pale brown soil with red-brown and grey inclusions and several large rocks
EA200: Description	DUP 802 - 10-SEP-2009 15:00	Pale brown soil with red-brown and grey inclusions and several large rocks

Report No. : 6E1198

Please note: Where samples are collected/submitted over several days, the date on which the last samples were analysed or extracted is reported.
Unless Ferrous Iron is determined on site, the possibility of a ferrous-ferric ratio change may occur.

Method	Description	Extracted	Analysed	Authorised	
E7500	Moisture (%w/w)	13/04/06	18/04/06	GTO	096
E1230	TPH C6-C9 by Purge and Trap	13/04/06	19/04/06	GTO	094
E1221	TPH (C10-C36)	13/04/06	18/04/06	GTO	095
E5910	Metals by ICP-AES	13/04/06	19/04/06	DLU	093
E5950	Mercury in Soil	13/04/06	19/04/06	DLU	093
E1110	Polycyclic Aromatic Hydrocarbons	13/04/06	24/04/06	WME	095
E1080	Organochlorine Pesticides	13/04/06	19/04/06	LSC	095
E0230	TPH C6-C9 by purge and trap	18/04/06	18/04/06	GTO	094
E0221F	TPH (C10-C36)	13/04/06	19/04/06	GTO	095
E4970	Total Metals by ICP-MS	13/04/06	19/04/06	DLU	093
E4950	Mercury	13/04/06	19/04/06	DLU	093
E0110	Polycyclic Aromatic Hydrocarbons	13/04/06	19/04/06	WME	095

NATA Signatories
(AGR) Alison Graham, (DBL) Dianne Blane, (DLU) Darrel Luck, (GTO) Greg Towers,
(MAV) Merrin Avery, (NCO) Nathan Cooper, (WME) Melanie Wade, (LSC) Lachlan Schwarz

amdel

Job Number : 6E1198

Client : Coffey Geosciences Pty Ltd

Reference : SE00128/01-6

Project : SE00128/01-6 10 APRIL-C COC: 33673-74

Analyte	Lab No	E259457	E259458	E259461	E259462	E259464
		Z6_HA117	Z6_HA117	Z6_HA118	Z6_HA118	Z6_HA119
	Sample Id	0.0-0.1	0.2-0.3	0.0-0.1	0.2-0.3	0.0-0.1
	PQL					
E5910 Metals in Soil						
Arsenic	5	6	250	39	10	71
Cadmium	0.5	nd	nd	nd	nd	nd
Chromium	5	25	14	21	23	20
Copper	5	24	44	24	29	33
Nickel	2	7	21	23	26	23
Lead	5	130	1400	36	31	41
Zinc	5	180	410	75	80	130
E5950 Mercury in Soil						
Mercury	0.05	0.27	0.09	nd	0.06	0.05

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = < PQL
- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

Refer to Amdel standard laboratory qualifier codes for comments.

amdel

Job Number : 6E1198

C pt : Coffey Geosciences Pty Ltd

Reference : SE00128/01-6

Project : SE00128/01-6 10 APRIL-C COC: 33673-74

Analyte	Lab No	E259457	E259458	E259461	E259462	E259464
		Z6_HA117	Z6_HA117	Z6_HA118	Z6_HA118	Z6_HA119
	Sample Id	0.0-0.1	0.2-0.3	0.0-0.1	0.2-0.3	0.0-0.1
	PQL					
E1110 Priority PAH's in Soil						
Naphthalene	0.5	nd	nd	nd	nd	nd
Acenaphthylene	0.5	nd	nd	nd	nd	nd
Acenaphthene	0.5	nd	nd	nd	nd	nd
Fluorene	0.5	nd	nd	nd	nd	nd
Phenanthrene	0.5	0.5	nd	nd	nd	nd
Anthracene	0.5	nd	nd	nd	nd	nd
Fluoranthene	0.5	1.2	0.5	nd	nd	nd
Pyrene	0.5	1.2	0.5	nd	nd	nd
Benz(a)anthracene	0.5	0.6	nd	nd	nd	nd
Chrysene	0.5	0.6	nd	nd	nd	nd
Benzo(b) & (k)fluoranthene	1	1	nd	nd	nd	nd
Benzo(a)pyrene	0.5	0.9	nd	nd	nd	nd
Indeno(1.2.3-cd)pyrene	0.5	0.6	nd	nd	nd	nd
Dibenz(a.h)anthracene	0.5	nd	nd	nd	nd	nd
Benzo(g.h.i)perylene	0.5	nd	nd	nd	nd	nd
Total USEPA Priority PAHs	0.5	7.0	1.0	nd	nd	nd
2-Fluorobiphenyl-SURROGATE	1	119%	108%	104%	105%	105%
Anthracene-d10-SURROGATE	1	111%	99%	96%	101%	96%
p-Terphenyl-D14-SURROGATE	1	116%	103%	103%	109%	106%

PQL = Practical Quantitation Limit
LNR = Samples Listed not Received
nd = <PQL
- = Not Applicable

Soils : mg/kg (ppm) dry weight unless otherwise specified
Waters : mg/L (ppm) unless otherwise specified in Method Header
Leachates : mg/L (ppm) in leachate unless otherwise specified in Method Header

Refer to Amdel standard laboratory qualifier codes for comments.

Batch: AES46884
Sub Batch: 0
Date of Issue: 07/06/2004
Client: URS AUSTRALIA PTY LTD
Client Reference:

CERTIFICATE OF ANALYSIS

METHOD	ANALYSIS DESCRIPTION	UNIT	LOR	Laboratory I.D.	38	39	40	41	42	43	44	45	46	47
				Date Sampled	28/03/2004	28/03/2004	28/03/2004	28/03/2004	28/03/2004	28/03/2004	28/03/2004	28/03/2004	28/03/2004	28/03/2004
				SAMPLE IDENTIFICATION	ZS_QC01	ZS_TP9_ 3.0-3.1	ZS_TP11_ 0.9-1.1	ZS_TP11_ 2.5-2.6	ZS_T24_0.3	ZS_TP9_ 0.9-1.1	ZS_TP9_ 4.0-4.1	ZS_TP13_ 0.0-0.1	ZS_QC02	ZS_TP13_ 0.5-0.6
EA-055	Moisture Content (dried @ 103°C)	%	0.1		20.8	20.5	10.8	10.1	---	3.2	19.5	5.3	15.4	24.7
EG-005T	Arsenic - Total	mg/kg	1		4	13	5	8	<1	2	7	8	4	75
EG-005T	Cadmium - Total	mg/kg	1		<1	<1	<1	<1	<1	1	<1	1	<1	<1
EG-005T	Chromium - Total	mg/kg	1		6	7	18	11	2	41	11	67	63	10
EG-005T	Copper - Total	mg/kg	1		23	45	31	39	5	33	15	97	33	38
EG-005T	Nickel - Total	mg/kg	1		23	14	25	21	4	101	1	90	75	22
EG-005T	Lead - Total	mg/kg	1		38	13	30	20	6	2	8	166	66	20
EG-005T	Zinc - Total	mg/kg	1		84	59	123	73	16	37	14	113	70	90
EG-035T	Mercury - Total	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Batch: AES46664
Sub Batch: 3
Date of Issue: 07/06/2004
Client: URS AUSTRALIA PTY LTD
Client Reference:

CERTIFICATE OF ANALYSIS

METHOD	ANALYSIS DESCRIPTION	UNIT	LOR	Laboratory I.D.	SAMPLE IDENTIFICATION								
				Date Sampled	30	31	32	34	35	37	38	42	43
					26/03/2004	26/03/2004	26/03/2004	26/03/2004	26/03/2004	26/03/2004	26/03/2004	26/03/2004	26/03/2004
					Z1C_QC12	Z1C_TP12_ RUBBISH	Z1_TP23_ 0.0-0.2	Z2_TP02_ 0.0-0.2	Z2_QC01	Z8_TP9_ 0.0-0.1	Z8_QC01	Z5_T24_0.3	Z5_TP9_ 0.0-0.1
EA-055	Moisture Content (dried @ 103°C)	%	0.1		29.6	28.0	14.1	19.8	19.3	26.2	26.0	—	5.3
EP-068A-SS	ORGANOCHLORINE PESTICIDES												
EP-068A-SS	alpha-BHC	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068A-SS	HCB	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068A-SS	beta-BHC & gamma-BHC	mg/kg	0.1		<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1
EP-068A-SS	delta-BHC	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068A-SS	Heptachlor	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068A-SS	Aldrin	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068A-SS	Heptachlor epoxide	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068A-SS	Chlordane - trans	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068A-SS	Endosulfan 1	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068A-SS	Chlordane - cis	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068A-SS	Dieldrin	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068A-SS	DDE	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068A-SS	Endrin	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068A-SS	Endosulfan 2	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068A-SS	DDD	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068A-SS	Endrin aldehyde	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068A-SS	Endosulfan sulfate	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068A-SS	DDT	mg/kg	0.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
EP-068A-SS	Endrin ketone	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068A-SS	Methoxychlor	mg/kg	0.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
EP-068B-SS	ORGANOPHOSPHORUS PESTICIDES												
EP-068B-SS	Dichlorvos	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068B-SS	Demeton-S-methyl	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068B-SS	Monocrotophos	mg/kg	0.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
EP-068B-SS	Dimethoate	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068B-SS	Diazinon	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068B-SS	Chlorpyrifos-methyl	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068B-SS	Parathion-methyl	mg/kg	0.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
EP-068B-SS	Malathion	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068B-SS	Fenthion	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068B-SS	Chlorpyrifos	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-068B-SS	Ethion	mg/kg	0.2		<0.2	<0.2	<0.2	<0.2	2	<0.2	<0.2	<0.2	<0.2

Batch: AES46864
Sub Batch: 3
Date of Issue: 07/06/2004
Client: URS AUSTRALIA PTY LTD
Client Reference:

CERTIFICATE OF ANALYSIS

METHOD	ANALYSIS DESCRIPTION	UNIT	LOR	Laboratory I.D.	SAMPLE IDENTIFICATION								
					30	31	32	34	36	37	38	42	43
	Date Sampled				26/03/2004	26/03/2004	26/03/2004	26/03/2004	26/03/2004	26/03/2004	26/03/2004	26/03/2004	26/03/2004
					Z1C_QC12	Z1C_TP12_ RUBBISH	Z2_TP33_ 0.0-0.2	Z2_TP02_ 0.8-0.2	Z2_QC01	Z5_TP6_ 0.0-0.1	Z5_QC01	Z5_T24_0.3	Z5_TP6_ 0.0-0.1
EP-065B-SS	Pirimiphos-ethyl	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-065B-SS	Chlorfenvinphos E	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-065B-SS	Chlorfenvinphos Z	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-065B-SS	Bromophos-ethyl	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-065B-SS	Fenamiphos	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-065B-SS	Prothiofos	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-065B-SS	Ethion	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-065B-SS	Carbophenothion	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-065B-SS	Azinphos-methyl	mg/kg	0.05		<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.10	<0.05
EP-065S-SS	ORGANOCHLORINE PESTICIDE SURROGATE												
EP-065S-SS	Dibromo-DDE	%	1		100	75	71	99	92	94	84	Not Det'd	100
EP-065T-SS	ORGANOPHOSPHORUS PESTICIDE SURROGATE												
EP-065T-SS	DEF	%	1		85	82	53	43	39	94	88	Not Det'd	106

Batch: AES46664
Sub Batch: 5
Date of Issue: 07/06/2004
Client: URS AUSTRALIA PTY LTD
Client Reference:

CERTIFICATE OF ANALYSIS

				SAMPLE IDENTIFICATION										
	Laboratory I.D.			37	38	39	40	41	42	43	44	45	46
	Date Sampled			26/03/2004	26/03/2004	26/03/2004	26/03/2004	26/03/2004	26/03/2004	26/03/2004	29/03/2004	29/03/2004	29/03/2004
METHOD	ANALYSIS DESCRIPTION	UNIT	LOR	Z6_TP6_ 0.0-0.1	Z6_QC01	Z6_TP5_ 3.0-3.1	Z6_TP11_ 0.0-0.1	Z6_TP11_ 2.5-2.6	Z5_T24_0.3	Z6_TP6_ 0.0-0.1	Z6_TP6_ 4.0-4.1	Z6_TP13_ 0.0-0.1	Z6_QC02
A-055	Moisture Content (dried @ 103°C)	%	0.1	26.2	26.0	20.9	10.8	10.1	---	5.3	19.5	5.3	15.4
P-071-SS	TOTAL PETROLEUM HYDROCARBONS												
P-071-SS	C6 - C9 Fraction	mg/kg	2	<2	<2	<2	<2	<2	6	<2	<2	2	<2
P-071-SS	C10 - C14 Fraction	mg/kg	50	<50	<50	<50	<50	<50	6290	<50	<50	<50	<50
P-071-SS	C15 - C28 Fraction	mg/kg	100	187	362	<100	<100	<100	63.5g/kg	<100	<100	163	161
P-071-SS	C29 - C36 Fraction	mg/kg	100	155	335	<100	<100	<100	19.4g/kg	<100	<100	463	461
P-080-SS	BTEX												
P-080-SS	Benzene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
P-080-SS	Toluene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2	<0.2	<0.2	<0.2	<0.2
P-080-SS	Chlorobenzene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
P-080-SS	Ethylbenzene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.8	<0.2	<0.2	<0.2	<0.2
P-080-SS	meta- & para-Xylene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.7	<0.2	<0.2	<0.2	<0.2
P-080-SS	ortho-Xylene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.3	<0.2	<0.2	<0.2	<0.2
P-080S-SS	VOLATILE TPH/BTEX COMPOUND SURROGATES												
P-080S-SS	1,2-Dichloroethane-D4	%	1	83	95	92	92	88	110	94	88	93	92
P-080S-SS	Toluene-D8	%	1	100	100	102	93	94	105	95	100	101	95
P-080S-SS	4-Bromofluorobenzene	%	1	101	97	102	92	93	94	99	102	98	98

Batch: AES46664
Sub Batch: 7
Date of Issue: 07/06/2004
Client: URS AUSTRALIA PTY LTD
Client Reference:

CERTIFICATE OF ANALYSIS

				SAMPLE IDENTIFICATION									
	Laboratory I.D.			33	35	39	42	43	45	46	47		
	Date Sampled			26/03/2004	29/03/2004	26/03/2004	26/03/2004	29/03/2004	29/03/2004	29/03/2004	29/03/2004		
METHOD	ANALYSIS DESCRIPTION	UNIT	LOR	Z2_TP13_ 3.0-3.2	Z2_TP02_ 1.0-1.2	Z6_TP6_ 3.0-3.1	Z6_T24_0.3	Z6_TP9_ 0.0-0.1	Z6_TP13_ 0.0-0.1	Z6_QC02	Z6_TP13_ 0.5-0.6		
A-055	Moisture Content (dried @ 103°C)	%	0.1	23.0	11.6	20.5	—	5.3	9.3	15.4	24.7		
P-075B-SA	POLYNUCLEAR AROMATIC HYDROCARBONS (Soil)												
P-075B-SA	Naphthalene	mg/kg	0.5	<0.5	<0.5	<0.5	1380	<0.5	<0.5	<0.5	<0.5		
P-075B-SA	Acenaphthylene	mg/kg	0.5	<0.5	<0.5	<0.5	20.3	<0.5	<0.5	<0.5	<0.5		
P-075B-SA	Acenaphthene	mg/kg	0.5	<0.5	<0.5	<0.5	1030	<0.5	<0.5	<0.5	<0.5		
P-075B-SA	Fluorene	mg/kg	0.5	<0.5	<0.5	<0.5	728	<0.5	<0.5	<0.5	<0.5		
P-075B-SA	Phenanthrene	mg/kg	0.5	<0.5	<0.5	<0.5	4130	<0.5	<0.5	<0.5	<0.5		
P-075B-SA	Anthracene	mg/kg	0.5	<0.5	<0.5	<0.5	1120	<0.5	<0.5	<0.5	<0.5		
P-075B-SA	Fluoranthene	mg/kg	0.5	<0.5	<0.5	<0.5	1610	<0.5	<0.5	<0.5	<0.5		
P-075B-SA	Pyrene	mg/kg	0.5	<0.5	<0.5	<0.5	2500	<0.5	<0.5	0.8	<0.5		
P-075B-SA	Benzo(a)anthracene	mg/kg	0.5	<0.5	<0.5	<0.5	953	<0.5	<0.5	0.7	<0.5		
P-075B-SA	Chrysene	mg/kg	0.5	<0.5	<0.5	<0.5	885	<0.5	<0.5	<0.5	<0.5		
P-075B-SA	Benzo(b)fluoranthene	mg/kg	0.5	<0.5	<0.5	<0.5	469	<0.5	<0.5	<0.5	<0.5		
P-075B-SA	Benzo(k)fluoranthene	mg/kg	0.5	<0.5	<0.5	<0.5	164	<0.5	<0.5	<0.5	<0.5		
P-075B-SA	Benzo(a)pyrene	mg/kg	0.5	<0.5	<0.5	<0.5	809	<0.5	<0.5	<0.5	<0.5		
P-075B-SA	Indeno(1,2,3-cd)pyrene	mg/kg	0.5	<0.5	<0.5	<0.5	184	<0.5	<0.5	<0.5	<0.5		
P-075B-SA	Dibenzo(a,h)anthracene	mg/kg	0.5	<0.5	<0.5	<0.5	64.8	<0.5	<0.5	<0.5	<0.5		
P-075B-SA	Benzo(g,h,i)perylene	mg/kg	0.5	<0.5	<0.5	<0.5	208	<0.5	<0.5	<0.5	<0.5		
P-075T-AS	PAH SURROGATES (Soil)												
P-075T-AS	2-Fluorobiphenyl	%	1	81	95	88	Not Def'd	98	94	88	86		
P-075T-AS	Anthracene-d10	%	1	88	103	97	Not Def'd	99	93	95	89		
P-075T-AS	4-Terphenyl-d14	%	1	86	109	106	Not Def'd	107	104	101	104		

Batch: AES46785
Sub Batch: 2
Date of Issue: 05/05/2004
Client: URS AUSTRALIA PTY LTD
Client Reference:

CERTIFICATE OF ANALYSIS

		Laboratory I.D.		3	4	12	17	19					
		Date Sampled		02/04/2004	02/04/2004	02/04/2004	02/04/2004	02/04/2004					
				SAMPLE IDENTIFICATION									
METHOD	ANALYSIS DESCRIPTION	UNIT	LOR	ZA_BH07_ 1.2-1.4	ZA_BH07_ 2.2-2.4	ZB_TP29_ 0.0-0.1	ZB_TP39_ 0.5-0.6	ZB_TP36_ 0.5-0.6					
EA-055	Moisture Content (dried @ 103°C)	%	0.1	5.3	19.7	6.6	13.2	9.8					
EP-066-SS	Total Polychlorinated biphenyls	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1					
EP-066S-SS	POLYCHLORINATED BIPHENYL SURROGATE												
EP-066S-SS	Decachlorobiphenyl	%	1	64	87	90	87	94					

ALS Environmental

ORGANICS QUALITY CONTROL REPORT

BATCH NO: ES46864

CLIENT: URS Australia Pty Ltd

PROJECT: 18240-058

DATE BATCH RECEIVED: 02/04/2004

DATE BATCH COMPLETED: 17/04/2004

Method Code	Test	Matrix	Method Reference		QC Lot Number	Date Samples Extracted	Date Samples Analysed
			Extraction	Analysis			
EP-066	PCB	Soil	Tumbler	USEPA 8270B	NPCBS765	08/04/04	09/04/04
EP-068	Pesticides	Water	USEPA 3510B	USEPA 8270B	NOCOPW422	02/04/04	08/04/04
EP-068	Pesticides	Soil	Tumbler	USEPA 8270B	NOCOPS1648	08/04/04	12/04/04
EP-071	TPH(SV)	Water	USEPA 3510B	USEPA 8015A	NTPHW1865	02/04/04	09/04/04
EP-071	TPH(SV)	Soil	Tumbler	USEPA 8015A	NTPHT4915	08/04/04	12/04/04
EP-071	TPH(SV)	Soil	Tumbler	USEPA 8015A	NTPHT4917	08/04/04	12/04/04
EP-071	TPH(SV)	Soil	Tumbler	USEPA 8015A	NTPHT4918	08/04/04	12/04/04
EP-071/80	TPH(V)/BTEX	Water	USEPA 5030A	USEPA 8260B	NVOCW1865	07/04/04	07/04/04
EP-071/80	TPH(V)/BTEX	Soil	USEPA 5030A	USEPA 8260B	NVOCS4916	07/04/04	09/04/04
EP-071/80	TPH(V)/BTEX	Soil	USEPA 5030A	USEPA 8260B	NVOCS4917	07/04/04	09/04/04
EP-071/80	TPH(V)/BTEX	Soil	USEPA 5030A	USEPA 8260B	NVOCS4918	07/04/04	09/04/04
EP-075	Semivolatile	Soil	Tumbler	USEPA 8270B	NSVOCS2004	08/04/04	12/04/04
EP-075SA	PAH/Phenols	Soil	Tumbler	USEPA 8270C	NEP075S-312	08/04/04	13/04/04
EP-075WA	PAH/Phenols	Water	USEPA 3510B	USEPA 8270C	NEP075W-112	02/04/04	08/04/04

Where applicable, internal standards are added to sample extracts prior to instrumental analysis. Absolute peak areas and retention times fall within the criteria specified in the individual methods. Continuing Calibration (CC) standards are run at the frequency of 1 in every 20 samples.

Abbreviations: SV = semivolatile, V = volatile

*: In-house methods

AUSTRALIAN SAFER ENVIRONMENT & TECHNOLOGY PTY LTD

ABN 36 084 693 112

Our ref: ASET3859/ 5590 / 1 - 4
Your ref:ES46680
NATA Accreditation No: 14484

10 May 2004

Australian Laboratory Services Pty Ltd,
277,Woodpark Road
Smithfield,
NSW 2164.

Fax No:02-87848500
Attn:Mr Greg Vogel

Dear Greg,

This report presents the results of four samples, forwarded by Australian Laboratory Services Pty Ltd, on 6 April 2004, for analysis for asbestos. This report supersedes the report forwarded on 6 April 2004.

1.Introduction:Four samples forwarded were examined and analysed for the presence of asbestos.

2. Methods : The samples were examined under a Stereo Microscope and selected fibres were analysed by Polarized Light Microscopy inconjunction with dispersion Staining method (Safer Environment Method 1.)

3. Results :

Sample No. 1. ASET3859 / 5590 / 1. #14 - ES46680 - Z6 - BH02 - 0.2 - 0.5.
Approx dimensions 5.5 cm x 1.0 cm x 0.35 cm
The sample consisted of mixture of soil and stones.
No asbestos detected.

Sample No. 2. ASET3859 / 5590 / 2. #51 - ES46680 - Z6 - TP18 - 0.0 - 0.1.
Approx dimensions 5.5 cm x 2.0 cm x 0.35 cm
The sample consisted of mixture of soil and stones.
No asbestos detected.

Sample No. 3. ASET3859 / 5590 / 3. #55 - ES46680 - Z6 - TP16 - 0.0 - 0.1.
Approx dimensions 5.0 cm x 1.5 cm x 0.5 cm
The sample consisted of mixture of clayish soil, stones and plant matter.
No asbestos detected.

SUITE 1, LEVEL 1 "THE WALK" CNR PACIFIC HWY & EDGEWORTH DAVID AVE, HORNSBY NSW 2077 - P.O. BOX 1644 HORNSBY NORTHGATE NSW 1635.
PHONE: (02) 9987 2183 FAX: (02) 9987 2151 EMAIL: aset@matra.com.au WEBSITE: aset.com.au

Sample No. 4. ASET3859 / 5590 / 4. #58 - ES46680 - Z6 - TP13 - 0.3 - 0.2.
Approx dimensions 5.5 cm x 1.25 cm x 0.35 cm
The sample consisted of mixture of soil and stones.
No asbestos detected.

NATA Accredited Laboratory
Number: 14467

This test, calibration or inspection covered by this document has been performed in accordance with NATA's requirements which include the requirements of ISO/IEC 17025 and are traceable to Australian national standards of measurement. This document shall not be reproduced, except in full.

Analysed and reported by,

Chameen Battegoda
Approved Analyst

Mahen De Silva . BSc. MSc. Grad Dip (Occ Hyg)
Occupational Hygienist / Approved Signatory.

Table 1: Summary of Borehole Information

Sample Point	Date Drilled/Sampled	Easting	Northing	Ground Level (mAHD)	Termination Depth (m)	RL (mAHD)	Depth of analysed sample (m)
BH1	13-Jul	318242	6247380	56	19	37	2.0-2.2
BH2	13-Jul	318287	6247448	56	12	44	1.3-1.5
BH3	14-Jul	318258	6247503	56	10.2	45.8	2.0-2.2
BH4	17-Jul	318223	6247391	56	7.5	48.5	0.8-0.9
BH5	18-Jul	318241	6247414	56	8	48	0.4-0.6
BH6	17-Jul	318286	6247470	56	8	48	1.2-1.3 / 7.6-7.7
BH7	17-Jul	318305	6247481	55	7.5	47.5	2.0-2.1
BH8	17-Jul	318304	6247515	55	8	47	1.6-1.7
BH9	17-Jul	318249	6247480	55	7.4	47.6	1.1-1.2 / 5.3-5.4
BH10	17-Jul	318286	6247503	55	8	47	2.0-2.1 / 6.0-6.1
BH11	18-Jul	318297	6247415	55	8	47	1.9-2.0 / 3.5-3.6
BH12	18-Jul	318297	6247381	54	7	47	0.5-0.6 / 5.0-5.1
BH13	18-Jul	318269	6247403	55	7.5	47.5	2.8-2.9
BH14	18-Jul	318277	6247448	56	8.2	47.8	2.4-2.5
BH15	18-Jul	318240	6247447	56	8.5	47.5	1.0-1.1 / 5.6-5.8

Note: Borehole coordinates were estimated using Google Maps and elevation was approximated from Google Earth.

Table 2: Groundwater Gauging Data

Well ID	Date	Coordinates		Top of Casing (TOC) Elevation	Ground Elevation	Measured Total Depth of Well	Depth to Water	Groundwater elevation	Depth to Product	Thickness of product	Corrected Groundwater Elevation
		Easting	Northing	m AHD	m AHD	m bgs	m BTOC	m AHD	m BTOC	m	m AHD
BH2	13-Jul-17	318287	6247448	55.93	56	11.790	9.202	46.728	-	0	46.728
BH3	14-Jul-17	318258	6247503	55.92	56	10.02	8.206	47.714	-	0	47.714

Note: Borehole coordinates were estimated using Google Maps and elevation was approximated from Google Earth.

Table 3a: Containers, preservation requirements, holding times and samples analysed - soil

Parameter	Container	Recommended Preservation	Maximum holding time	Number of samples analysed
Acid digestible metals and metalloids - Total and TCLP (As,Cd,Cu,Cr,Ni,Pb,Zn)	Glass with Teflon lid	Cool to <6°C	6 months	15
Mercury	Glass with Teflon lid	Cool to <6°C	28 days	15
Asbestos	Bag	Nil	Indefinite	15
TPH/BTEX	Glass with Teflon lid	4oC, zero headspace	14 days	23
PAHs (total and TCLP)	Glass with Teflon lid	4oC	14 days [1]	15
OCPs	Glass with Teflon lid	Cool to <6°C	14 days	15
OPPs	Glass with Teflon lid	Cool to <6°C	14 days	15
PCBs	Glass with Teflon lid	Cool to <6°C, dark	28 days	15
Total Organic Carbon	Glass with Teflon lid	pH <2 (H2SO4 or HCl) + Cool to <6°C, dark	28 days	8
Note 1: Extraction within 14 days. Analysis within 40 days.				

Table 3b: Containers, preservation requirements, holding times and samples analysed - groundwater

Parameter	Container	Recommended Preservation	Maximum holding time	Number of samples analysed
Dissolved metals and metalloids (As,Cd,Cu,Cr,Ni,Pb,Zn)	Glass with Teflon lid	Cool to <6°C	6 months	2
Mercury	Glass with Teflon lid	Cool to <6°C	28 days	2
TPH/BTEX	Glass with Teflon lid	4oC, zero headspace	14 days	2
PAHs	Glass with Teflon lid	4oC	14 days	2
OCPs	Glass with Teflon lid	Cool to <6°C	7 days	2
OPPs	Glass with Teflon lid	Cool to <6°C	7days	2
PCBs	Glass with Teflon lid	Cool to <6°C, dark	7days	2
Note 1: Extraction within 14 days. Analysis within 40 days.				

Table 4: Analytical parameters, PQLs and methods - Soil

Parameter	Unit	PQL	Method based on
Metals in Soil			
As [1]	mg kg^{-1}	4	USEPA 200.7
Cd [1]	mg kg^{-1}	0.4	USEPA 200.7
Cr [1]	mg kg^{-1}	1	USEPA 200.7
Cu [1]	mg kg^{-1}	1	USEPA 200.7
Hg [2]	mg kg^{-1}	0.1	USEPA 7471A
Ni [1]	mg kg^{-1}	1	USEPA 200.7
Pb [1]	mg kg^{-1}	1	USEPA 200.7
Zn [1]	mg kg^{-1}	1	USEPA 200.7
Total Petroleum Hydrocarbons (TPH) in Soil			
C_6-C_9 fraction	mg kg^{-1}	25	USEPA 8015B
C_{10}-C_{14} fraction	mg kg^{-1}	50	USEPA 8015B
C_{15}-C_{28} fraction	mg kg^{-1}	100	USEPA 8015B
C_{29}-C_{36} fraction	mg kg^{-1}	100	USEPA 8015B
BTEX in Soil			
Benzene	mg kg^{-1}	0.2	USEPA 8021A
Toluene	mg kg^{-1}	0.5	USEPA 8021A
Ethylbenzene	mg kg^{-1}	1	USEPA 8021A
m&p-xylene	mg kg^{-1}	2	USEPA 8021A
o-xylenes	mg kg^{-1}	1	USEPA 8021A
Organic Contaminants in Soil			
PAHs	mg kg^{-1}	0.1	USEPA 8270 SIM
Organochlorine Pesticides (OPC) in Soil			
OCPs	mg kg-1	0.1	USEPA 8081
Organophosphate Pesticides (OPP) in Soil			
OPPs	mg kg-1	0.1	USEPA 8270 or 8141
Polychlorinated Biphenyls (PCB) in Soil			
PCBs	mg kg-1	0.1	USEPA 8082
Asbestos in Soil			
Asbestos in Soil	g/kg	0.1	AS4964-2004

Note 1: Acid soluble metals by ICP-AES.

Note 2: Total recoverable mercury.

Table 5: Analytical parameters, PQLs and methods - Groundwater

Parameter	Unit	PQL	Method based on
Dissolved Metals in Groundwater			
As [1]	mg L^{-1}	1	USEPA 200.7
Cd [1]	mg L^{-1}	0.1	USEPA 200.7
Cr [1]	mg L^{-1}	1	USEPA 200.7
Cu [1]	mg L^{-1}	1	USEPA 200.7
Hg [2]	mg L^{-1}	0.05	USEPA 7471A
Ni [1]	mg L^{-1}	1	USEPA 200.7
Pb [1]	mg L^{-1}	1	USEPA 200.7
Zn [1]	mg L^{-1}	1	USEPA 200.7
Total Petroleum Hydrocarbons (TPH) in Groundwater			
C_6-C_9 fraction	µg L^{-1}	10	USEPA 8015B
C_{10}-C_{14} fraction	µg L^{-1}	50	USEPA 8015B
C_{15}-C_{28} fraction	µg L^{-1}	100	USEPA 8015B
C_{29}-C_{36} fraction	µg L^{-1}	100	USEPA 8015B
BTEX in Groundwater			
Benzene	µg L^{-1}	1	USEPA 8021A
Toluene	µg L^{-1}	1	USEPA 8021A
Ethylbenzene	µg L^{-1}	1	USEPA 8021A
m&p-xylene	µg L^{-1}	2	USEPA 8021A
o-xylenes	µg L^{-1}	1	USEPA 8021A
Organic Contaminants in Groundwater			
PAHs	µg L^{-1}	1	USEPA 8270 SIM
Organochlorine Pesticides (OPC) in Groundwater			
OCPs	µg L^{-1}	0.2	USEPA 8081
Organophosphate Pesticides (OPP) in Groundwater			
OPPs	µg L^{-1}	0.2	USEPA 8270 or 8141
Polychlorinated Biphenyls (PCB) in Groundwater			
PCBs	µg L^{-1}	2	USEPA 8082

Note 1: Acid soluble metals by ICP-AES.

Note 2: Total recoverable mercury.

Table 6: Site Assessment Criteria - Soil and Groundwater

Contaminant	HIL (Setting A)[1] (mg/kg)	HSL (Settings A & B)[2] (mg/kg)	EIL (urban residential and public open space)[3] (mg/kg)	ESL (Urban Residential and public open space)[4] (mg/kg)	CT1 Values - General Solid Waste[1] (mg/kg)	CT2 Values - Restricted Solid Waste[2] (mg/kg)
TRH C6 - C9					**650**	**2600**
TRH C6 - C10						
FRACTION 1		**50**		**180**		
TRH C10 - C14						
TRH C15 - C28						
TRH C29 - C36						
TRH total C10 - C36						
TRH C10-C36						
TRH >C10-C16						
FRACTION 2		**280**		**120**		
TRH >C16-C34				**1300**		
TRH >C34-C40				**5600**		
TRH total >C10-C40					**10000**	**40000**
Benzene		**0.7**		**65**	**10**	**40**
Toluene		**480**		**105**	**288**	**1152**
Ethylbenzene				**125**	**600**	**2400**
m+p-xylene						
o-Xylene						
Xylenes		**110**		**45**	**1000**	**4000**
Naphthalene		**5**	**170**			
Acenaphthylene						
Acenaphthene						
Fluorene						
Phenanthrene						
Anthracene						
Fluoranthene						
Pyrene						
Benzo(a)anthracene						
Chrysene						
Benzo(b+k)fluoranthene						
Benzo(a)pyrene				**0.7**	**0.8**	**3.2**
Indeno(1,2,3-c,d)pyrene						
Dibenzo(a,h)anthracene						
Benzo(g,h,i)perylene						
Benzo(a)pyrene TEQ	**3**					
Total +ve	**300**				**200**	**800**
HCB	**10**					
alpha-BHC						
gamma-BHC						
beta-BHC						
Heptachlor	**6**					
delta-BHC						
Aldrin						
Heptachlor Epoxide						
gamma-Chlordane						
alpha-chlordane						
Endosulfan I	**270**				**60**	**240**
pp-DDE						
Dieldrin						
Endrin						
pp-DDD						
Endosulfan II						
pp-DDT			**180**			
Endrin Aldehyde						
Endosulfan Sulphate						
Methoxychlor	**300**					
Endosulfan (Endosulfan I + Endosulfan 2 + Endosulfan sulphate)					**60**	**240**
Azinphos-methyl (Guthion)						
Bromophos-ethyl						
Chlorpyriphos					**4**	**16**
Chlorpyriphos-methyl						
Diazinon						
Dichlorvos						
Dimethoate						
Ethion						
Fenitrothion						
Malathion						
Parathion						
Ronnel						
Aroclor 1016						
Aroclor 1221						
Aroclor 1232						
Aroclor 1242						
Aroclor 1248						
Aroclor 1254						
Aroclor 1260						
PCBs					**<50**	**<50**
Arsenic	**100**		**100**		**100**	**400**
Cadmium	**20**				**20**	**80**
Chromium	**100**		**400**		**100**	**400**
Copper	**6000**		**210**			
Lead	**300**		**1100**		**100**	**400**
Mercury	**40**				**4**	**16**
Nickel	**400**		**270**		**40**	**160**
Zinc	**7400**		**700**			
Asbestos						

Note 1: NEPC (1999, as amended 2013) – Schedule B1 Guideline on Investigation Levels for Soil and Groundwater, HIL A (Residential with garden accessible soil)
Note 2: (NEPC< 1999, as amended 2013) - Schedule B1, Guideline on Invesitgation Levels For Soil and Groundwater, HSL A (Clay, 0m to <1m)
Note 3: (NEPC< 1999, as amended 2013) - Schedule B1, Guideline on Invesitgation Levels For Soil and Groundwater, EIL (urban residential and public open space)
Note 4: (NEPC< 1999, as amended 2013) - Schedule B1, Guideline on Invesitgation Levels For Soil and Groundwater, ESL (urban residential and public open space)

Table 7: QC Sample Data Acceptance Criteria

QC Sample Type	Method of Assessment	Acceptable Range
Field QC		
Blind Replicates and Split Samples	The assessment of split replicate is undertaken by calculating the Relative Percent Difference (RPD) of the replicate concentration compared with the original sample concentration. The RPD is defined as: $RPD = 100 \times \frac{\lvert X_1 - X_2 \rvert}{Average}$ Where: X_1 and X_2 are the concentration of the original and replicate samples.	The acceptable range depends upon the levels detected: ▪ 0 – 100% RPD (When the average concentration is < 5 times the LOR/EQL) ▪ 0 – 75% RPD (When the average concentration is 5 to 10 times the LOR/EQL) ▪ 0 – 50% RPD (When the average concentration is > 10 times the LOR/EQL)
Blanks (Rinsate and Trip Blanks)	Each blank is analysed as per the original samples.	Analytical Result < LOR/EQL
Laboratory-prepared Trip Spike	The trip spike is analysed after returning from the field and the % recovery of the known spike is calculated.	70% - 130%
Laboratory QC		
Laboratory Duplicates	Assessment as per Blind Replicates and Split Samples.	The acceptable range depends upon the levels detected: ▪ 0 – 100% RPD (When the average concentration is < 4 times the LOR/EQL) ▪ 0 – 50% RPD (When the average concentration is 4 to 10 times the LOR/EQL) ▪ 0 – 30% RPD (When the average concentration is > 10 times the LOR/EQL)
Surrogates Matrix Spikes Laboratory Control Samples	Assessment is undertaken by determining the percent recovery of the known spike or addition to the sample. $\% \text{ Recovery} = 100 \times \frac{C - A}{B}$ Where: A = Concentration of analyte determined in the original sample; B = Added Concentration; C = Calculated Concentration.	70% - 130% (General Analytes) 50% - 130% (Phenols) 60% - 130% (OP Pesticides) If the result is outside the above ranges, the result must be < 3x Standard Deviation of the Historical Mean (calculated over past 12 months)
Method Blanks	Each blank is analysed as per the original samples.	Analytical Result < LOR/EQL

Note: EQL = Laboratory Estimated Quantitation Limit (EQL) or the minimum detection limit for a particular analyte. LOR = Limit of Reporting or the minimum

Table 8a: QA/QC tabulated results - Soil

					Soil Sample	BH05-2.0-2.1	Q1	Q2	Average	Blind RPD	Average	Split RPD
					Sample Type	Original	Blind replicate	Split replicate				
					Laboratory report	171621	171621	ES1717866				
Parameters	**Unit**	**Primary PQL**	**Blind PQL**	**Split PQL**						**%**		**%**
TRH C6 - C9	mg/kg	25	25	10		<25	<25	<10	N/A	N/A	N/A	N/A
TRH C6 - C10	mg/kg	25	25	10		<25	<25	<10	N/A	N/A	N/A	N/A
FRACTION 1	mg/kg	25	25	10		<25	<25	<10	N/A	N/A	N/A	N/A
TRH C10 - C14	mg/kg	50	50	50		<50	<50	<50	N/A	N/A	N/A	N/A
TRH C15 - C28	mg/kg	100	100	100		<100	<100	<100	N/A	N/A	N/A	N/A
TRH C29 - C36	mg/kg	100	100	100		<100	<100	<100	N/A	N/A	N/A	N/A
TRH >C10-C16	mg/kg	50	50	50		<50	<50	<50	N/A	N/A	N/A	N/A
FRACTION 2	mg/kg	50	50	50		<50	<50	<50	N/A	N/A	N/A	N/A
TRH >C16-C34	mg/kg	100	100	100		<100	<100	<100	N/A	N/A	N/A	N/A
TRH >C34-C40	mg/kg	100	100	100		<100	<100	<100	N/A	N/A	N/A	N/A
Benzene	mg/kg	0.2	0.2	0.2		<0.2	<0.2	<0.2	N/A	N/A	N/A	N/A
Toluene	mg/kg	0.5	0.5	0.5		<0.5	<0.5	<0.5	N/A	N/A	N/A	N/A
Ethylbenzene	mg/kg	1	1	0.5		<1	<1	<0.5	N/A	N/A	N/A	N/A
m+p-xylene	mg/kg	2	2	0.5		<2	<2	<0.5	N/A	N/A	N/A	N/A
o-Xylene	mg/kg	1	1	0.5		<1	<1	<0.5	N/A	N/A	N/A	N/A
Naphthalene	mg/kg	0.1	0.1	0.5		<0.1	<0.1	<0.5	N/A	N/A	N/A	N/A
Acenaphthylene	mg/kg	0.1	0.1	0.5		<0.1	<0.1	<0.5	N/A	N/A	N/A	N/A
Acenaphthene	mg/kg	0.1	0.1	0.5		<0.1	<0.1	<0.5	N/A	N/A	N/A	N/A
Fluorene	mg/kg	0.1	0.1	0.5		<0.1	<0.1	<0.5	N/A	N/A	N/A	N/A
Phenanthrene	mg/kg	0.1	0.1	0.5		<0.1	<0.1	<0.5	N/A	N/A	N/A	N/A
Anthracene	mg/kg	0.1	0.1	0.5		<0.1	<0.1	<0.5	N/A	N/A	N/A	N/A
Fluoranthene	mg/kg	0.1	0.1	0.5		<0.1	<0.1	<0.5	N/A	N/A	N/A	N/A
Pyrene	mg/kg	0.1	0.1	0.5		<0.1	<0.1	<0.5	N/A	N/A	N/A	N/A
Benzo(a)anthracene	mg/kg	0.1	0.1	0.5		<0.1	<0.1	<0.5	N/A	N/A	N/A	N/A
Chrysene	mg/kg	0.1	0.1	0.5		<0.1	<0.1	<0.5	N/A	N/A	N/A	N/A
Benzo(b+k)fluoranthene	mg/kg	0.2	0.2	0.5		<0.2	<0.2	<0.5	N/A	N/A	N/A	N/A
Benzo(a)pyrene	mg/kg	0.05	0.05	0.5		<0.05	<0.05	<0.5	N/A	N/A	N/A	N/A
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	0.1	0.5		<0.1	<0.1	<0.5	N/A	N/A	N/A	N/A
Dibenzo(a,h)anthracene	mg/kg	0.1	0.1	0.5		<0.1	<0.1	<0.5	N/A	N/A	N/A	N/A
Benzo(g,h,i)perylene	mg/kg	0.1	0.1	0.5		<0.1	<0.1	<0.5	N/A	N/A	N/A	N/A
Benzo(a)pyrene TEQ	mg/kg	0.5	0.5	0.5		<0.5	<0.5	1.2	N/A	N/A	1.2	N/A
Total +ve	mg/kg	-	-	0.5		<0.05	<0.05	<0.5	N/A	N/A	N/A	N/A
HCB	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
alpha-BHC	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
gamma-BHC	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
beta-BHC	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
Heptachlor	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
delta-BHC	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
Aldrin	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
Heptachlor Epoxide	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
gamma-Chlordane	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
alpha-chlordane	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
Endosulfan I	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
pp-DDE	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
Dieldrin	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
Endrin	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
pp-DDD	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
Endosulfan II	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
pp-DDT	mg/kg	0.1	0.1	0.2		<0.1	<0.1	<0.2	N/A	N/A	N/A	N/A
Endrin Aldehyde	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
Endosulfan Sulphate	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
Methoxychlor	mg/kg	0.1	0.1	0.2		<0.1	<0.1	<0.2	N/A	N/A	N/A	N/A
Azinphos-methyl (Guthio	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
Bromophos-ethyl	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
Chlorpyriphos	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
Chlorpyriphos-methyl	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
Diazinon	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
Dichlorvos	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
Dimethoate	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
Ethion	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
Fenitrothion	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
Malathion	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
Parathion	mg/kg	0.1	0.1	0.2		<0.1	<0.1	<0.2	N/A	N/A	N/A	N/A
Ronnel	mg/kg	0.1	0.1	0.05		<0.1	<0.1	<0.05	N/A	N/A	N/A	N/A
Aroclor 1016	mg/kg	0.1	0.1	-		<0.1	<0.1	nt	N/A	N/A	N/A	N/A
Aroclor 1221	mg/kg	0.1	0.1	-		<0.1	<0.1	nt	N/A	N/A	N/A	N/A
Aroclor 1232	mg/kg	0.1	0.1	-		<0.1	<0.1	nt	N/A	N/A	N/A	N/A
Aroclor 1242	mg/kg	0.1	0.1	-		<0.1	<0.1	nt	N/A	N/A	N/A	N/A
Aroclor 1248	mg/kg	0.1	0.1	-		<0.1	<0.1	nt	N/A	N/A	N/A	N/A
Aroclor 1254	mg/kg	0.1	0.1	-		<0.1	<0.1	nt	N/A	N/A	N/A	N/A
Aroclor 1260	mg/kg	0.1	0.1	-		<0.1	<0.1	nt	N/A	N/A	N/A	N/A
Arsenic	mg/kg	4	4	5		4	<4	<5	4	N/A	4.0	N/A
Cadmium	mg/kg	0.4	0.4	1		<0.4	<0.4	<1	N/A	N/A	N/A	N/A
Chromium	mg/kg	1	1	2		11	11	16	11	0.0%	13.5	37%
Copper	mg/kg	1	1	5		34	35	40	34.5	2.9%	37.0	16.2%
Lead	mg/kg	1	1	5		19	13	18	16	37.5%	18.5	5.4%
Mercury	mg/kg	0.1	0.1	0.1		<0.1	<0.1	<0.1	N/A	N/A	N/A	N/A
Nickel	mg/kg	1	1	2		18	17	22	17.5	5.7%	20.0	20%
Zinc	mg/kg	1	1	5		75	63	84	69	17.4%	79.5	11.3%

Table 8a: QA/QC tabulated results - Soil - continued

					Soil Sample	BH15-5.6-5.8	Q3	Q4	Average	Blind RPD	Average	Split RPD
					Sample Type	Original	Blind replicate	Split replicate				
					Laboratory report	171621	171621	ES1717866				
Parameters	**Unit**	**Primary PQL**	**Blind PQL**	**Split PQL**						**%**		**%**
TRH C6 - C9	mg/kg	25	25	10	<25	<25	<10		N/A	N/A	N/A	N/A
TRH C6 - C10	mg/kg	25	25	10	<25	<25	<10		N/A	N/A	N/A	N/A
FRACTION 1	mg/kg	25	25	10	<25	<25	<10		N/A	N/A	N/A	N/A
TRH C10 - C14	mg/kg	50	50	50	<50	<50	<50		N/A	N/A	N/A	N/A
TRH C15 - C28	mg/kg	100	100	100	<100	<100	<100		N/A	N/A	N/A	N/A
TRH C29 - C36	mg/kg	100	100	100	<100	<100	<100		N/A	N/A	N/A	N/A
TRH >C10-C16	mg/kg	50	50	50	<50	<50	<50		N/A	N/A	N/A	N/A
FRACTION 2	mg/kg	50	50	50	<50	<50	<50		N/A	N/A	N/A	N/A
TRH >C16-C34	mg/kg	100	100	100	<100	<100	<100		N/A	N/A	N/A	N/A
TRH >C34-C40	mg/kg	100	100	100	<100	<100	<100		N/A	N/A	N/A	N/A
Benzene	mg/kg	0.2	0.2	0.2	<0.2	<0.2	<0.2		N/A	N/A	N/A	N/A
Toluene	mg/kg	0.5	0.5	0.5	<0.5	<0.5	<0.5		N/A	N/A	N/A	N/A
Ethylbenzene	mg/kg	1	1	0.5	<1	<1	<0.5		N/A	N/A	N/A	N/A
m+p-xylene	mg/kg	2	2	0.5	<2	<2	<0.5		N/A	N/A	N/A	N/A
o-Xylene	mg/kg	1	1	0.5	<1	<1	<0.5		N/A	N/A	N/A	N/A

Table 8b: QA/QC tabulated results - Groundwater

			Soil Sample	170727-JJ-BH02	170727-JJ-QAQC	Average	Blind RPD
			Sample Type	Original	Blind replicate		
			Laboratory report	172229	172229		
Parameters	Unit	Primary PQL	Blind PQL			µg/L	%
TRH C6 - C9	µg/L	10	10	<10	<10	N/A	N/A
TRH C6 - C10	µg/L	10	10	<10	<10	N/A	N/A
FRACTION 1	µg/L	10	10	<10	<10	N/A	N/A
TRH C10 - C14	µg/L	50	50	<50	<50	N/A	N/A
TRH C15 - C28	µg/L	100	100	<100	<100	N/A	N/A
TRH C29 - C36	µg/L	100	100	<100	<100	N/A	N/A
TRH >C10-C16	µg/L	50	50	<50	<50	N/A	N/A
FRACTION 2	µg/L	50	50	<50	<50	N/A	N/A
TRH >C16-C34	µg/L	100	100	<100	<100	N/A	N/A
TRH >C34-C40	µg/L	100	100	<100	<100	N/A	N/A
Benzene	µg/L	1	1	<1	<1	N/A	N/A
Toluene	µg/L	1	1	<1	<1	N/A	N/A
Ethylbenzene	µg/L	1	1	<1	<1	N/A	N/A
m+p-xylene	µg/L	2	2	<2	<2	N/A	N/A
o-Xylene	µg/L	1	1	<1	<1	N/A	N/A
Naphthalene	µg/L	1	1	<1	<1	N/A	N/A
Acenaphthylene	µg/L	1	1	<1	<1	N/A	N/A
Acenaphthene	µg/L	1	1	<1	<1	N/A	N/A
Fluorene	µg/L	1	1	<1	<1	N/A	N/A
Phenanthrene	µg/L	1	1	<1	<1	N/A	N/A
Anthracene	µg/L	1	1	<1	<1	N/A	N/A
Fluoranthene	µg/L	1	1	<1	<1	N/A	N/A
Pyrene	µg/L	1	1	<1	<1	N/A	N/A
Benzo(a)anthracene	µg/L	1	1	<1	<1	N/A	N/A
Chrysene	µg/L	1	1	<1	<1	N/A	N/A
Benzo(b+k)fluoranthene	µg/L	2	2	<2	<2	N/A	N/A
Benzo(a)pyrene	µg/L	1	1	<1	<1	N/A	N/A
Indeno(1,2,3-c,d)pyrene	µg/L	1	1	<1	<1	N/A	N/A
Dibenzo(a,h)anthracene	µg/L	1	1	<1	<1	N/A	N/A
Benzo(g,h,i)perylene	µg/L	1	1	<1	<1	N/A	N/A
Benzo(a)pyrene TEQ	µg/L	5	5	<5	<5	N/A	N/A
Total +ve	µg/L	1	1	NIL (+)VE	NIL (+)VE	N/A	N/A
HCB	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
alpha-BHC	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
gamma-BHC	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
beta-BHC	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
Heptachlor	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
delta-BHC	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
Aldrin	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
Heptachlor Epoxide	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
gamma-Chlordane	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
alpha-chlordane	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
Endosulfan I	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
pp-DDE	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
Dieldrin	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
Endrin	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
pp-DDD	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
Endosulfan II	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
pp-DDT	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
Endrin Aldehyde	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
Endosulfan Sulphate	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
Methoxychlor	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
Azinphos-methyl (Guthio	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
Bromophos-ethyl	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
Chlorpyriphos	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
Chlorpyriphos-methyl	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
Diazinon	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
Dichlorvos	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
Dimethoate	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
Ethion	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
Fenitrothion	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
Malathion	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
Parathion	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
Ronnel	µg/L	0.2	0.2	<0.2	<0.2	N/A	N/A
Aroclor 1016	µg/L	2	2	<2	<2	N/A	N/A
Aroclor 1221	µg/L	2	2	<2	<2	N/A	N/A
Aroclor 1232	µg/L	2	2	<2	<2	N/A	N/A
Aroclor 1242	µg/L	2	2	<2	<2	N/A	N/A
Aroclor 1248	µg/L	2	2	<2	<2	N/A	N/A
Aroclor 1254	µg/L	2	2	<2	<2	N/A	N/A
Aroclor 1260	µg/L	2	2	<2	<2	N/A	N/A
Arsenic	µg/L	1	1	<1	<1	N/A	N/A
Cadmium	µg/L	0.1	0.1	0.2	0.2	0.2	0.0%
Chromium	µg/L	1	1	<1	<1	N/A	N/A
Copper	µg/L	1	1	3	5	4	50.0%
Lead	µg/L	1	1	<1	<1	N/A	N/A
Mercury	µg/L	0.05	0.05	<0.05	<0.05	N/A	N/A
Nickel	µg/L	1	1	48	47	47.5	2.1%
Zinc	µg/L	1	1	48	43	45.5	11.0%

Table 9 - Soil Analytical Results

Parameters	Unit	PQL	BH1	BH2	BH3	BH4	BH4	BH5	BH5	BH6	BH6	BH7	BH8	BH8	BH9	BH9	BH9	BH10	BH10	BH11	BH11	BH12	BH12	BH12	BH13	BH14	BH15	BH15
Depth (m)			2.0-2.2	1.3-1.5	2.0-2.2	0.8-0.9	0.8-0.9	0.4-0.6	4.3-4.4	1.2-1.3	7.6-7.7	2.0-2.1	1.6-1.7	4.4-4.5	1.1-1.2	5.3-5.4	5.3-5.4	2.0-2.1	6.0-6.2	1.9-2.0	3.5-3.6	0.5-0.6	5.0-5.1	5.0-5.1	2.8-2.9	2.4-2.5	1.0-1.1	5.6-5.8
Date Sampled			13-Jul-17	13-Jul-17	14-Jul-17	17-Jul-17	17-Jul-17	18-Jul-17	18-Jul-17	17-Jul-17	17-Jul-17	17-Jul-17	17-Jul-17	17-Jul-17	17-Jul-17	17-Jul-17	17-Jul-17	17-Jul-17	17-Jul-17	18-Jul-17	18-Jul-17	18-Jul-17	18-Jul-17	18-Jul-17	18-Jul-17	18-Jul-17	18-Jul-17	18-Jul-17
Unit			Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Natural	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Natural	Fill	Fill	Fill	Natural	Natural	Fill	Fill	Fill	Natural
Laboratory report			171307	171307	171428	171503	171503	156717	156717	171503	171503	171503	171503	171503	171503	171503	171503	171503	171503	171621	171621	171621	171621	171621	171621	171621	171621	171621
Sample Type			N	N	N	N	REP	N	N	N	N	N	N	N	N	N	REP	N	N	N	N	N	N	REP	N	N	N	N
TRH C6 - C9	mg/kg	25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	nt	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
TRH C6 - C10	mg/kg	25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	nt	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
FRACTION 1	mg/kg	25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	nt	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
TRH C10 - C14	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	nt	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TRH C15 - C28	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	nt	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
TRH C29 - C36	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	nt	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
TRH C10-C36	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	nt	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
TRH >C10-C16	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	nt	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
FRACTION 2	mg/kg	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	nt	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
TRH >C16-C34	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	nt	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
TRH >C34-C40	mg/kg	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	nt	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Benzene	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	nt	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	nt	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	nt	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	nt	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
o-Xylene	mg/kg	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	nt	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Xylenes	mg/kg	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	nt	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	0.2	nt	<0.1	0.2	nt	0.1	nt	nt	<0.1	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Phenanthrene	mg/kg	0.1	<0.1	0.9	0.3	<0.1	0.1	<0.1	nt	0.6	nt	<0.1	0.3	nt	1	nt	nt	<0.1	<0.1	<0.1	nt	1.2	nt	nt	0.1	<0.1	0.2	nt
Anthracene	mg/kg	0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	nt	0.2	nt	<0.1	0.1	nt	0.3	nt	nt	<0.1	<0.1	<0.1	nt	0.2	nt	nt	<0.1	<0.1	<0.1	nt
Fluoranthene	mg/kg	0.1	0.1	1.4	0.5	0.3	0.3	<0.1	nt	1.6	nt	<0.1	1.1	nt	1.2	nt	nt	<0.1	<0.1	<0.1	nt	3.4	nt	nt	0.7	<0.1	0.4	nt
Pyrene	mg/kg	0.1	0.1	1.3	0.5	0.3	0.4	<0.1	nt	1.6	nt	<0.1	1.2	nt	1.3	nt	nt	<0.1	<0.1	<0.1	nt	3.3	nt	nt	0.7	<0.1	0.5	nt
Benzo(a)anthracene	mg/kg	0.1	<0.1	0.6	0.2	0.1	0.1	<0.1	nt	0.7	nt	<0.1	0.5	nt	0.6	nt	nt	<0.1	<0.1	<0.1	nt	1	nt	nt	0.2	<0.1	0.2	nt
Chrysene	mg/kg	0.1	<0.1	0.4	0.2	0.1	0.2	<0.1	nt	0.6	nt	<0.1	0.5	nt	0.5	nt	nt	<0.1	<0.1	<0.1	nt	1.1	nt	nt	0.3	<0.1	0.2	nt
Benzo(b+k)fluoranthene	mg/kg	0.2	<0.2	0.8	0.4	0.3	0.3	<0.2	nt	1	nt	<0.2	1	nt	0.7	nt	nt	<0.2	<0.2	<0.2	nt	2	nt	nt	0.4	<0.2	0.3	nt
Benzo(a)pyrene	mg/kg	0.05	<0.05	0.55	0.2	0.1	0.1	<0.05	nt	0.7	nt	<0.05	0.64	nt	0.4	nt	nt	<0.05	<0.05	<0.05	nt	**1.4**	nt	nt	0.3	<0.05	0.2	nt
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	<0.1	0.3	0.1	<0.1	0.1	<0.1	nt	0.4	nt	<0.1	0.4	nt	0.2	nt	nt	<0.1	<0.1	<0.1	nt	0.9	nt	nt	0.2	<0.1	0.1	nt
Dibenzo(a,h)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Benzo(g,h,i)perylene	mg/kg	0.1	<0.1	0.4	0.2	0.1	0.1	<0.1	nt	0.6	nt	<0.1	0.5	nt	0.3	nt	nt	<0.1	<0.1	<0.1	nt	1.1	nt	nt	0.3	<0.1	0.2	nt
Benzo(a)pyrene TEQ	mg/kg	0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	nt	0.9	nt	<0.5	0.8	nt	0.6	nt	nt	<0.5	<0.5	<0.5	nt	1.8	nt	nt	<0.5	<0.5	<0.5	nt
Total +ve	mg/kg	-	0.2	7.1	2.6	1.4	1.8	<0.05	nt	8.5	nt	<0.05	6.5	nt	6.6	nt	nt	<0.05	<0.05	<0.05	nt	16	nt	nt	3.2	<0.05	2.3	nt
HCB	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
alpha-BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
gamma-BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
beta-BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
delta-BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Heptachlor Epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
gamma-Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
alpha-chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Endosulfan I	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
pp-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Dieldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Endrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
pp-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Endosulfan II	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
pp-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Endosulfan Sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Azinphos-methyl (Guthion)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Bromophos-ethyl	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Chlorpyriphos	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Chlorpyriphos-methyl	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Diazinon	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Dichlorvos	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Dimethoate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Ethion	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Fenitrothion	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Malathion	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Parathion	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Ronnel	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Aroclor 1016	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Aroclor 1221	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Aroclor 1232	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Aroclor 1242	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Aroclor 1248	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Aroclor 1254	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Aroclor 1260	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Total PCBs	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Arsenic	mg/kg	4	4	6	8	6	6	7	nt	9	nt	11	8	nt	9	nt	nt	4	nt	11	nt	5	nt	nt	10	<4	10	nt
Cadmium	mg/kg	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	nt	<0.4	nt	<0.4	<0.4	nt	<0.4	nt	nt	<0.4	nt	<0.4	nt	<0.4	nt	nt	<0.4	<0.4	<0.4	nt
Chromium	mg/kg	1	14	23	12	15	18	7	nt	19	nt	10	20	nt	14	nt	nt	11	nt	11	nt	12	nt	nt	13	11	18	nt
Copper	mg/kg	1	34	56	35	32	32	12	nt	53	nt	36	37	nt	33	nt	nt	41	nt	36	nt	34	nt	nt	20	57	38	nt
Lead	mg/kg	1	15	13	14	14	15	8	nt	23	nt	23	15	nt	23	nt	nt	19	nt	16	nt	18	nt	nt	15	18	25	nt
Mercury	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	nt	<0.1	nt	<0.1	<0.1	nt	<0.1	nt	nt	<0.1	nt	<0.1	nt	<0.1	nt	nt	<0.1	<0.1	<0.1	nt
Nickel	mg/kg	1	16	20	14	26	23	2	nt	22	nt	18	29	nt	18	nt	nt	20	nt	19	nt	10	nt	nt	15	19	21	nt
Zinc	mg/kg	1	68	63	66	60	51	12	nt	130	nt	72	59	nt	76	nt	nt	79	nt	72	nt	130	nt	nt	48	88	74	nt
Total Organic Carbon	mg/kg	1000	nt	nt	nt	nt	nt	nt	2,900	nt	1500	nt	nt	3,200	nt	14000	14000	nt	2800	nt	3900	nt	14000	nt	nt	nt	nt	4600
Total Organic Carbon	% w/w	0.001	nt	nt	nt	nt	nt	nt	0.0029	nt	0.0015	nt	nt	0.0032	nt	0.014	0.014	nt	0.0028	nt	0.0039	nt	0.014	nt	nt	nt	nt	0.0046
Asbestos ID	g/kg	0.1	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	nt	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	nt	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	nt	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	nt	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	nt	nt	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	nt	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	nt	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	nt	nt	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg: Organic fibres detected	nt
Asbestos Trace Analysis	-	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	nt	No asbestos detected	nt	No asbestos detected	nt	No asbestos detected	No asbestos detected	nt	No asbestos detected	nt	nt	No asbestos detected	nt	No asbestos detected	nt	No asbestos detected	nt	nt	No asbestos detected	No asbestos detected	No asbestos detected	nt

Parameters	NEPM (2013) HIL - Residential A	NEPM (2013) HSL - A & B: Low - high density residential - clay; 0 - <1m	NEPM (2013) EIL (urban residential and public open space)	NEPM (2013) ESL (Urban Residential and public open space)	NEPM (2013) Asbestos HSL - Residential B	CT1 Values - General Solid Waste	CT2 Values - Restricted Solid Waste	Max.	Min.	Mean	Standard Deviation	95%UCL
TRH C6 - C9						**650**	**2600**	0	0	N/A	N/A	N/A
TRH C6 - C10								0	0	N/A	N/A	N/A
FRACTION 1		**50**		**180**				0	0	N/A	N/A	N/A
TRH C10 - C14								0	0	N/A	N/A	N/A
TRH C15 - C28								0	0	N/A	N/A	N/A
TRH C29 - C36								0	0	N/A	N/A	N/A
TRH C10-C36						**10,000**	**40,000**	0	0	N/A	N/A	N/A
TRH >C10-C16								0	0	N/A	N/A	N/A
FRACTION 2		**280**		**120**				0	0	N/A	N/A	N/A
TRH >C16-C34				**1300**				0	0	N/A	N/A	N/A
TRH >C34-C40				**5600**				0	0	N/A	N/A	N/A
Benzene		**0.7**		**65**		**10**	**40**	0	0	N/A	N/A	N/A
Toluene		**480**		**105**		**288**	**1152**	0	0	N/A	N/A	N/A
Ethylbenzene				**125**		**600**	**2400**	0	0	N/A	N/A	N/A
m+p-xylene								0	0	N/A	N/A	N/A
o-Xylene								0	0	N/A	N/A	N/A
Xylenes		**110**		**45**		**1000**	**4000**	0	0	N/A	N/A	N/A
Naphthalene		**5**	**170**					0.1	0.1	0.1	N/A	N/A
Acenaphthylene								0.2	0.1	0.17	0.06	0.26
Acenaphthene								0	0	N/A	N/A	N/A
Fluorene								0	0	N/A	N/A	N/A
Phenanthrene								1	0.1	0.53	0.36	0.83
Anthracene								0.3	0.1	0.20	0.08	0.30
Fluoranthene								1.6	0.1	0.81	0.58	1.20
Pyrene								1.6	0.1	0.84	0.57	1.22
Benzo(a)anthracene								0.7	0.1	0.40	0.26	0.59
Chrysene								0.6	0.1	0.36	0.19	0.50
Benzo(b+k)fluoranthene								1	0.3	0.64	0.31	0.87
Benzo(a)pyrene				**0.7**		**0.8**	**3.2**	0.7	0.1	0.38	0.25	0.57
Indeno(1,2,3-c,d)pyrene								0.4	0.1	0.25	0.14	0.36
Dibenzo(a,h)anthracene								0	0	N/A	N/A	N/A
Benzo(g,h,i)perylene								0.6	0.1	0.31	0.20	0.46
Benzo(a)pyrene TEQ	**3**							0.9	0.6	0.75	0.13	0.90
Total +ve	**300**					**200**	**800**	8.5	0.2	4.34	3.16	6.46
HCB	**10**							0	0	N/A	N/A	N/A
alpha-BHC								0	0	N/A	N/A	N/A
gamma-BHC								0	0	N/A	N/A	N/A
beta-BHC								0	0	N/A	N/A	N/A
Heptachlor	**6**							0	0	N/A	N/A	N/A
delta-BHC								0	0	N/A	N/A	N/A
Aldrin								0	0	N/A	N/A	N/A
Heptachlor Epoxide								0	0	N/A	N/A	N/A
gamma-Chlordane								0	0	N/A	N/A	N/A
alpha-chlordane								0	0	N/A	N/A	N/A
Endosulfan I	**270**					**60**	**240**	0	0	N/A	N/A	N/A
pp-DDE								0	0	N/A	N/A	N/A
Dieldrin								0	0	N/A	N/A	N/A
Endrin								0	0	N/A	N/A	N/A
pp-DDD								0	0	N/A	N/A	N/A
Endosulfan II								0	0	N/A	N/A	N/A
pp-DDT			**180**					0	0	N/A	N/A	N/A
Endrin Aldehyde								0	0	N/A	N/A	N/A
Endosulfan Sulphate								0	0	N/A	N/A	N/A
Methoxychlor	**300**							0	0	N/A	N/A	N/A
Azinphos-methyl (Guthion)								0	0	N/A	N/A	N/A
Bromophos-ethyl								0	0	N/A	N/A	N/A
Chlorpyriphos						**4**	**16**	0	0	N/A	N/A	N/A
Chlorpyriphos-methyl								0	0	N/A	N/A	N/A
Diazinon								0	0	N/A	N/A	N/A
Dichlorvos								0	0	N/A	N/A	N/A
Dimethoate								0	0	N/A	N/A	N/A
Ethion								0	0	N/A	N/A	N/A
Fenitrothion								0	0	N/A	N/A	N/A
Malathion								0	0	N/A	N/A	N/A
Parathion								0	0	N/A	N/A	N/A
Ronnel								0	0	N/A	N/A	N/A
Aroclor 1016								0	0	N/A	N/A	N/A
Aroclor 1221								0	0	N/A	N/A	N/A
Aroclor 1232								0	0	N/A	N/A	N/A
Aroclor 1242								0	0	N/A	N/A	N/A
Aroclor 1248								0	0	N/A	N/A	N/A
Aroclor 1254								0	0	N/A	N/A	N/A
Aroclor 1260								0	0	N/A	N/A	N/A
Total PCBs						**<50**	**<50**	0	0	N/A	N/A	N/A
Arsenic	**100**		**100**			**100**	**400**	11.0	4.0	7.4	2.4	8.64
Cadmium	**20**					**20**	**80**	0	0	N/A	N/A	N/A
Chromium	**100**		**400**					23.0	7.0	14.5	4.7	16.9
Copper	**6000**		**210**					56.0	12.0	36.4	11.0	42.1
Lead	**300**		**1100**			**100**	**400**	23.0	8.0	16.5	4.6	18.9
Mercury	**40**					**4**	**16**	0	0	N/A	N/A	N/A
Nickel	**400**		**270**			**40**	**160**	29.0	2.0	18.9	6.7	22.4
Zinc	**7400**		**700**					130.0	12.0	67.3	26.4	81.0
Total Organic Carbon (mg/kg)												
Total Organic Carbon (% w/w)												
Asbestos ID					0.004							
Asbestos Trace Analysis					0.001							

Notes:

na- not analysed

Bold - indicates exceedance of criteria value

Health investigation levels for Residential land use with garden accessible soil (home grown products <10%minimal opportunities for soil access (Schedule B1, NEPM)

Health screening levels for Low to high density residential land use for clay 0m - <1m (Schedule B1, NEPM)

Ecological Investigation Level for urban residential and public open space (CSIRO EIL Calculation Spreadsheet)

Ecological Screening Level for urban residential and public open space (Schedule B1, NEPM)

Health screening levels for asbestos contamination in soil - Residential B: minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high rise buildings and apartments (Schedule B1, NEPM)

Maximum values of specific contamininat concentration (SCC) for classification without TCLP - CT1 (General Solid Waste) (NSW EPA, 2014)

Maximum values of specific contamininat concentration (SCC) for classification without TCLP - CT2 (Restricted Solid Waste) (NSW EPA, 2014)

Table 10: Groundwater Analytical Results

Sample Location			BH02		BH03		NEPM (2013) GIL - Fresh Waters [1]	NEPM (2013) GIL - Marine Waters [2]
Date Sampled			27-Jul-17	27-Jul-17	27-Jul-17	27-Jul-17		
Laboratory report			172229	172229	172229	172229		
Sample Type			N	REP	N	REP		
Parameters	**Unit**	**PQL**						
TRH C6 - C9	µg/L	10	<10	nt	<10	<10	-	-
TRH C6 - C10	µg/L	10	<10	nt	<10	<10	-	-
FRACTION 1	µg/L	10	<10	nt	<10	<10	-	-
TRH C10 - C14	µg/L	50	<50	nt	<50	nt	-	-
TRH C15 - C28	µg/L	100	<100	nt	<100	nt	-	-
TRH C29 - C36	µg/L	100	<100	nt	<100	nt	-	-
TRH total C10 - C36	µg/L	100	<100	nt	<100	nt	-	-
TRH >C10-C16	µg/L	50	<50	nt	<50	nt	-	-
FRACTION 2	µg/L	50	<50	nt	<50	nt	-	-
TRH >C16-C34	µg/L	100	<100	nt	<100	nt	-	-
TRH >C34-C40	µg/L	100	<100	nt	<100	nt	-	-
TRH total >C10-C40	µg/L	100	<100	nt	<100	nt	-	-
Benzene	µg/L	1	<1	nt	<1	<1	950	500
Toluene	µg/L	1	<1	nt	<1	<1	-	-
Ethylbenzene	µg/L	1	<1	nt	<1	<1	-	-
m+p-xylene	µg/L	2	<2	nt	<2	<2	-	-
o-Xylene	µg/L	1	<1	nt	1	1	350	-
Xylenes	µg/L	2	<2	nt	<2	<2	-	-
Naphthalene	µg/L	1	<1	nt	<1	nt	16	50
Acenaphthylene	µg/L	1	<1	nt	<1	nt	-	-
Acenaphthene	µg/L	1	<1	nt	<1	nt	-	-
Fluorene	µg/L	1	<1	nt	<1	nt	-	-
Phenanthrene	µg/L	1	<1	nt	<1	nt	-	-
Anthracene	µg/L	1	<1	nt	<1	nt	-	-
Fluoranthene	µg/L	1	<1	nt	<1	nt	-	-
Pyrene	µg/L	1	<1	nt	<1	nt	-	-
Benzo(a)anthracene	µg/L	1	<1	nt	<1	nt	-	-
Chrysene	µg/L	1	<1	nt	<1	nt	-	-
Benzo(b+k)fluoranthene	µg/L	2	<2	nt	<2	nt	-	-
Benzo(a)pyrene	µg/L	1	<1	nt	<1	nt	-	-
Indeno(1,2,3-c,d)pyrene	µg/L	1	<1	nt	<1	nt	-	-
Dibenzo(a,h)anthracene	µg/L	1	<1	nt	<1	nt	-	-
Benzo(g,h,i)perylene	µg/L	1	<1	nt	<1	nt	-	-
Benzo(a)pyrene TEQ	µg/L	5	<5	nt	<5	nt	-	-
Total +ve	µg/L	1	NIL (+)VE	nt	NIL (+)VE	nt	-	-
HCB	µg/L	0.2	<0.2	nt	<0.2	nt	-	-
alpha-BHC	µg/L	0.2	<0.2	nt	<0.2	nt	-	-
gamma-BHC	µg/L	0.2	<0.2	nt	<0.2	nt	-	-
beta-BHC	µg/L	0.2	<0.2	nt	<0.2	nt	-	-
Heptachlor	µg/L	0.2	<0.2	nt	<0.2	nt	0.01	-

Notes:

nt- not tested

[1]Groundwater investigation levels for Fresh Waters (Schedule B1, NEPM)

[2]Groundwater investigation levels for Marine Waters (Schedule B1, NEPM)

Table 10: Groundwater Analytical Results - Continued

Sample Location			BH02		BH03		NEPM (2013) GIL - Fresh Waters [1]	NEPM (2013) GIL - Marine Waters [2]
Date Sampled			27-Jul-17	27-Jul-17	27-Jul-17	27-Jul-17		
Laboratory report			172229	172229	172229	172229		
Sample Type			N	REP	N	REP		
delta-BHC	µg/L	0.2	<0.2	nt	<0.2	nt	-	-
Aldrin	µg/L	0.2	<0.2	nt	<0.2	nt	-	-
Heptachlor Epoxide	µg/L	0.2	<0.2	nt	<0.2	nt	-	-
gamma-Chlordane	µg/L	0.2	<0.2	nt	<0.2	nt	-	-
alpha-chlordane	µg/L	0.2	<0.2	nt	<0.2	nt	0.03	-
Endosulfan I	µg/L	0.2	<0.2	nt	<0.2	nt	0.03	0.005
pp-DDE	µg/L	0.2	<0.2	nt	<0.2	nt	-	-
Dieldrin	µg/L	0.2	<0.2	nt	<0.2	nt	-	-
Endrin	µg/L	0.2	<0.2	nt	<0.2	nt	0.01	0.004
pp-DDD	µg/L	0.2	<0.2	nt	<0.2	nt	-	-
Endosulfan II	µg/L	0.2	<0.2	nt	<0.2	nt	-	-
pp-DDT	µg/L	0.2	<0.2	nt	<0.2	nt	0.006	-
Endrin Aldehyde	µg/L	0.2	<0.2	nt	<0.2	nt	-	-
Endosulfan Sulphate	µg/L	0.2	<0.2	nt	<0.2	nt	-	-
Methoxychlor	µg/L	0.2	<0.2	nt	<0.2	nt	-	-
Azinphos-methyl (Guthion)	µg/L	0.2	<0.2	nt	<0.2	nt	-	-
Bromophos-ethyl	µg/L	0.2	<0.2	nt	<0.2	nt	-	-
Chlorpyriphos	µg/L	0.2	<0.2	nt	<0.2	nt	0.01	0.009
Chlorpyriphos-methyl	µg/L	0.2	<0.2	nt	<0.2	nt	-	-
Diazinon	µg/L	0.2	<0.2	nt	<0.2	nt	0.01	-
Dichlorvos	µg/L	0.2	<0.2	nt	<0.2	nt	-	-
Dimethoate	µg/L	0.2	<0.2	nt	<0.2	nt	0.15	-
Ethion	µg/L	0.2	<0.2	nt	<0.2	nt	-	-
Fenitrothion	µg/L	0.2	<0.2	nt	<0.2	nt	0.2	-
Malathion	µg/L	0.2	<0.2	nt	<0.2	nt	0.05	-
Parathion	µg/L	0.2	<0.2	nt	<0.2	nt	0.004	-
Ronnel	µg/L	0.2	<0.2	nt	<0.2	nt	-	-
Aroclor 1016	µg/L	2	<2	nt	<2	nt	-	-
Aroclor 1221	µg/L	2	<2	nt	<2	nt	-	-
Aroclor 1232	µg/L	2	<2	nt	<2	nt	-	-
Aroclor 1242	µg/L	2	<2	nt	<2	nt	0.3	-
Aroclor 1248	µg/L	2	<2	nt	<2	nt	-	-
Aroclor 1254	µg/L	2	<2	nt	<2	nt	0.01	-
Aroclor 1260	µg/L	2	<2	nt	<2	nt	-	-
PCBs	µg/L	2	<2	nt	<2	nt	-	-
Arsenic	µg/L	1	<1	<1	<1	nt	24	-
Cadmium	µg/L	0.1	0.2	0.2	0.1	nt	0.2	0.7
Chromium	µg/L	1	<1	<1	<1	nt	-	27
Copper	µg/L	1	**3**	**3**	1	nt	1.4	1.3
Lead	µg/L	1	<1	<1	<1	nt	3.4	4.4
Mercury	µg/L	0.05	<0.05	<0.05	<0.05	nt	0.06	0.1
Nickel	µg/L	1	**48**	**47**	**38**	nt	11	7
Zinc	µg/L	1	**48**	**47**	**49**	nt	8	15

Notes:

nt- not tested

[1]Groundwater investigation levels for Fresh Waters (Schedule B1, NEPM)

[2]Groundwater investigation levels for Marine Waters (Schedule B1, NEPM)

Table 11: Photoionisaton Detecter (PID) Screening Results

Depth (mbgl)	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0
Borehole Location ID	**PID Screening Results (ppm)**																	
BH1	0.9	0.9	1.0	0.8	1.1	0.5	0.9	0.9	1.1	4.8	0.9	-	-	-	-	-	-	-
BH2	1.5	1.4	1.2	0.9	1.0	1.1	0.7	2.0	2.2	2.1	2.1	-	1.6	1.5	1.5	2.0	1.7	1.9
BH3	1.2	0.8	0.7	1.0	1.2	1.1	0.9	1.0	1.2	1.3	2.2	1.0	1.3	1.3	1.9	-	-	-
BH4	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.3	0.3	0.3	0.1	0.2	0.2	0.1	0.2	-	-	-
BH5	0.1	0.2	0.1	0.1	0.1	0.0	0.4	0.5	0.3	0.1	0.2	0.4	0.2	0.2	0.1	0.1	-	-
BH6	1.2	1.1	1.3	1.5	1.2	0.7	0.8	0.7	0.4	0.3	0.2	0.2	0.3	0.2	0.2	0.2	-	-
BH7	0.3	0.4	0.3	0.4	0.3	0.4	0.4	0.5	0.4	0.4	0.4	0.5	0.3	0.7	0.5	-	-	-
BH8	1.1	1.2	0.6	1.0	0.9	0.8	0.8	0.6	1.0	0.8	0.8	0.6	0.7	0.6	0.6	1.3	-	-
BH9	0.2	0.2	0.4	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.5	0.2	0.3	0.3	0.3	-	-	-
BH10	0.5	0.4	0.6	0.6	0.5	0.8	1.1	0.9	1.1	1.0	1.0	0.8	0.4	0.9	0.7	0.7	-	-
BH11	0.2	0.7	0.3	0.3	0.2	0.2	0.2	0.3	0.1	0.1	0.2	0.5	0.7	0.6	0.6	0.9	-	-
BH12	0.3	0.3	0.4	0.5	0.5	0.4	0.2	0.3	0.8	1.2	0.7	0.8	0.9	0.8	-	-	-	-
BH13	0.2	0.2	0.3	0.3	0.4	0.8	0.5	0.8	0.8	0.7	0.3	0.6	0.7	0.7	0.7	-	-	-
BH14	0.0	0.2	0.1	0.1	0.4	0.2	0.3	0.5	0.3	0.2	0.3	0.3	0.3	0.1	0.1	0.2	-	-
BH15	0.3	0.4	0.5	0.2	0.3	0.3	0.2	0.3	0.4	0.2	0.2	0.0	0.4	0.5	0.5	0.5	-	-

Appendix D Borelogs

Project ID:	CES170303-SD
Client:	Mushan Group Pty Ltd
Project:	Potts Hill Senior Living
Location:	10 Nelson Short Street, Potts Hill

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Suite 3, Level 1
55 Grandview Street, Pymble NSW 2073
PH: (02) 8569 2200 FAX: (02) 9983 0582
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LOG ID: BH01

Sheet: 1 of 1

X-Coord:	318242	GDA 94 MGA 56	**Date Commenced:**	13/07/17	**Logged by:** IW
Y-Coord:	6247380		**Date Completed:**	13/07/17	**Checked by:** DL
Surface Elevation (R.L) :	56	mAHD	**Hole Diameter (mm):**	110	

Drilling Information				LITHOLOGY				Samples		Tests		
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description SOIL TYPE: plasticity or particle characteristics colour, moisture, secondary and minor components	Consistency / Density	Sample ID	Type	SPT	Pocket Penetrometer (kPa) 100 200 300 400	Well Installation Detail
0	56	ADV				Clayey SILT: brown red, low plasticity silt, medium plasticity clay with sand, dry. [Fill]	Fm					
1	55					Silty CLAY: red brown, medium plasticity, dry. [Fill]	St			SPT01 @ 1-1.45m 3,5,6 N=11		
2	54					At 2m, trace medium grained gravels	Fm			SPT02 @ 2-2.45m 2,2,3 N=5		
3	53					From 3m, red brown / orange brown From 3.5m, red brown / light grey, medium to high plasticity				SPT03 @ 3-3.45m 3,4,5 N=9		
4	52					Clayey SILT: dark brown, with rootlets and black organics, dry. [Old Topsoil]	St			SPT04 @ 4-4.45m 3,9,11 N=20		
5	51					Silty CLAY: light grey, medium plasticity, dry. [Natural] From 4.6m, light grey				SPT05 @ 5-5.45m 3,7,10 N=17		
6	50					becoming hard						
7	49					Shaley CLAY: light grey, medium plasticity, dry. [Residual Clay]	Vst-H					
8	48					Coring commenced at 7.4m bgl. Refer to BH01 corelog.						
9	47											
10	46											

Drill Company:	SDI Drilling	**Operator Name:**	Doug Miller
Machine Type:	Edson 1000	**Operators Licence No.:**	N/A

Refer to Standard Sheets for details of abbreviations

Project ID:	CES170303-SD
Client:	Mushan Group Pty Ltd
Project:	Potts Hill Senior Living
Location:	10 Nelson Short Street, Potts Hill

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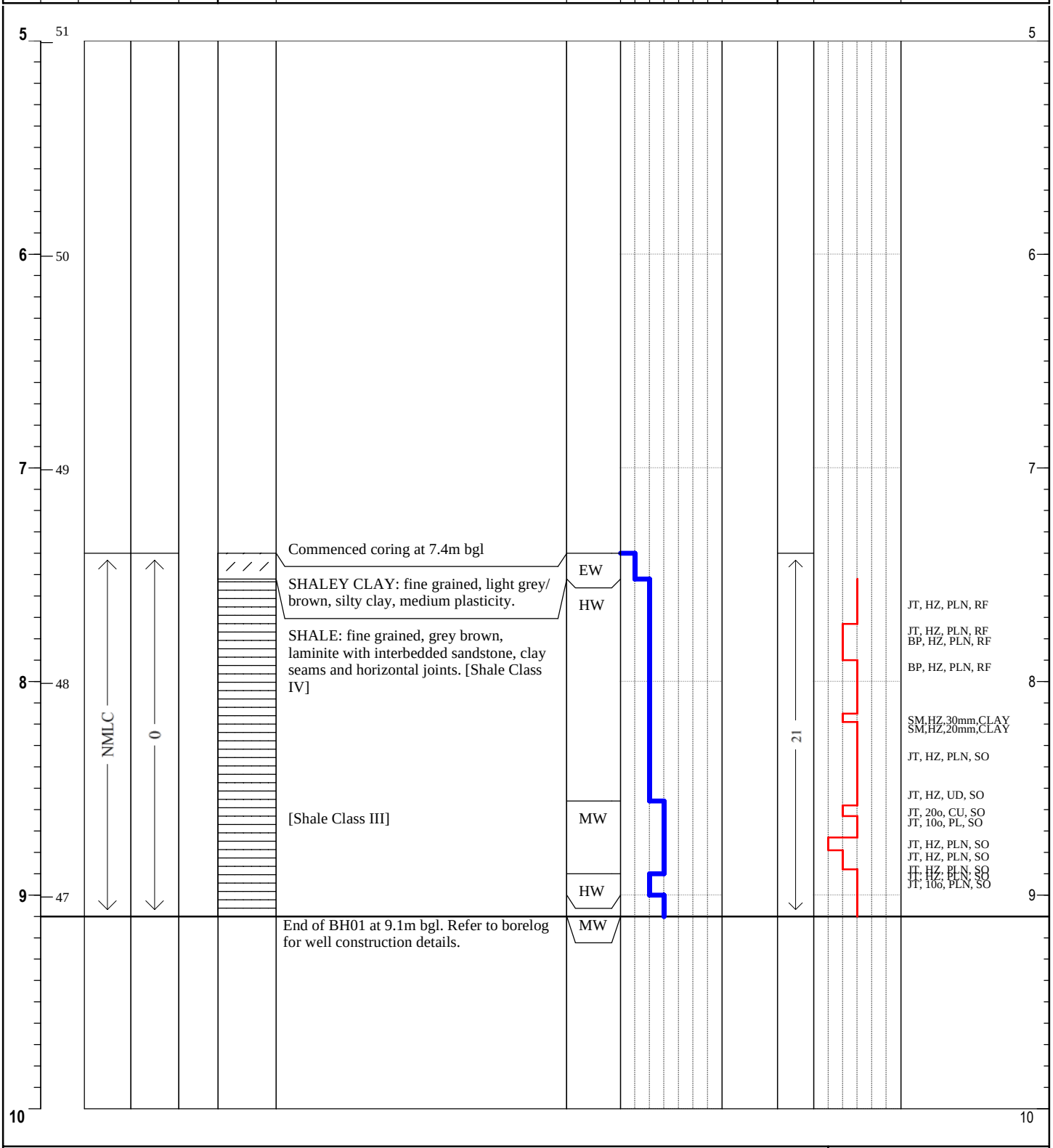
Suite 3, Level 1
55 Grandview Street, Pymble NSW 2073
PH: (02) 8569 2200 FAX: (02) 9983 0582
www.consultingearth.com.au

Corehole ID: BH01

Sheet: 1 of 1

X-Coord:	318242	**Date Commenced:**	13/07/2017	**Logged by:**	IW
Y-Coord:	6247380	**Date Completed:**	13/07/2017	**Checked by:**	DL
Surface Elevation (R.L.):	56 m AHD	**Hole Diameter (mm):**	110		



Drill Company:	SDI Drilling	**Operator Name:**	Doug Miller
Machine Type:	Edson 1000		

Refer to Standard Sheets for details of abbreviations

Project ID:	CES170303-SD
Client:	Mushan Group Pty Ltd
Project:	Potts Hill Senior Living
Location:	10 Nelson Short Street, Potts Hill

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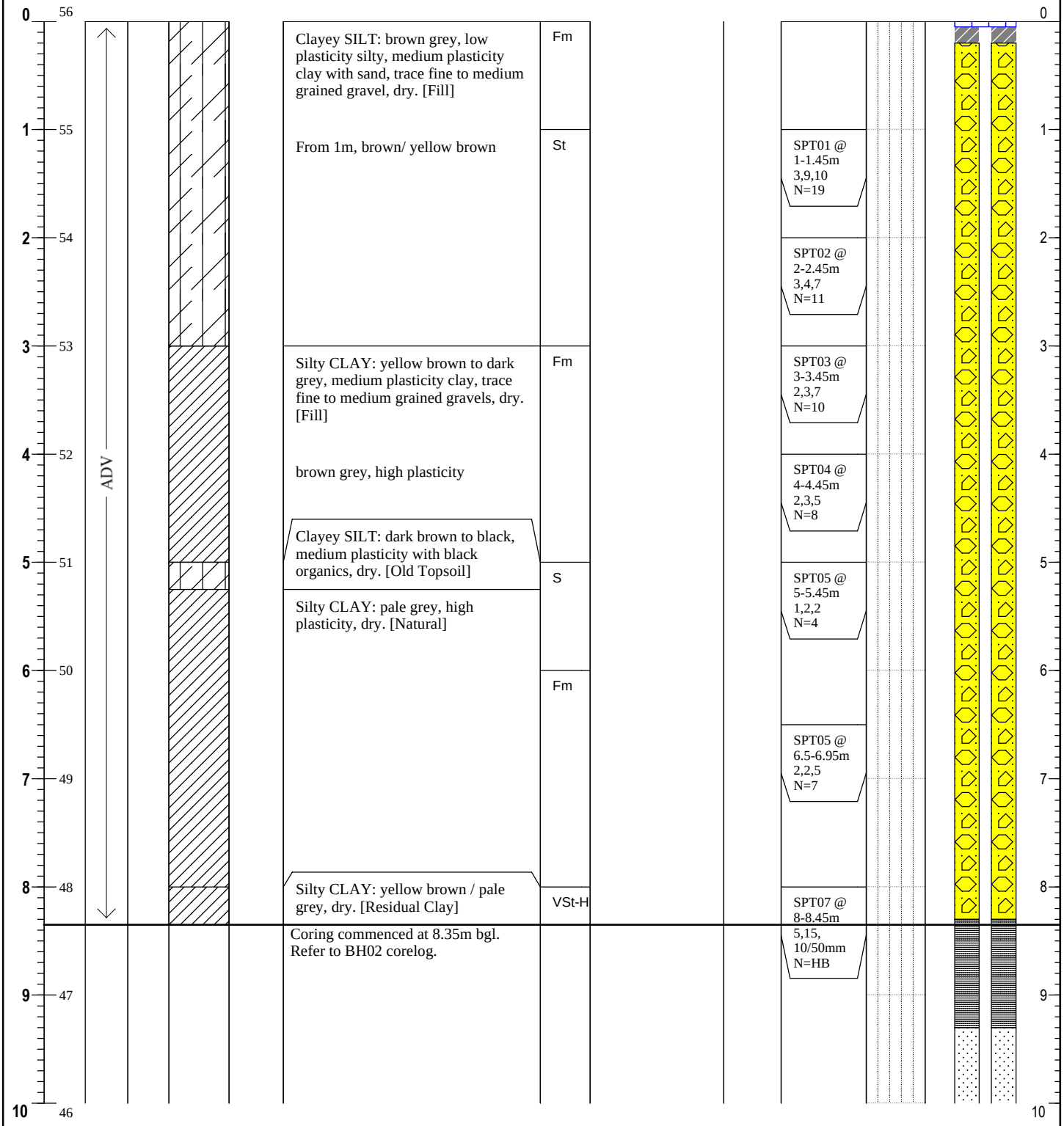
Suite 3, Level 1
55 Grandview Street, Pymble NSW 2073
PH: (02) 8569 2200 FAX: (02) 9983 0582
www.consultingearth.com.au

LOG ID: BH02

X-Coord:	318287	GDA 94 MGA 56	**Date Commenced:**	13/07/17	**Logged by:** IW
Y-Coord:	6247448		**Date Completed:**	13/07/17	**Checked by:** DL
Surface Elevation (R.L) :	56	mAHD	**Hole Diameter (mm):**	110	

Drilling Information				LITHOLOGY				Samples		Tests		
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description SOIL TYPE: plasticity or particle characteristics colour, moisture, secondary and minor components	Consistency / Density	Sample ID	Type	SPT	Pocket Penetrometer (kPa) 100 200 300 400	Well Installation Detail



Drill Company:	SDI Drilling	**Operator Name:**	Doug Miller	Refer to Standard Sheets for details of abbreviations
Machine Type:	Edson 1000	**Operators Licence No.:**	N/A	

Project ID:	CES170303-SD
Client:	Mushan Group Pty Ltd
Project:	Potts Hill Senior Living
Location:	10 Nelson Short Street, Potts Hill

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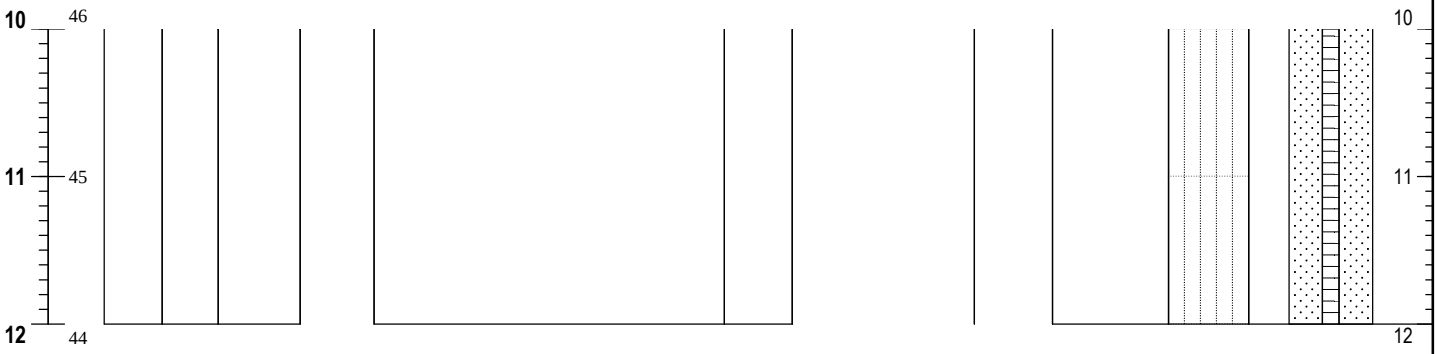
LOG ID: BH02

X-Coord:	318287	GDA 94 MGA 56	**Date Commenced:**	13/07/17	**Logged by:** IW
Y-Coord:	6247448		**Date Completed:**	13/07/17	**Checked by:** DL
Surface Elevation (R.L) :	56	mAHD	**Hole Diameter (mm):**	110	

Drilling Information				LITHOLOGY				Samples		Tests		
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description SOIL TYPE: plasticity or particle characteristics colour, moisture, secondary and minor components	Consistency / Density	Sample ID	Type	SPT	Pocket Penetrometer (kPa) 100 200 300 400	Well Installation Detail



Drill Company:	SDI Drilling	**Operator Name:**	Doug Miller	Refer to Standard Sheets for details of abbreviations
Machine Type:	Edson 1000	**Operators Licence No.:**	N/A	

Project ID:	CES170303-SD
Client:	Mushan Group Pty Ltd
Project:	Potts Hill Senior Living
Location:	10 Nelson Short Street, Potts Hill

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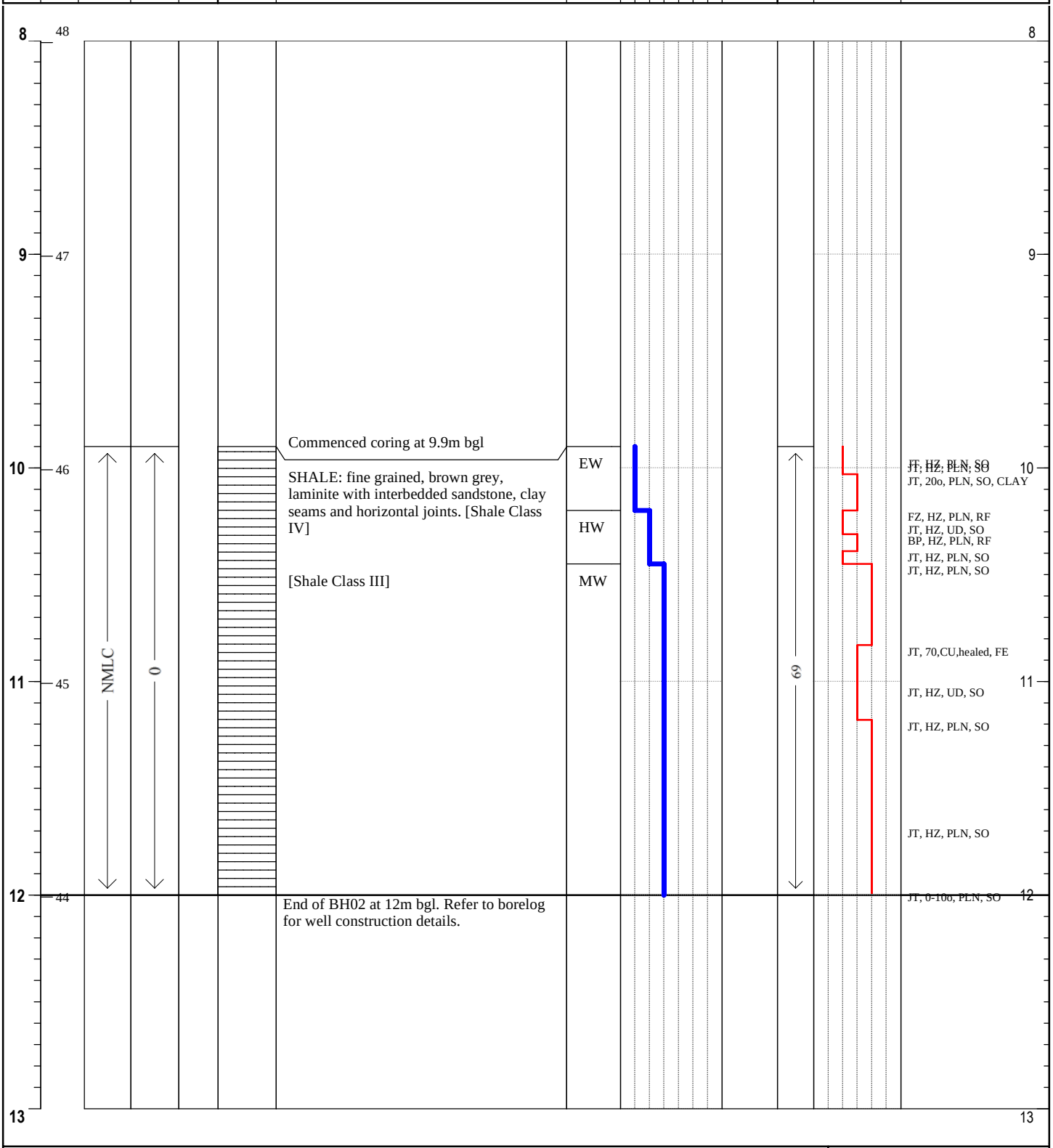
Corehole ID: BH02

Sheet: 1 of 1

X-Coord:	318287	**Date Commenced:**	13/07/2017	**Logged by:**	IW
Y-Coord:	6247448	**Date Completed:**	13/07/2017	**Checked by:**	DL
Surface Elevation (R.L.):	56 m AHD	**Hole Diameter (mm):**	110		



Drill Company:	SDI Drilling	**Operator Name:**	Doug Miller
Machine Type:	Edson 1000		

Refer to Standard Sheets for details of abbreviations

Project ID:	CES170303-SD
Client:	Mushan Group Pty Ltd
Project:	Potts Hill Senior Living
Location:	10 Nelson Short Street, Potts Hill

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LOG ID: BH03

Sheet: 1 of 1

X-Coord:	318258	GDA 94 MGA 56	**Date Commenced:**	14/07/17	**Logged by:** IW
Y-Coord:	6247503		**Date Completed:**	14/07/17	**Checked by:** DL
Surface Elevation (R.L) :	56	mAHD	**Hole Diameter (mm):**	110	

Drilling Information				LITHOLOGY				Samples		Tests		
Depth (mBGL)	R.L. (m)	Method (Support)	Water	Symbol	USCS Symbol	Description SOIL TYPE: plasticity or particle characteristics colour, moisture, secondary and minor components	Consistency / Density	Sample ID	Type	SPT	Pocket Penetrometer (kPa) 100 200 300 400	Well Installation Detail
0	56	ADV				Clayey SILT: dark brown, low plasticy silt, medium plasticity clay with sand, dry. [Fill]	Fm					
1	55					Silty CLAY: brown, medium plasticity, trace fine to medium grained gravels, dry. [Fill]	St			SPT01 @ 1-1.45m 5,11,8 N=19		
2	54					From 2m, brown grey / red brown. No gravels.	Fm			SPT02 @ 2-2.45m 2,4,5 N=9		
3	53					pale grey/ brown				SPT03 @ 3-3.45m 2,4,4 N=8		
4	52					From 4m, yellow brown/ pale grey From 4.4m, medium to high plasticity				SPT04 @ 4-4.45m 2,4,4 N=8		
5	51					Silty CLAY: pale grey, high plasticity, dry. [Natural]				SPT05 @ 5-5.45m 2,3,3 N=6		
6	50											
7	49					At 7.3m, moist.	H			SPT05 @ 6.5-6.95m 8,15,10/50mm N=HB		
						Coring commenced at 7.5m bgl. Refer to BH03 corelog.						
8	48											
9	47											
10	46											

Drill Company:	SDI Drilling	**Operator Name:**	Doug Miller
Machine Type:	Edson 1000	**Operators Licence No.:**	N/A

Refer to Standard Sheets for details of abbreviations

Project ID:	CES170303-SD
Client:	Mushan Group Pty Ltd
Project:	Potts Hill Senior Living
Location:	10 Nelson Short Street, Potts Hill

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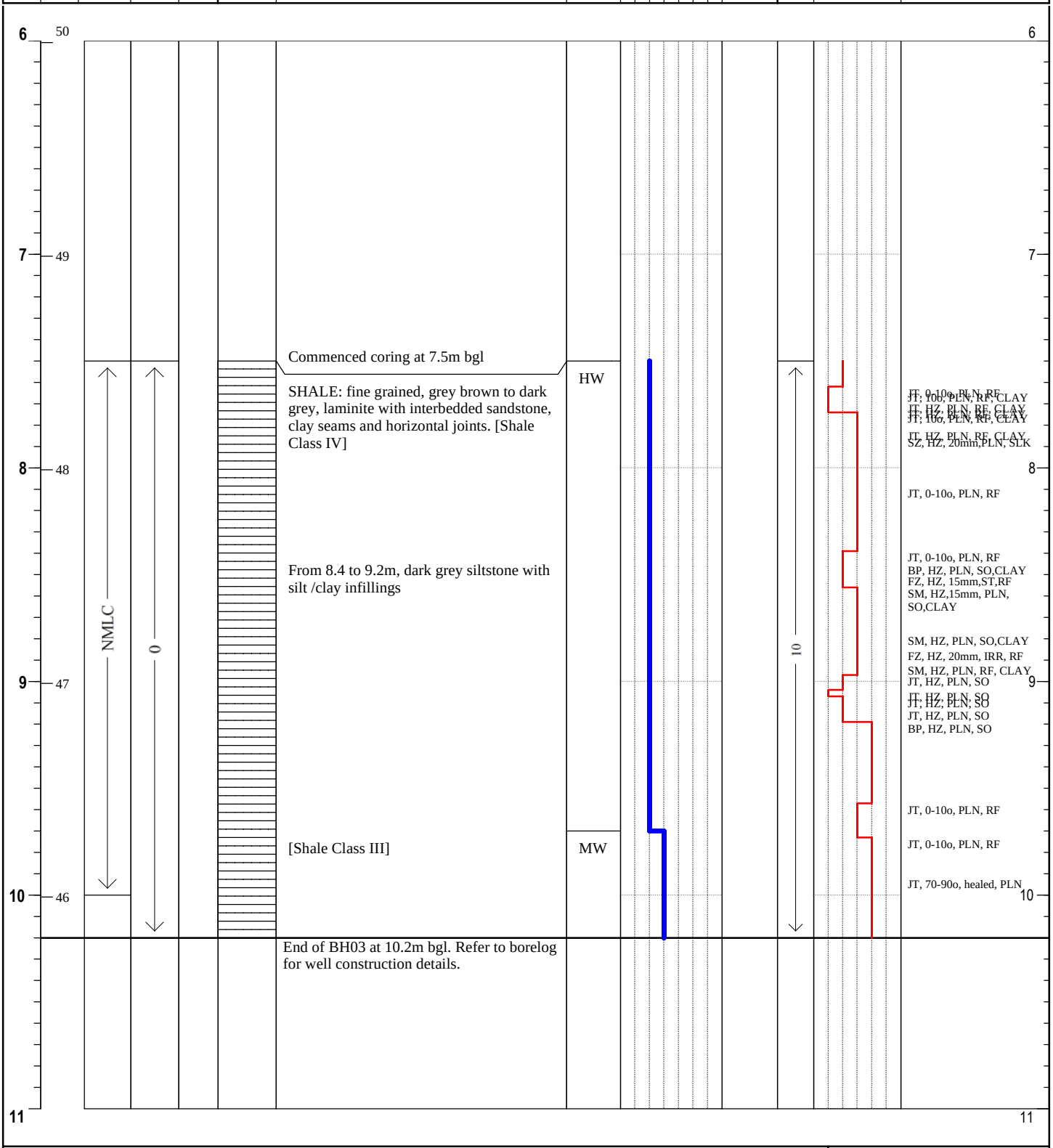
Corehole ID: BH03

Sheet: 1 of 1

X-Coord:	318258	**Date Commenced:**	14/07/2017	**Logged by:**	IW
Y-Coord:	6247503	**Date Completed:**	14/07/2017	**Checked by:**	DL
Surface Elevation (R.L.):	56 m AHD	**Hole Diameter (mm):**	110		



Drill Company:	SDI Drilling	**Operator Name:**	Doug Miller
Machine Type:	Edson 1000		

Refer to Standard Sheets for details of abbreviations

Project ID: CES170303-SD
Project: Potts Hill
Client: Mushan Group
Location: 10 Nelson Short St, Potts Hill

Easting: 318223mE
Northing: 6247391mN
Elevation:

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Environmental Log: **BH04**

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 2.5 5.0 7.5	
0	Push Tube			FILL: Gravelly clay, brown, moderate plasticity, dry.				
1				FILL: Gravelly clay, dry, low plasticity, mottled (orange, grey, red, brown), gravel.	BH04-0.8-0.9 BH04-2.5-2.7			
2								
3								
4				Becoming wet at 3.7m. FILL: Gravelly clay, orange/brown, wet.	BH04-4.0-4.2			
5	Auger			FILL: Clay, mottled, grey/orange, wet. FILL: Clay, grey/orange, low plasticity, dry.	BH04-5.0-5.1			
6				CLAY: Wet, grey/brown.				
7								
8				**Borehole terminated at 7.5m bgl** **Target depth reached**				

Drill Company: Numac Drilling
Drill Model:
Hole Diameter (mm): 100

Date Commenced: 17/07/17
Date Completed: 17/07/17
Logged/checked by: EM

Project ID: CES170303-SD
Project: Potts Hill
Client: Mushan Group
Location: 10 Nelson Short St, Potts Hill

Easting: 318241mE
Northing: 6247414mN
Elevation:

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Environmental Log: **BH05**

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 2.5 5.0 7.5	
0	Push Tube			FILL: Gravelly clay, brown, dry, low plasticity, Rootlets at 0.1m	BH05-0.9-1.0			
1				FILL: Gravelly clay, mottled, grey, red, brown, moderate plasticity and dry.	BH05-2.0-2.1/Q1/Q2			
2								
3				FILL: Gravelly clay, mottled, grey, red, brown, high plasticity and dry.				
				FILL: Grey, brown, clay, high plasticity, moist	BH05-3.4-3.6			
4				FILL: Black,clay, slight organic odour, dry, low plasticity (crumbly)				
				FILL: Grey/orange, clay, high plasticity, moist Becoming low plasticity and increased gravel at 4.7m	BH05-4.3-4.4			
5				FILL: Brown, gravelly clay, dry, moderate plasticity Refusal/Resistance at 5.1-5.5m				
6	Auger			CLAY: Brown, dry, low plasticity				
7								
8				**Borehole terminated at 8.0m bgl** **Target depth reached**				
9								

Drill Company: Numac Drilling
Drill Model:
Hole Diameter (mm): 100

Date Commenced: 18/07/17
Date Completed: 18/07/17
Logged/checked by: EM

Project ID: CES170303-SD
Project: Potts Hill
Client: Mushan Group
Location: 10 Nelson Short St, Potts Hill

Easting: 318286mE
Northing: 6247470mN
Elevation:

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Environmental Log: **BH06**

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 2.5 5.0 7.5	
0	Push Tube			FILL: Brown, silty clay, dry, low plasticity, sandstone cobbles.				
1				FILL: Brown clay, mottled (orange, grey, brown), gravel.	BH06-1.2-1.3			
2				FILL: Brown, gravelly clay, dry, low plasticity.				
2.6				FILL: Mottled gravelly clay.	BH06-2.5-2.6			
3				FILL: Brown, gravelly clay, dry.	BH06-3.0-3.2			
				Sandstone cobbles at 3.2m				
4				FILL: Brown clay, moist, moderate plasticity.	BH06-4.0-4.1			
5				FILL: Red, high plasticity, moist, some gravel.				
				FILL: Orange/grey, gravelly clay, high plasticity, moist, some organic/wood present.	BH06-5.4-5.5			
6				FILL: Dark brown clay, Very slight organic odour, rootlets, gravel, moist, low plasticity.	BH06-6.5-6.6			
7				CLAY: Red/grey, moist, high plasticity.	BH06-7.6-7.7			
8				**Borehole terminated at 8.0m bgl Target depth reached**				
9								

Drill Company: Numac Drilling
Drill Model:
Hole Diameter (mm): 100

Date Commenced: 17/07/17
Date Completed: 17/07/17
Logged/checked by: EM

Project ID: CES170303-SD
Project: Potts Hill
Client: Mushan Group
Location: 10 Nelson Short St, Potts Hill

Easting: 318305mE
Northing: 6247481mN
Elevation:

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Environmental Log: **BH07**

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 2.5 5.0 7.5	
0	Push Tube			FILL: Gravelly sand, Fine to medium, orange/brown, dry.				
				FILL: Gravelly clay, dry, low platricity, brown.	BH07-0.5-0.7			
1								
2					BH07-2.0-2.1			
				Becoming mottled at 2.7m.				
3								
4				Shale cobbles at 4.4m	BH07-4.5-4.7			
5								
6				FILL: Gravelly clay, grey/brown, wet, low plasticity.	BH07-6.2-6.3			
				CLAY: Dry, pale brown, moderate to low plasticity.				
7				CLAY: Brown, becoming red/ grey.				
				Borehole terminated at 7.5m bgl Target depth reached				
8								

Drill Company: Numac Drilling
Drill Model:
Hole Diameter (mm): 100

Date Commenced: 17/07/17
Date Completed: 17/07/17
Logged/checked by: EM

Project ID: CES170303-SD
Project: Potts Hill
Client: Mushan Group
Location: 10 Nelson Short St, Potts Hill

Easting: 318304mE
Northing: 6247515mN
Elevation:

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Environmental Log: **BH08**

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 2.5 5.0 7.5	
0	Push Tube			FILL: Brown, silty clay, gravels and cobbles of concrete. Rootlets at 0.2m				
1					BH08-1.0-1.1			
2					BH08-2.1-2.2			
3				FILL: Silty clay, grey/brown, dry, low plasticity.	BH08-3.1-3.2			
				FILL: Clay, mottled (Orange, grey, red, brown), dry, low plasticity, gravels.				
4					BH08-4.4-4.5			
5				FILL: Clay, pale brown, very dry,, gravels.				
6					BH08-6.0-6.3			
				FILL: Clay, pale brown, moist.				
7				FILL: Clay, grey/brown, wet, gravels, high plasticity.	BH08-7.0-7.1			
				CLAY: Red, high plasticity, moist, organic (wood) material. Becoming grey-red at 7.5m				
8				**Borehole terminated at 8.0m bgl** **Target depth reached**	BH08-7.9-8.0			
9								

Drill Company: Numac Drilling
Drill Model:
Hole Diameter (mm): 100

Date Commenced: 17/07/17
Date Completed: 17/07/17
Logged/checked by: EM

Project ID: CES170303-SD
Project: Potts Hill
Client: Mushan Group
Location: 10 Nelson Short St, Potts Hill

Easting: 318249mE
Northing: 6247480mN
Elevation:

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Environmental Log: **BH09**

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 2.5 5.0 7.5	
0	Push Tube			FILL: Sandstone, yellow.				
				FILL: Yellow/brown, gravelly clay, dry, low plasticity.	BH09-1.1-1.2			
1				FILL: Brown, gravelly clay with sandstone cobbles, dry, low plasticity.				
2				FILL: Gravelly clay, mottled (grey, orange, red, brown), dry, low plasticity.	BH09-2.2-2.3			
				FILL: Clay, mottled (grey, orange, red, brown), moderate plasticity	BH09-3.6-3.7			
3					BH09-4.8-5.0			
4				Becoming high plasticity at 4.5m				
5				FILL: dark brown clay, organic odour, high plasticity, slightly moist.	BH09-5.3-5.4			
				CLAY: grey/brown, moist, high plasticity.	BH09-6.5-6.6			
6				becoming grey red at 6.0m Moderate plasticity at 6.1m. Becoming yellow/grey at 6.3m.				
7				**Borehole terminated at 7.4m bgl Target depth reached**				
8								

Drill Company: Numac Drilling
Drill Model:
Hole Diameter (mm): 100

Date Commenced: 17/07/17
Date Completed: 17/07/17
Logged/checked by: EM

Project ID: CES170303-SD
Project: Potts Hill
Client: Mushan Group
Location: 10 Nelson Short St, Potts Hill

Easting: 318286mE
Northing: 6247503mN
Elevation:

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Environmental Log: **BH10**

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 2.5 5.0 7.5	
0	Push Tube			FILL: Clay, dry, low plasticity with gravels, cobbles of sandstone.	BH10-1.0-1.1			
1								
				FILL: Grey/brown, moist, high plasticity.				
2				FILL: Brown, very dry, very low plasticity.	BH10-2.0-2.1			
				FILL: Mottled (orange, grey, brown, red), dry, very low plasticity.	BH10-3.0-3.2 QAQC1/QAQC2			
3								
				FILL: Mottled (orange, grey, brown, red), slightly moist, high plasticity.	BH10-4.0-4.1			
4					BH10-5.0-5.1			
5								
				FILL: Silty clay, dark brown plant fibre, organic odour, dry.				
6				CLAY: Orange/red, high plasticity.	BH10-6.0-6.2			
				CLAY: Grey and low plasticity.				
7				CLAY: Mottled (orange, grey, brown, red), dry, low plasticity.	BH10-7.1-7.3			
8				**Borehole terminated at 8.0m bgl Target depth reached**				
9								

Drill Company: Numac Drilling
Drill Model:
Hole Diameter (mm): 100

Date Commenced: 17/07/17
Date Completed: 17/07/17
Logged/checked by: EM

Project ID: CES170303-SD
Project: Potts Hill
Client: Mushan Group
Location: 10 Nelson Short St, Potts Hill

Easting: 318297mE
Northing: 6247415mN
Elevation:

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Environmental Log: **BH11**

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 2.5 5.0 7.5	
0	Push Tube			FILL: Gravelly clay,brown, cobbles of concrete, dry, weak, low plasticity.	BH11-1.9-2.0			
1								
2				Shale sand at 2.1m				
3								
3.5				FILL: Gravelly clay, orange/grey, dry, weak, low plasticity.	BH11-3.5-3.6			
4.4				FILL: Clay, grey/orange, soft, high plasticity, moist.	BH11-4.4-4.5			
4.9				FILL: Weathered clay, dry, weak, pale brown. Shale fragment/gravel at 4.9m.				
5.9				FILL: Gravelly clay, brown, moist/wet, loose.	BH11-5.9-6.0			
6				CLAY: brown becoming grey/red, organic/black wood matter, moist,	BH11-6.0-6.1 BH11-7.9-8.0			
7				No organic intrusion, weak and dry at 7.0m.				
8				**Borehole terminated at 8.0m bgl Target depth reached**				
9								

Drill Company: Numac Drilling
Drill Model:
Hole Diameter (mm): 100

Date Commenced: 18/07/17
Date Completed: 18/07/17
Logged/checked by: EM

Project ID: CES170303-SD
Project: Potts Hill
Client: Mushan Group
Location: 10 Nelson Short St, Potts Hill

Easting: 318297mE
Northing: 6247381mN
Elevation:

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Environmental Log: **BH12**

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 2.5 5.0 7.5	
0	Push Tube			FILL: Concrete rubbles/cobbles				
				FILL: Gravelly clay, brown, dry, weak, low plasticity	BH12-0.5-0.6			
1				Layers of mudstone/shale at 1.0m				
2					BH12-2.4-2.5			
3				Sandstone at 3.0m				
				FILL: Clay, dry, weak, low plasticity, orange/grey.				
4				Shale fragments at 4.4m				
5				CLAY: Clay, orange to grey, dry, low plastcity, stiff	BH12-5.0-5.1			
6				CLAY: weathered grey orange to orange, dry, weak, loose	BH12-6.7-6.8			
7				**Borehole terminated at 7.0m bgl Target depth reached**				
8								

Drill Company: Numac Drilling
Drill Model:
Hole Diameter (mm): 100

Date Commenced: 18/07/17
Date Completed: 18/07/17
Logged/checked by: EM

Project ID: CES170303-SD
Project: Potts Hill
Client: Mushan Group
Location: 10 Nelson Short St, Potts Hill

Easting: 318269mE
Northing: 6247403mN
Elevation:

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Environmental Log: **BH13**

DRILLING INFO.			LITHOLOGY		SAMPLING INFORMATION			WELL DETAIL
Depth	Method	Water	Symbol	Description	Sample ID	Type	FID/PID (ppm) 0 2.5 5.0 7.5	
0	Push Tube			FILL: Brown, gravelly clay with cobbles of concrete, dry, weak				
2				FILL: Orange sandstone, fine to medium, weak, dry.				
3				FILL: Clay, dark brown with some rusty coloured sand, moist, weak, low to medium plasticity.	BH13-2.8-2.9			
				FILL: Clay, grey/orange, soft, high plasticity, moist. Becoming more stiff at 3.5m				
4				FILL: Dark brown clay, dry-moist, weak/loose, slight organic, some rootlets/organic wood observed.	BH13-4.2-4.3			
5				CLAY: Clay, grey/orange, stiff, dry, low plasticity. Becoming grey at 5.7m.				
6				CLAY: CLay, mottled, grey, orange, red, brown, dry, stiff, weak.				
7				CLAY: Clay, grey/red, dry, brittle weak. Becoming orange at 7.0m	BH13-7.0-7.1			
8				**Borehole terminated at 7.5m bgl** **Refusal at 7.5m**				

Drill Company: Numac Drilling
Drill Model:
Hole Diameter (mm): 100

Date Commenced: 18/07/17
Date Completed: 18/07/17
Logged/checked by: EM

Project ID: CES170303-SD
Project: Potts Hill
Client: Mushan Group
Location: 10 Nelson Short St, Potts Hill

Easting: 318277mE
Northing: 6247448mN
Elevation:

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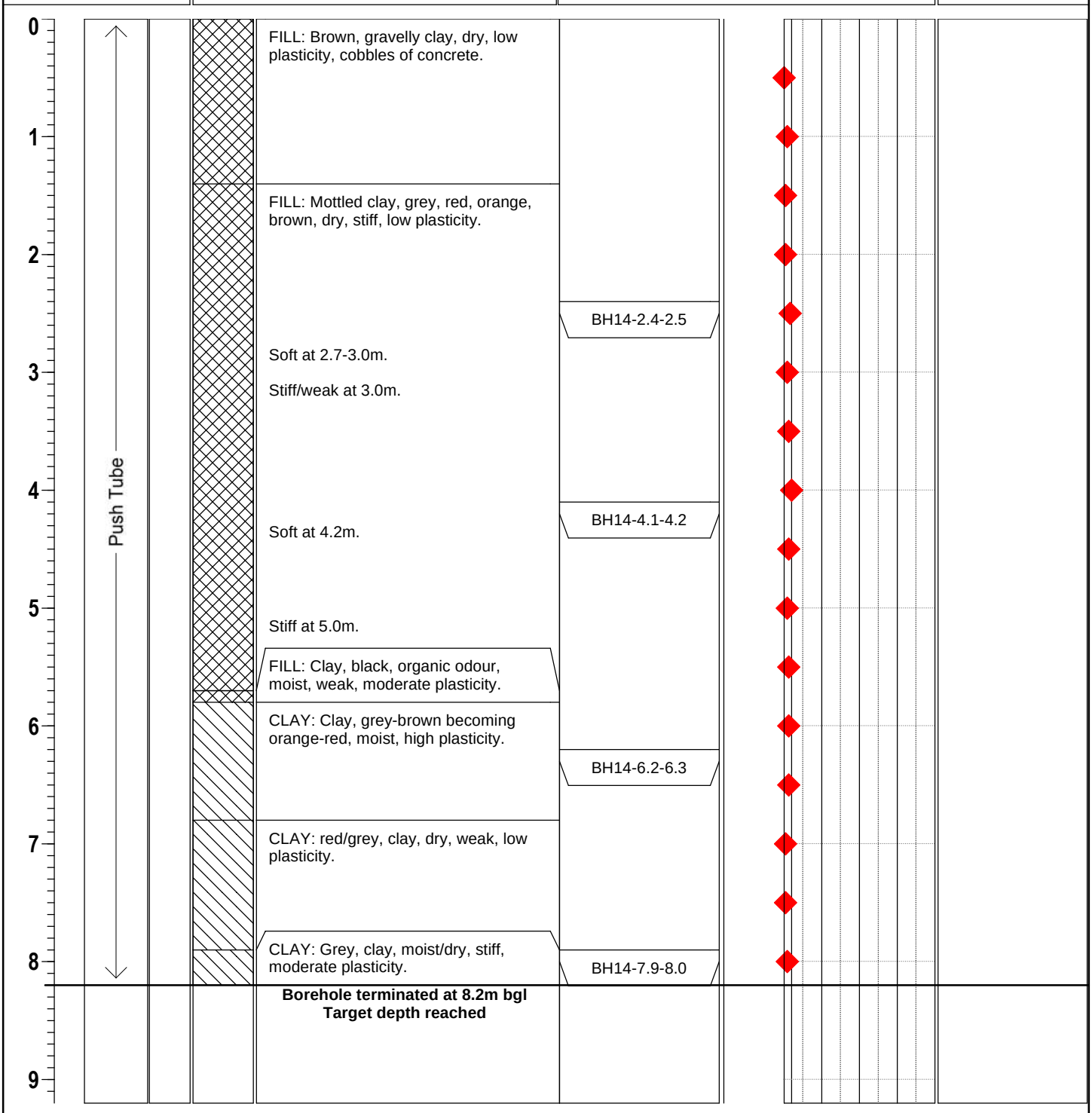
Environmental Log: **BH14**



Drill Company: Numac Drilling
Drill Model:
Hole Diameter (mm): 100

Date Commenced: 18/07/17
Date Completed: 18/07/17
Logged/checked by: EM

Project ID: CES170303-SD
Project: Potts Hill
Client: Mushan Group
Location: 10 Nelson Short St, Potts Hill

Easting: 318240mE
Northing: 6247447mN
Elevation:

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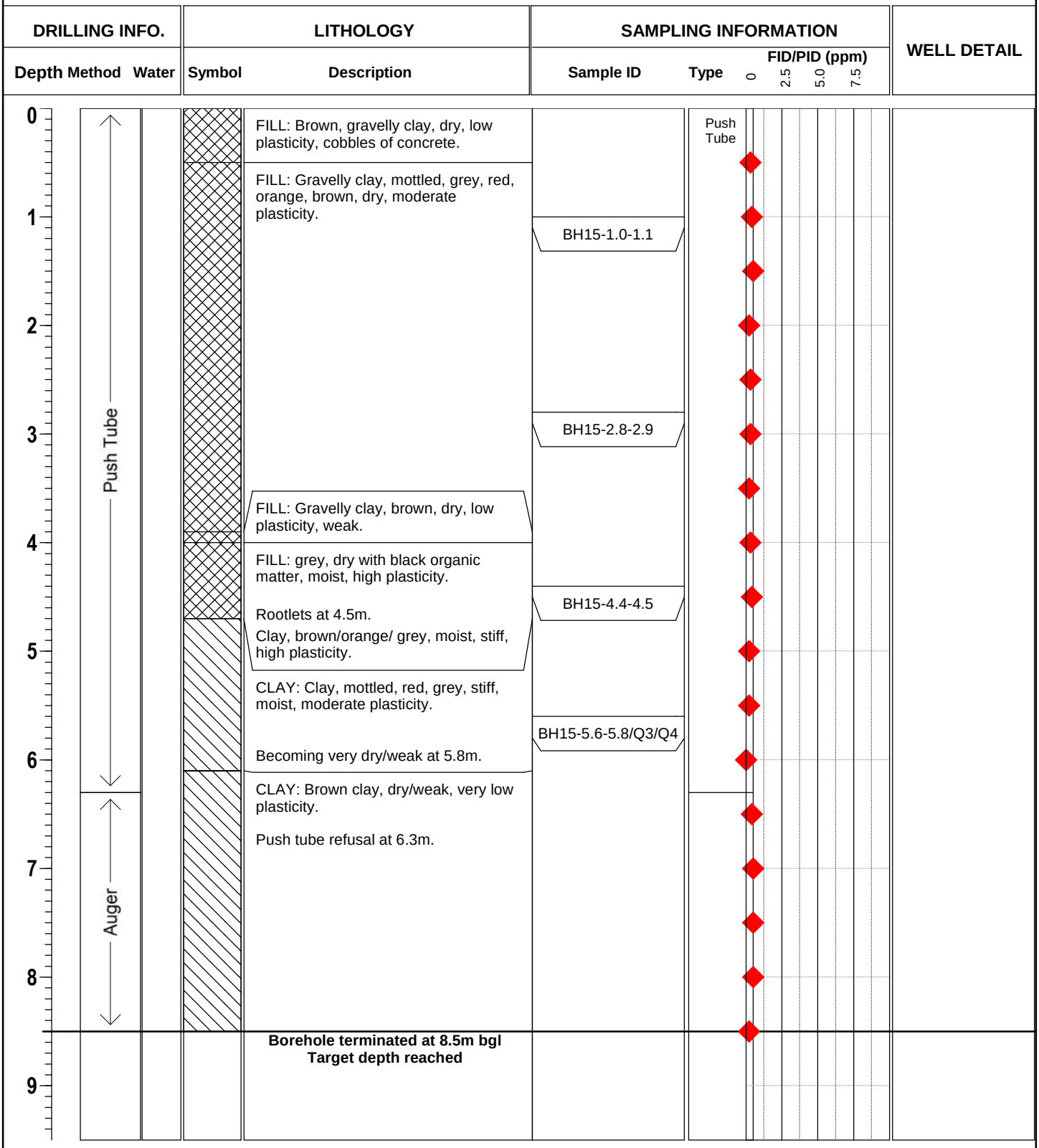
Environmental Log: **BH15**



Drill Company: Numac Drilling
Drill Model:
Hole Diameter (mm): 100

Date Commenced: 18/07/17
Date Completed: 18/07/17
Logged/checked by: EM

Appendix E QA/QC Summary

Table E1. Sampling and Analysis Plan Methodology

Sampling Item	EPA Guidelines	CES (16 August 2017)	Auditor Comment
Data Quality Objectives (DQOs)	"Data Quality Objectives: Outline of the DQO Process" in Schedule B2 of NEPM (2013).	The objective of this report was to assess whether the site is likely to be suitable for the proposed high-density residential development designed for seniors living, or whether further investigation or remediation is required. DQOs were not provided.	The Auditor considers the objectives to be appropriate, but requires DQOs to be provided in future investigations.
Sampling Pattern Rationale	The EPA (1995) Sampling Design Guidelines (Section 2.3) provides details on judgmental, random, systematic and stratified sampling pattern.	Systematic	The Auditor considers the sampling pattern to be appropriate for the purposes of this SAR.
Sampling Density Rationale:	EPA (1995) Sampling Design Guidelines	15 soil boreholes (2 converted into groundwater monitoring wells) within the Main area (outside the embankment), which is approximately 1.5ha. The number of sampling locations is below the NSW EPA (1995) requirement of 25 locations.	The Auditor considers the sampling density rational to be appropriate for the purposes of this SAR
Locations Shown on Site Plan:	The OEH (2011) Guidelines for Consultants reporting on Contaminated Sites requires that sampling locations are shown on a site plan.	Provided in figures reproduced in Appendix A.	The Auditor considers this requirement to have been met.
Sampling Depths	The OEH (2011) Guidelines for Consultants Reporting on Contaminated Sites requires information on the depths of samples that were collected. NEPM (2013) Schedule B2.	Samples were randomly analysed from various depths from 0.4mbgl to 7.7mbgl within the fill and natural material. One to maximum three samples were analysed per location.	The Auditor considers the sampling depths to be appropriate for the purposes of this SAR.

Sampling Item	EPA Guidelines	CES (16 August 2017)	Auditor Comment
Selection of Samples for Analysis:	The OEH (2011) Guidelines for Consultants Reporting on Contaminated Sites. NEPM (2013) Schedule B2	Rationale for sample selection not provided. The following boreholes and depths were noted to have organic odour but were not analysed/sampled: BH05 (3.7-4.2m), BH06 (6.5-6.6m), BH10 (5.6-5.8m), BH14 (5.7-5.8m). CES states that soil with organic odour was analysed from BH09 (5.3-5.4m) which did not detect TRH, BTEX or naphthalene exceeding LOR. PID readings did not detect significant VOC. CES considers the organic odour could be associated with former topsoil layer present onsite prior to filling.	The Auditor considers that the selection of samples for analysis was appropriate for the purposes of this SAR.
Sample Splitting Techniques and Statement of QA/QC Sample Frequencies	NEPM (2013) Schedule B3 EPA (2017) Contaminated Land Management Guidelines for the NSW Site Auditor Scheme OEH (2011) Guidelines for Consultants Reporting on Contaminated Sites	Section 7.3 and 7.4 state blind replicate soil samples were preserved, stored, transported, prepared and analysed in an identical manner to the primary sample. Split samples were taken from the same location as the blind replicate. Two intralaboratory and two interlaboratory soil duplicates were analysed for a total of 25 primary samples, which met the acceptance targets. One intralaboratory duplicate was analysed for groundwater. No interlaboratory duplicate was analysed for groundwater.	The Auditor considers that the sample splitting techniques were appropriate for the purposes of this SAR. The QA/QC sampling frequencies for the investigations generally comply with NEPM (2013) requirements. The Auditor considers this to be acceptable.
Analytical Methods:	EPA (2017) Contaminated Land Management Guidelines for the NSW Site Auditor Scheme	Analytical methods are provided in Tables 4 and 5. Laboratories were NATA accredited.	The Auditor considers the analytical methods to be appropriate for the purposes of this SAR.
Sample Container Selection:	NEPM (2013) Schedule B2 and B3	Section 5.6.1 states soil samples were collected in laboratory prepared glass jars with Teflon lined lids and groundwater samples were collected in laboratory supplied containers with appropriate preservatives.	The Auditor considers the sample container selection to be appropriate for the purposes of this SAR.
Sampling Devices / Techniques	NEPM (2013) Schedule B2 and B3 DEC (2007) Groundwater Guidelines	Soil samples were collected directly from push tube sleeve using new nitrile gloves.	The Auditor considers the sampling devices / techniques adopted to be appropriate for the COPC and purpose of this SAR.
Decontamination Procedures:	Australian Standard AS4482.1 – 2005	Section 5.6 states no decontamination of sampling equipment was required as soil samples were collected directly from the dedicated push tube sleeves using dedicated new nitrile gloves.	The Auditor considers the decontamination procedures to be appropriate for the purposes of this SAR.

Sampling Item	EPA Guidelines	CES (16 August 2017)	Auditor Comment
	NEPM (2013) Schedule B2 and B3		
Sample Handling and Preservation Procedures:	NEPM (2013) Schedule B3 AS4482.1 and AS 4482.2	Section 5.7 states sample containers were immediately placed in a cool box in which ice had been added and then transported directly to the laboratory.	The Auditor considers these procedures to be appropriate for the purposes of this SAR.
Field Calibration and Screening Protocols	NEPM (2013) B2	Calibration records for PID, water interface meter and water quality meter are provided in Appendix I.	The Auditor considers the field calibration and screening protocols to be appropriate for the purposes of this SAR.
Groundwater Monitoring Well Installation	NEPM (2013) Schedule B2 DEC (2007)	Section 5.2 states groundwater wells BH02 and BH03 were installed to depths of 12m (Screened 2m) and 10m (screened 3m) below ground level. The wells were completed with a gravel pack from the depth of the well to 0.7m above the screen and finalised with bentonite and gatic covers. Groundwater was not identified at BH01 and hence well was not installed.	The Auditor considers this method of construction to be appropriate for the COPC and purposes of the SAR.
Groundwater Monitoring Well Development & Sampling	NEPM (2013) Schedule B2 DEC (2007) AS5667.11 (1998)	Section 5.2 states the purging process was undertaken by the low-flow method using a decontaminated bladder pump with drawdown control to limit drawdown to less than 0.05 m, one week after development. This was done using a low flow pump with inlet tubing (Teflon free) set at the midpoint of the response zone (slotted pipe). Sampling also used low flow technique after water quality parameters stabilise.	The Auditor considers the well development and sampling to be appropriate for the COPC and purposes of the SAR.

Table E2. Quality Assessment and Quality Control Summary

Requirement	DQI	CES (16 August 2017)	Auditor Comment
Completeness		**DQI Range**	
Appropriate field sampling, sample documentation & description	AS4482.2 (1997) Parts 1&2	All samples comply	Acceptable
Records detailing samples & conditions	Recorded on Borehole logs	All sample records provided in borehole logs.	Acceptable
All critical samples analysed for COCs and compared to criteria	All Samples.	Critical samples generally analysed. CES states samples with organic odours were likely associated with previous topsoil prior to filling.	Acceptable
Comparability			
Experienced sampling team followed SAQP/SOP	Comment made in report	Section 7.2 states that samples were collected by an experienced CES geotechnical engineer and environmental engineer.	Acceptable
Climatic Conditions Recorded & Discussed	Recorded on Borehole logs or in Report	Not provided	Acceptable
Primary Laboratory	NATA Accredited to 17025	Envirolab (NATA 17025)	Acceptable
Secondary Laboratory	NATA Accredited to 17025	ALS (NATA 825)	Acceptable
Appropriate Analytical Methods	NEPM	All NATA accredited	Acceptable

Requirement	DQI	CES (16 August 2017)	Auditor Comment
LOR, PQL Appropriate & Consistent	LOR<criteria	LOR<criteria, with the exception of some OCPs, OPPs PCBs above freshwater/marine GIL. CES states that no site historical information or previous SAR did not identify sources of PCBs or OCPs.	The Auditor notes the non-conformance in the LOR, but considers that this is unlikely to affect the outcome of the audit, given OCPs, OPPs and PCBs were not detected in significant concentrations in the previous audit.
Representativeness			
Sample Handling Appropriate & Received by Lab in Good Condition under correct Preservation Conditions	Compliant SRN	Section 5.7 states sample containers were immediately placed in a cool box in which ice had been added and then transported directly to the laboratory. SRN indicates samples were received by the laboratory in good condition, with some attempt of chilling, noting that in some batches the temperature was >18°C. No SRN provided for the secondary laboratory.	The Auditor considers that the absence of secondary laboratory SRN would not affect the outcome of the audit. The Auditor notes that while attempts of chilling were present, two batches have temperatures of 17.9°C and 18.9°C. The Auditor notes that only 3 samples were analysed from these two batches. While the analyses included TRH and BTEX, the Auditor considers that the temperature is unlikely to affect the outcome given no TRH/BTEX were detected in the remainder of the samples exceeding LOR.
Field Screening Method Calibration	Field Instrumentation calibrated in accordance with manufacturers instruction	Calibration records for PID, water interface meter and water quality meter are provided in Appendix I.	Acceptable
Primary Lab Holding Times	All samples comply with NEPM (2013)	Holding times were met.	Acceptable
Secondary Lab Holding Times	All samples comply with NEPM (2013)	Holding times were met.	Acceptable
Trip Spike	(per sampling event) 70-130%R	Not analysed	The Auditor considers that the absence of trip spikes is unlikely to affect the outcome of the audit given volatile contamination has not been identified at the site in significant concentration.

Requirement	DQI	CES (16 August 2017)	Auditor Comment
Trip Blank	70-130%R	Not analysed	The Auditor considers that the absence of trip blank is unlikely to affect the outcome of the audit given volatile contamination has not been identified at the site in significant concentration.
Rinsate Blank	(per sampling event)	Not analysed. Samples were collected from disposable push tube liner with disposable gloves.	The Auditor considers that rinsate blank should have been collected on the interface meter, which was used for all wells. However, groundwater samples did not indicate potential cross contamination.
Precision			
Primary Lab Duplicates (D)	(1/20 sample batch)	%RPD: 0-67%	Acceptable, considering the overall data.
Field Duplicate Samples by Primary (intra-laboratory duplicates)	<5xPQL = any %RPD	%RPD: 0-37.5% (soil) %RPD: 0-50% (groundwater)	Acceptable
Field Duplicate Samples by Secondary (intra-laboratory duplicates)	>5xPQL = <50% RPD	%RPD: 0-37%	Acceptable
Accuracy			
Primary Lab Matrix Spikes (MS)	(1/20 sample batch) 70-130%R Soil	%R: 80-124%	Acceptable
Primary Lab Surrogate Spikes (S)	(1/20 sample batch) 70-130%R Soil	%R: 70-123%	Acceptable
Primary Lab Control Spikes (LCS)	(1/20 sample batch) 70-130%R Soil	%R: 70-127%	Acceptable

Requirement	DQI	CES (16 August 2017)	Auditor Comment
Primary Lab Method Blanks (MB)	<LOR	<LOR	Acceptable
Secondary Laboratory QA/QC Data (Soil and Water)	0-100%R 70-130%R 70-140%R 70-140%R <LOR	D: 0-25.4%RPD MS: 81.8-120%R S: 86-128%R LCS: 71.4-119%R MB: <LOR	Acceptable

Appendix F Remedial Action Plan

CONSULTING EARTH SCIENTISTS

REMEDIAL ACTION PLAN
10 NELSON SHORT STREET, POTTS HILL, NEW SOUTH WALES
CES DOCUMENT REFERENCE: CES170303-SD-AE

Written by: J. Johnston

Reviewed by: D. Johnson

Authorised by: D. Lowe

Client: Mushan Pty Limited
Suite 2, Level 33
1 Macquarie Place,
Sydney 2000

Date: 17 August 2018

Suite 3, Level 1 • 55-65 Grandview Street • Pymble, NSW 2073 • Australia
Telephone: 02 8569 2200 • Fax: 02 9983 0582 0 • ABN 67 151 524 757

Document Control

REMEDIAL ACTION PLAN
10 NELSON SHORT STREET, POTTS HILL, NEW SOUTH WALES
PREPARED FOR MUSHAN GROUP PTY LTD

CES DOCUMENT REFERENCE: CES170303-SD-AE

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Revision Number	Revision Date	Description
0.0	18/07/2018	Original Report: CES170303-SD-AE Remedial Action Plan
1.0	17/08/2018	CES170303-SD-AE Remedial Action Plan updated based on IA1

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EXECUTIVE SUMMARY

The site (10 Nelson Short Street, Potts Hill) (Lot 104 in Deposited Plan (DP) 1149790) covering an area of approximately 1.9 hectares is currently zoned as commercial/ industrial (business park) land use. The site was previously owned by Sydney Water Corporation and is situated within the former Sydney Water Potts Hill Reservoir Site.

The objective of the Remedial Action Plan (RAP) is to set remediation goals which will assist in making the site suitable for the proposed residential use and will pose no unacceptable risk to human health or to the environment. The site has previously had a Site Audit Report (SAR) (Environ, 2010), an Environmental Management Plan (EMP) put into effect (AECOM, 2010) and a Stage 1 – Preliminary Site Investigation (PSI) (CES, 2017) undertaken, in which the finding are the basis for this RAP.

Previous environmental reports provided to CES included a Site Audit Report and Environmental Management Plan (EMP). The Audit completed by Environ considered the review of twenty-five reports prepared between 1996 and 2010. The key sources of contaminants identified at the site were filling of unknown origin, storage activities and a former Underground Storage Tank (UST). The contaminants of concern therefore were considered as asbestos containing materials (ACM), heavy metals, TPH, BTEX, PAHs, OCPs, OPP and phenols. The main contaminants identified in the samples submitted for laboratory analysis included PAH, mainly identified in samples collected from the shallow fill of the northern portion of the Main Area but also identified in the embankment fill material (possibly due to the presence of ash, coal, slag, and bitumen/asphalt in the fill materials), TPH C10-C36 from five samples collected from the Main Area, and some heavy metals, primarily arsenic, lead and zinc. Additionally, one small fragment of cement bonded sheeting identified within a sample collected from the surface on the eastern embankment was identified as asbestos containing. It was considered by the Auditor that the remedial works and validation sampling was adequate to demonstrate the Main Area of the site suitable for commercial/industrial use. The Embankment area however was deemed not suitable for commercial/industrial use but could be maintained in a condition suitable for commercial/industrial use with the provision of an Environmental Management Plan.

In 2017 CES undertook a Stage 1 – Preliminary Site Investigation (CES, 2017), to investigate data gaps that were deemed areas of concern regarding the site. The scope of works during this investigation included:

- Desktop study;
- Site inspection;
- Soil and groundwater sampling programme; and
- Preparation of this Stage I – Preliminary Site Investigation report.

No exceedance of human health criteria was identified in the analysis results for the fill samples from the fifteen borehole locations. One location exceeded the ecological criteria for benzo(a)pyrene, however this was not considered significant as the entire footprint of the proposed development will be excavated for the construction of a basement carpark, thus removing the fill material from site. Additionally, results of fill from the top three metres were compared to NSW EPA waste classification criteria for a preliminary waste classification and were within the criteria for classification as general solid waste.

Groundwater results were below the SAC for all analytes tested with the exception of copper, nickel, and zinc. These concentrations exceeded the groundwater investigation levels (GIL) – marine waters criteria, however it is likely that these concentrations are background concentrations and unlikely to impact the receiving natural water body of Cooks River.

The Total Organic Carbon (TOC) content of fill and natural soil samples below three metres indicates a "Characteristic Situation 1" in accordance with CL:AIRE - *A Pragmatic Approach to Ground Gas Risk Assessment* (CL:AIRE, 2012) and therefore a very low ground gas risk.

As there were no analysed fill samples that exceeded the human health based SAC, it is unlikely that site soils located within the main flat area of the site pose a potential risk to human health or the environment for the proposed high density residential development. However, the investigation was limited in spatial scope, with the embankment area of the site not investigated.

Previous investigations detected PAH and asbestos impacts within the embankment, therefore the embankment requires further investigation and may require remediation to make the site suitable for the proposed use. Additional investigation work should consist of 13 sample locations as required to meet the NSW EPA minimum sample density requirement for a site of 1.8 ha. The further investigations should be targeted to investigate the area of the site which has the highest risk of unsuitable contamination, the embankment which is currently subject to an EMP.

This RAP has been prepared to further assess the contamination status of the site. The results of previous investigations at the site are discussed and data gaps and further investigations identified (Section 5.5).

Remediation, if required following the further investigations, should be carried out in accordance with Sections 8-11.

This RAP is considered suitable to confirm whether or not the site is suitable for the proposed high density residential use. If the additional investigations identify impacts which pose an unacceptable risk to human health or the environment, implementation of the remedial actions detailed in Sections 6-11 is considered suitable to make the site suitable for the proposed high-density land use.

This RAP should be revised following further investigation detailed in Section 5.5 if required based on the investigation results.

REMEDIAL ACTION PLAN
10 NELSON SHORT STREET, POTTS HILL, NEW SOUTH WALES
PREPARED FOR MUSHAN GROUP PTY LTD

CES DOCUMENT REFERENCE: CES170303-SD-AE

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LIST OF ABBREVIATIONS

ACM	Asbestos Containing Material
AHD	Australian Height Datum
ASS	Acid Sulfate Soil
BTEX	Benzene, Toluene, Ethylbenzene and Total Xylenes
CES	Consulting Earth Scientists Pty Ltd
CLM	Contaminated Land Management
COPC	Contaminants of Potential Concern
DECCW	Department of Environment and Climate Change and Water
DLWC	Department of Land and Water Conservation
EMP	Environmental Management Plan
EPA	Environment Protection Authority
ESA	Environmental Site Assessment
km	Kilometre
LGA	Local Government Area
LPI	Land and Property Information Division
LEP	Local Environmental Plan
m	Metre
mbgl	metres Below Ground Level
NEPM	National Environment Protection Measure
NSW	New South Wales
OCP	Organochlorine Pesticide
PAH	Polycyclic Aromatic Hydrocarbon
PSI	Preliminary Site Investigation
PSP	Project Safety Plan
RAP	Redial Action Plan
TRH	Total Recoverable Hydrocarbons
UST	Underground Storage Tank
VOC	Volatile Organic Compounds

REMEDIAL ACTION PLAN

10 NELSON SHORT STREET, POTTS HILL, NEW SOUTH WALES
PREPARED FOR MUSHAN GROUP PTY LTD

CES DOCUMENT REFERENCE: CES170303-SD-AE

1 INTRODUCTION

1.1 *BACKGROUND*

Consulting Earth Scientists Pty Ltd (CES) was commissioned by Mushan Group Pty Ltd (Mushan, the Client) to prepare a Remedial Action Plan (RAP) for the property located at 10 Nelson Short Street, Potts Hill, New South Wales (NSW) (the site). A site location plan is presented as Figure 1.

It has also been prepared in general accordance with the requirements specified for a Stage 3 – Site Remedial Action Plan as published by the NSW Environment Protection Authority (EPA) *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites* (NSW EPA), 2011 and the National Environmental Protection Measure (NEPM) *Guidelines on Site Characterisation* (Schedule B2) 1999, as amended 2013.

CES understands previous investigations by various consultants have been undertaken at the site and the site has been subject to remediation to make the site suitable for commercial/industrial land use.

The proposed development consists of a high density residential development designed for seniors living. The development includes the construction of four-storey apartment blocks above a single level underground car park which would extend over the majority of the site footprint.

1.2 *OBJECTIVES*

The principal objectives of this RAP are as follows:

- Set remediation goals which will assist in making the site suitable for the proposed residential use and will pose no unacceptable risk to human health or to the environment;
- Document all procedures and plans to be implemented to reduce risks to acceptable levels for the proposed high density residential land use; and
- Establish the environmental safeguards required to complete the remediation in an environmentally acceptable manner.

1.3 *SCOPE OF WORK*

The scope of works for the preparation of this RAP included:

- a review and summary of the previous environmental site assessment report;
- identification of data gaps and areas that require further investigation;
- identification of reported impacts and the extent of remediation required;
- preparation of site conceptual model characterising the known contamination sources, pathways and (current and future) receptors;
- evaluation of remediation options and rationale for the recommended remedial option including contingency plan, if the selected remedial strategy fails;
- setting of remediation goals and acceptance criteria based on environmental legislation;
- preparation of validation procedures for the site;
- setting of Construction Site Management Plan requirements for stormwater, soil management, noise control, dust control, odour control and WHS plan for the operational phase of remediation;
- preparation of Contingency Plans to respond to site incidents that may affect site workers or surrounding site environments or communities;
- identification of regulatory compliance requirements such as licences or approvals;
- identification of a remediation timeline and schedule and hours of remedial work operations;
- identification of appropriate personnel to contact during remediation;
- identification of reporting requirements; and,
- identification of long-term site management plan requirements.

This RAP and the information summarised within has been prepared on the basis of information provided in existing reports which should be read in conjunction with this RAP. No further verification of the information provided in the previous third party reports has been undertaken, however, in some cases, additional information has been provided by CES or the Client to meet reporting requirements.

1.4 *REVISION OF THIS RAP*

This RAP is applicable for the duration of the construction works at the site. It may be necessary to revise and re-issue the RAP in order to reflect changes in project objectives; parties responsible for implementation of the RAP and development; unexpected finds; or changes to planning or statutory requirements.

If revision of the RAP is necessary, the following procedure should be followed:

- Review of the RAP by an experienced environmental consultant with reference to the changes requiring the revision. This review should also be done in consultation with the Site Auditor and, where necessary, the Local Council, particularly if the updated report varies or is inconsistent with any condition of consent imposed by Council which could require a Section 4.55 (Modification of Consent) application under the Environmental Planning and Assessment Act 1979 to be submitted to modify the consent;
- Update the RAP, including the document register revision number information, to address the requirements of the changed conditions;
- The updated RAP should be provided to the Site Auditor for review and endorsement prior to re-issue; and
- Re-issue the RAP and provide notice to the key stakeholders that previous versions have been superseded.

2 SITE INFORMATION

The site information presented below is based on a review of government and publicly available information sources.

2.1 *SITE IDENTIFICATION*

The site is located at 10 Nelson Short Street, Potts Hill, New South Wales (NSW) 2143, within the Local Government Area (LGA) of Canterbury-Bankstown. The site covers an area of approximately 1.9 hectares, and is legally identified as a single lot, Lot 104 in Deposited Plan (DP) 1149790 (Figure 1). The geographical extent of the site is presented in Table 1 below.

Table 1: Geographical extent of site

Corner/point of site	Eastings	Northings
Southeast corner of site	318312.909mE	6247341.275mN
Northeast corner of site	318238.208mE	6247538.055mN
Southwest corner of site	318169.819mE	6247364.917mN
Northwest corner of site	318337.351mE	6247524.576mN
Centre of site	318272.834mE	6247433.492mN

2.2 *SITE ZONING*

Bankstown Local Environmental Plan (LEP) 2015 indicates that the site is currently zoned "B7 – Business Park".

2.3 *SITE DESCRIPTION*

The subject site is located within a mixed public recreation and residential district of Potts Hill. It was formally part of the Sydney Water Potts Hill reservoir complex. The site is accessed via Nelson Short Street and is largely trapezoidal in shape. At the time of the site inspection, the property included:

- Two conjoined areas of vegetated open space. No buildings were observed on site at the time of the site inspection.

During the site inspection there were signs of dry and browned vegetation, however the vegetation was not considered distressed (an indication of potential environmental impacts) and in the accessible areas observed, there was no surface staining indicative of surface spills that could have impacted underlying soil and groundwater.

There was no evidence of above ground or below ground fuel storage tanks on the site.

Based on observations from the site inspection, the surrounding land use comprised the following:

- **North** – immediately bordering the northern boundary of the site is the Potts Hill NSW Police Facility located within the Potts Hill Business Park, further north of which lies residential areas including the Carnarvon Golf Club (1.3km North-northeast), Sydney University (Cumberland Campus) (2km northeast) and Rookwood Cemetery (2.5km northeast);
- **East** – Graf Avenue borders the eastern boundary of the site, beyond which are low density single and double storey residential properties of Yagoona. Beyond this lies an industrial area of Chullora, the Hume Highway separates the industrial area from the residential area of Greenacre;
- **South** – Brunker Road immediately borders the southern boundary of the site, beyond which are low density single and double storey residential properties of Yagoona stretching far south; and
- **West** –Immediately bordered by Nelson Short Street and further west is the Sydney Water reservoir site. Further west lies residential areas of Birrong and Sefton.

2.4 *TOPOGRAPHY*

The site was observed during the site inspection to have no preferential slope, however steep fill embankments were observed along the eastern and southern boundaries of the site.

2.5 *SURFACE WATER*

The nearest surface water features are the Cooks River, located approximately 262 m northeast of the site boundary. The likely discharge point for groundwater / surface water run-off, based on local topography is the Cooks River.

2.6 *GEOLOGY*

Reference to the Sydney 1:100 000 Geological Series Sheet 9130 (1983) indicates that the majority of the site is underlain by Bringelly Shale of the Wianamatta Group, of Triassic Age. This formation typically comprises shale, carbonaceous claystone, claystone, laminate, fine to medium-grained lithic sandstone, rare coal and tuff. The nature of the formation is considered alluvial and estuarine.

2.7 *HYDROGEOLOGY*

It is expected that groundwater would flow away from the Reservoirs 1 and 2 to the southeast, towards the Cooks River.

A search of the Department of Primary Industries Office of Water database (http://allwaterdata.water.nsw.gov.au/water.stm, accessed 27 July 2016) indicates there are nine registered groundwater abstraction wells located between 941 and 972 m from the site boundary. All nine wells are used for monitoring and extend between 3.7 and 13 m below ground level. The

groundwater standing water levels recorded is range of between 1.80 and 9.10 m below the ground surface.

2.8 *SENSITIVE LOCAL ENVIRONMENTS*

The site is not located within an Underground Petroleum Storage System (UPSS) environmentally sensitive zone. UPSS environmentally sensitive zones represent areas that are likely to be vulnerable to the contamination from leaking UPSS due to geology or groundwater properties.

2.9 *ACID SULFATE SOILS*

The classification of acid sulphate soils (ASS) is based on the likelihood that these soils will be present in particular areas at specific depths. Soils are classed from 1 (high probability presence) to 5 (low probability presence).

There is no acid sulfate soil risk mapped for the site in the Bankstown LEP (2015) Acid sulfate soils map (sheet: ASS-004).

2.10 *METEOROLOGY*

Information on meteorology recorded from the Bankstown Airport AWS has been obtained from the Bureau of Meteorology website (http://www.bom.gov.au/ accessed 27 July 2017).

- Mean annual temperature – 23.3 degrees Celsius;
- Mean annual lowest temperature – 12.0 degrees Celsius; and
- Mean annual rainfall – 996.7 millimetres (mm).

2.11 *NSW CONTAMINATED SITE REGISTER*

The site is located within proximity to six sites on the List of NSW contaminated sites notified to EPA:

- Shell Coles Express Service Station located 165m east;
- Galserv Galvanising Services located 259m northeast;
- Former Plating Works located 336m southeast;
- Sydney Water Potts Hill Complex located 336 west;
- BP Potts Hill Service Station and Truckstop located 470m northeast; and
- 7-Eleven (former Mobil) Service Station located 930m southeast.

3 SITE HISTORY

Information pertaining to the history of the site was obtained through a review of information available from external sources including historical title searches, aerial photographs and council records and the WorkCover NSW Dangerous Goods search (detailed documents contained within the appendices of the *Stage 1 – Preliminary Site Investigation* report (CES, 2017)).

3.1 *PROPERTY TITLE INFORMATION*

A title deeds search was conducted by Lot Search. Where available, the original title and lease documents are outlined within the *Stage 1 – Preliminary Site Investigation* report (CES, 2017).

A review of the past owner of the site, Sydney Water Corporation (SWC) indicates the site would have been highly utilised for works and operations of the reservoirs. It is likely that activities relating to the construction, ongoing use and maintenance of the reservoirs would have occurred at the site between the dates of 1911 and 2016. This is supported by the review of previous environmental reports in section 3.6 outlining the contaminating sources that may be associated with such works and operations as identified previously by consultants.

3.2 *HISTORICAL AERIAL PHOTOGRAPH INTERPRETATION*

Aerial photography viewed on Nearmap in addition to photographs taken from 1943 to 2015 obtained from Lot Search were reviewed to assess the history of development of the site and indications of potential sources of contamination. The photographs are outlined within the *Stage 1 – Preliminary Site Investigation* report (CES, 2017).

The historical aerial photographs obtained from Lot Search revealed that the site has been in use as a storage yard for the associated works of the Sydney Water reservoir for the majority of the time between 1943 and 2014. The review of the historical aerial photographs also indicates that the surrounding areas of the site did not undergo any significant changes other than that of gradual residential development.

3.3 *SAFEWORK NSW RECORDS*

A search of SafeWork NSW Stored Chemical Information Database and microfiche records has been undertaken. Records pertaining to the site have not been located.

3.4 *PLANNING CERTIFICATES*

Review of Planning Certificates under Section 149 of the Environmental Planning and Assessment Act (1979) indicates the following for the subject site:

- The land has not been proclaimed as within a Mine Subsidence District;
- The land is not biodiversity certified land;
- The land does not include or comprise critical habitat;
- The land is not in a conservation area;
- The land has not been identified as bush fire prone land; and
- Development on the land is not subject to flood related development controls.

The following matters are prescribed under section 59 (2) of the Contaminated Land Management Act (1997):

- The land is not significantly contaminated;
- The land is not subject to a management order;
- The land is not subject of an approved voluntary management proposal;
- The land is not subject to an on-going maintenance order; and
- The land is not subject to an audit statement.

A copy of the Section 149 certificates is outlined within the *Stage 1 – Preliminary Site Investigation* report (CES, 2017).

3.5 *SITE WALKOVER*

CES carried out a site walkover as part of the Preliminary Site Investigation on 13 July 2017. Photographs taken during the site walkover are presented within the *Stage 1 – Preliminary Site Investigation* report (CES, 2017). The following was identified:

- No buildings were observed on-site.
- No evidence of below or above ground fuel storage tanks were observed (e.g. manhole covers, vent stacks, fill points or bowsers);
- No significant odours were detected;
- No evidence of chemical storage was observed;
- Vegetation across the site appeared dry and brown in some areas, however, it did not appear stressed; and
- Two large (2m by 2m) concrete pits covered by metal grates were identified in the north-eastern and south-eastern corners of the main investigation area. It is expected that these concrete pits are connected by means of concrete cased conduits.

3.6 *PREVIOUS ENVIRONMENTAL REPORTS*

CES had previously written the most current report regarding the site, *Stage 1 – Preliminary Site Investigation (CES, 2018)*. Prior to this, CES had been provided reports of investigations and remediation works previously undertaken by consultants. A summary of information pertaining to the site from each of the reports has been provided below.

3.6.1 *ENVIRON, MAY 2010, SITE AUDIT REPORT, PROPOSED LOT 104, POTTS HILL*

The Audit completed by Environ was conducted to provide an independent review by an EPA NSW Accredited Auditor to determine the suitability of the site for commercial/industrial land use. The Site Audit Report (SAR) considered the review of twenty-five reports prepared between 1996 and 2010.

Key observations during the various investigations undertaken between 2003 and 2009 at the site prior to demolition and remediation included a former underground storage tank (UST) present in the southwest portion of the site. The south and south-eastern yard areas were surfaced by asphalt

in poor condition and were used for the storage of shipping containers and drums with no evidence of bulk chemical storage noted in the area, Coffey noted a small above ground fuel storage area in the northwest corner of the site and some rusted drums on the middle of the eastern boundary of the Main Area (developable land), directly south of an equipment wash down area. AECOM also noted observations of potential building waste materials such as concrete, bitumen, ballast gravels, and terracotta pipe in the accessible areas of the southern embankment. The eastern embankment was inaccessible at the time of inspection however it was noted that steel and concrete wastes were commonly encountered during test pitting.

A history of the site indicated distribution of excavated reservoir spoil across the Potts Hill reservoir area which could have potentially contained ash waste, fly ash and waste associated with the removal of bitumen-based pipe linings. Significant placement of the spoil is believed to have occurred at the site creating the steep embankments in the south and east. The 45,000 L petrol UST identified in the southwest portion of the site was decommissioned in 1996 by Fluor Daniel GTI (GTI). It was reported at the time of decommissioning that the UST was in "very good condition" with no significant corrosion or visible leaks, however petrol contamination was noted. The remaining pit was backfilled with sand originally surrounding the UST and topped with imported fill.

The key sources of contaminants identified at the site were filling of fill of unknown origin, storage activities and the former UST. The contaminants of concern therefore were considered as asbestos containing materials (ACM), heavy metals, TPH, BTEX, PAHs, OCPs, OPP and phenols. The main contaminants identified in the samples submitted for laboratory analysis included PAH, mainly identified in samples collected from the shallow fill of the northern portion of the Main Area but also identified in the embankment fill material (possibly due to the presence of ash, coal, slag, bitumen/asphalt in the fill materials), TPH C10-C36 from five samples collected from the Main Area, and some heavy metals, primarily arsenic, lead and zinc. Additionally, one small fragment of cement bonded sheeting identified within a sample collected from the surface on the eastern embankment was identified as asbestos containing. No specific contaminant concentration information or sample location information (for both investigation works and validation works) is contained within the SAR.

Remediation works undertaken at the site in response to the results of the environmental investigations undertaken included the re-excavation and validation of the UST pit area by AECOM, the excavation and offsite disposal of the PAH impacted fill from five locations, the screening and removal of the top one metre of surface material (identified by Coffey as Unit 1A) from a portion of the Main Area with the screened soil validated for re-use to backfill remediation excavations at the site and adjoining sites, and the excavation, screening and re-emplacement of soils for the stabilisation of the Embankment.

It was considered by the Auditor that the remedial works and validation sampling was adequate to demonstrate the Main Area of the site suitable for commercial/industrial use. The Embankment area however was deemed not suitable for commercial/industrial use but could be maintained in a

condition suitable for commercial/ industrial use with the provision of an Environmental Management Plan (EMP).

3.6.2 *AECOM, May 2010, Environ: Site Audit Report, Proposed Lot 104, Potts Hill, Appendix E: Environmental Management Plan*

AECOM Australia prepared an Environmental Management Plan (EMP) to address and manage the PAH contamination risks of the contaminated fill materials identified within the Environmental Site Assessments (ESAs) undertaken by URS Corporation (URS) and Coffey Environmental (Coffey) and the Supplementary Contamination Assessment (SCA) completed by AECOM, following the development of the site for commercial/industrial land use.

The EMP applies to construction (applicable upon initiation of the construction works) and operational phase (after development has completed) of the Management Area. The EMP is applicable to, but not limited to, the excavations of the Management Area, stockpiling, storage, movement and handling of excavated materials, on-site reuse or off-site disposal of excavated materials, general disturbance of the Maintenance Area, importation and use of fill materials, and routine inspections of the Management Area.

The EMP outlines the Occupational Health and Safety (OH&S) considerations and requirements for works of the Maintenance Area including an overview of site induction requirements, prevention of potential hazards and personal protective equipment. Additionally, the EMP outlines site management procedures including the consideration of water management, soil management, odour and dust control, excavation reinstatement, disposal of excavated materials, and importation of fill materials. Furthermore, the EMP details the requirement for inspection and monitoring of the Management Area. No reports detailing the implementation of the EMP have been provided to CES, however CES understand that current site management requires the implementation of the EMP.

3.6.3 *Consulting Earth Scientists Pty Ltd, August 2017, Stage 1 – Preliminary Site Investigation, 10 Nelson Short Street, Potts Hill, New South Wales*

The objective of the Preliminary Site Investigation was to determine whether the site is likely to be suitable for the future proposed residential seniors living development, or whether further investigation is required. In order to meet the objectives of the investigation, CES completed the following scope of works:

- Desktop study;
- Site inspection;
- Soil and groundwater sampling programme; and
- Preparation of a Preliminary Site Investigation report.

No exceedance of human health criteria was identified in the analysis results for the fill samples from the fifteen borehole locations. One location exceeded the ecological criteria for benzo(a)pyrene however this was not considered significant as the entire footprint of the proposed development will be excavated for the construction of a basement carpark, thus removing the fill material from site. Additionally, results of fill from the top three metres were compared to NSW EPA waste classification criteria for a preliminary waste classification and were within the criteria for classification as general solid waste.

Groundwater results were below the SAC for all analytes tested with the exception of copper, nickel, and zinc. These concentrations exceeded the groundwater investigation levels (GIL) – marine waters criteria, however it is likely that these concentrations are background concentrations and unlikely to impact the receiving natural water body of Cooks River.

The total Organic Carbon (TOC) content of fill and natural soil samples below three metres indicates a "Characteristic Situation 1" in accordance with CL:AIRE - *A Pragmatic Approach to Ground Gas Risk Assessment* (CL:AIRE, 2012) and therefore a very low ground gas risk.

As there were no analysed fill samples that exceeded the human health based SAC, it is unlikely that site soils located with the main flat area of the site pose a potential risk to human health or the environment for the proposed high density residential development. However, the investigation was limited in spatial scope, with the embankment area of the site not investigated.

Previous investigations detected PAH and asbestos impacts within the embankment therefore the embankment requires further investigation and may require remediation to make the site suitable for the proposed use. Additional investigation work should consist of 13 sample locations as required to meet the NSW EPA minimum sample density requirement for a site 1.8 ha. The further investigations should be targeted to investigate the area of the site which has the highest risk of unsuitable contamination, the embankment which is currently subject to an EMP.

3.7 *ENVIRONMENTAL MANAGEMENT PLAN*

The site in its current condition has an EMP implementation of which is required for the current management of the site. The EMP, *Aecom May 2010, Environ Site Audit Report, Proposed Lot 104, Potts Hill, Appendix E: Environmental Management Plan,* applies to a Management Area of the site, which consists of the embankment area (steeply sloped land to the east and south of the site) and the apron area (strip of land between the embankment and the site boundary to the east and north).

The EMP provides procedures for site works in the Management Area, including: stormwater management, soil management, odour control, dust control, drag out control, waste management,

and excavation reinstatement, in a manner which reduces risks to human health and the environment.

If remediation is not carried out to make the management are of the site suitable for the proposed development, an updated EMP may be required for this area of the site.

4 SITE ASSESSMENT CRITERIA

The selection of the most appropriate investigation levels for use with a site specific environmental setting and land use scenario should consider factors including the protection of human health and ecosystems.

Investigation and screening levels are provided in *Guideline on Investigation Levels for Soil and Groundwater* (Schedule B1, NEPC, 2013) for commonly encountered contaminants which are applicable to generic land use scenarios and include consideration of, where possible, the soil type and the depth of contamination. Investigation levels and screening levels are the concentrations of a contaminant above which further appropriate investigation and evaluation will be required. Investigation and screening levels provide the basis of Tier 1 risk assessment.

In the absence of a site specific risk assessment these Tier 1 screening criteria could be used as remediation acceptance criteria.

4.1 *SOIL*

4.1.1 *HUMAN HEALTH ASSESSMENT*

To address potential health impacts at the site, CES compared the analytical testing results against a set of health based soil investigation criteria appropriate for the proposed land-use. That is, the HIL has been set at a level that provides confidence that contaminant concentrations below the HIL will not adversely affect human health. As described in Section 1.1, the future site land-use is proposed high density residential seniors living development; however, as CES is not in possession of development plans and as such cannot confirm the development to take place at the site, the NEPM (2013) HIL B (residential with minimal opportunities for soil access includes dwellings with fully permanently paved yard space such as high rise buildings and flats) criteria has been adopted as a conservative approach for the assessment of human health. Additionally, NEPM (2013) HSL A & HSL B (low-high density residential for clay) criteria have been selected for the assessment of human health.

4.1.2 *ECOLOGICAL ASSESSMENT*

NEPC (1999) indicates that while protection of human health often drives the first stages of assessment, protection of the environment (terrestrial and aquatic) should be a consideration for all site assessments. The closest waterbody, Cooks River, is approximately 250 m north east of the site and may be considered a sensitive ecological receptor.

To address the potential ecological impacts at the site, CES compared the analytical testing results against a set of ecological investigation and screening levels appropriate for the proposed land use of urban residential and public open space (mixed use and aged care development). The NEPM (2013) EIL criteria adopted were generated using the CSIRO for *NEPM Ecological Investigation Level Calculation Spreadshee*t (CSIRO, 2010). Conservative values for pH (7.0 pH), cation

exchange capacity (CEC) (20 cmolc/kg), organic content (1%) and clay content (>10%) were used in the absence of available data. Additionally, the NEPM (2013) ESL (fine soil texture) was adopted for the ecological assessment. Assessments identified in Section 5.5 include collection of site specific values for pH, CEC, organic content and clay content. When available site specific data should be used to recalculate EILs/ESLs for the site.

4.1.3 *ASBESTOS*

Health screening levels for asbestos in soils, which are based on scenario-specific likely exposure levels, are adopted from the Western Australia, Department of Health (WA DoH) guidelines as outlined in Table 7 of Schedule B1, NEPC, 2013. Based on the proposed seniors living development, the Residential B exposure setting has been selected. As such, the HSL for bonded asbestos containing materials (ACM) is 0.04% w/w and 0.001% w/w for asbestos fines and fibrous asbestos.

4.1.4 *GROUND GAS RISK*

Total Organic Carbon (TOC) provides an assessment of the proportion of organic materials present in the soil and thus provides an indication of the amount of methane and carbon dioxide potentially produced by the decomposition of the materials. The data can be used to determine the gas generation risk against screening values such as those included in Table 1 of CL:AIRE Research Bulletin: *A Pragmatic Approach to Ground Gas Risk Assessment* (CL:AIRE, 2012).

4.2 *GROUNDWATER*

To address the data gap of groundwater characterisation at the site, CES compared results of samples of groundwater to the NEPM (2013) GIL criteria for Marine Waters and Fresh Waters.

4.3 *WASTE CLASSIFICATION*

For off-site disposal of soils, the assessment should be undertaken in accordance with the NSW EPA (2014) *Waste Classification Guidelines: Part 1 Classifying Waste.*

5 CONCEPTUAL SITE MODEL

A Conceptual Site Model (CSM) has been developed in consideration of the findings of the preliminary investigation taking into account the proposed future high density residential redevelopment.

5.1 *POTENTIAL SOURCES OF CONTAMINATION*

Uncontrolled fill has been identified as a potential source of contamination on the main area and the embankment area due to the historical cut and fill activities that may have occurred during development at the reservoir site. In consideration of the previous environmental investigations the fill materials in the 'main area' of the site are unlikely to be significantly contaminated and therefore are unlikely to pose a risk to the environment or human health. As such the identified COPC considered likely to be remaining on site are:

- PAHs; and
- Asbestos.

Additional COPC associated with uncontrolled fill, which are considered unlikely to contribute significant contamination risk at the site are:

- TRH and BTEX; and
- Heavy Metals.

5.2 *POTENTIAL OFF-SITE SOURCES OF CONTAMINATION*

There have been no potential off-site sources of contamination identified within the surrounds of the site.

5.3 *POTENTIAL PATHWAYS*

The pathways through which contaminants may reach receptors are in part dependent on the nature and behaviour of the contaminant. The following potential pathways have been identified:

- Ingestion / dermal contact during construction;
- Inhalation of contaminants in the particulate form (dust);
- Leaching of contaminants from site soils into groundwater; and
- Lateral migration of contaminants in groundwater (dissolved and immiscible phases) to surface waters.

5.4 *RECEPTORS*

Potential sensitive receptors (on and off-site) are listed below:

- Future construction workers during the construction of the proposed redevelopment;

- Future residents and employees;
- Groundwater beneath the site; and
- Neighbouring residents.

5.5 *DATA GAPS AND FURTHER ASSESSMENT*

Based on the previous investigation undertaken by CES (2017) the main area of the site is considered to be adequately characterised in terms of risk to future users of the proposed development, with the exception of potential PAH and asbestos impacts. Data gaps in the available information have however been identified and are presented below with the proposed sampling programme to address the data gaps.

Further assessment is required for soils to be disposed of offsite, which require waste classification. Based on the development plans provided to CES presented Appendix B, approximately 4.5 m of excavation will be required for the construction of a basement carpark, which extends over the majority of the 'Main Area' footprint. Waste classification of material for offsite disposal should be undertaken in accordance with the NSW EPA (2014) *Waste Classification Guidelines: Part 1 Classifying Waste.* The number of samples requires will be confirmed once volumes of soil for disposal are known. Sample frequency should be undertaken in accordance with Tables 5 and 6 in Section 8.7.5. Samples should be analysed for the following COPC: TRH, PAH, Asbestos, metals and OCP.

The Management Area of the site was not assessed as part of the PSI due to access issues during the investigation. Investigations of the Management Area of the site should be carried out to characterise the soils which were not assessed as part of the PSI. The assessment should consist of 13 locations, with soils assessed for PAH and asbestos. 13 further sample locations were recommended by the PSI (CES 2017). The proposed further investigation locations are presented on Figure 3. The investigation should address the COPC identified in the CSM detailed in Section 5.1. Due to site specific constraints (the slope of the embankment, and the condition of the slope), the further investigation would be most suitably carried out during the construction phase.

Investigations undertaken during the PSI did not detect significant PAH concentrations or asbestos in soils, however the asbestos analysis undertaken was for waste classification purposes, and therefore did not comply with the NEPM asbestos assessment requirements. In addition, historic PAH detections in excess of the SAC were detected as part of the historic site validation. In consideration of this, soils which are to remain onsite in the Main Area following basement excavations should be assessed for asbestos (NEPM method - 10 L screen and 500ml laboratory analysis) and PAH to confirm no PAH or asbestos impacts remain onsite. In accordance with the NSW EPA 1995 *Sampling Design Guidelines* 27 sample locations should be assessed based on the Main Area being 1.3 ha. Samples should be collected on a systematic grid pattern.

The client has indicated that a tree(s) will require to be retained onsite, understood to be in the south of the site. Soils surrounding the trees that will be retained onsite should be characterised to

assess the risk posed by potential contaminants to human health and the environment. Samples collected should be assessed for the following COPC: TRH, PAH, Asbestos, metals and OCP.

In order to refine the EILs/ESLs for the site four samples should be collected and analysed of pH CEC, organic carbon, and clay content. Samples should be collected from soils that will be located in areas of landscaping in the proposed development.

The site auditor, during a site walkover identified a number of stockpiles which appear to have been fly tipped at the site. Recent aerial photographs indicate that this material appears to have been tipped onsite between 06 May and 15 June 2017 and consists of approximately 8 small stockpiles, each likely to be 5 m^3. This material should be classified and disposed of offsite at a suitably licenced waste facility capable of accepting the waste. Stockpiles should be managed in accordance with Section 8.7 prior to offsite disposal.

Following completion of the data gap assessment, if the results indicate significant changes to the remediation approach are required, this RAP should be updated. Update of the RAP should be undertaken in accordance with Section 1.4.

5.6 *REMEDIATION*

Based on the previous investigation, the main area of the site is suitable for the proposed high density residential use, with no further assessment, remediation or management required.

Based on the embankment area being subject to an EMP to make the site suitable for commercial/industrial use, it is likely that remediation or management will be required to make this area of the site suitable for the proposed high density residential land use. The following sections (6-11) present a Remediation Action Plan (RAP) which could be implemented to make the site suitable for use should remediation be required based on the results of the further assessment detailed in Section 5.5.

6 REMEDIAL ACTION PLAN

The NSW Environmental Planning and Assessment Regulation (2000), under the Environmental Planning and Assessment Act (EP&A) 1979 (NSW Government, 1979), provides the legislative framework within which notifications and approvals must be made for redevelopment of the site. The remediation works (involving potential exposure to contaminated materials and handling potential contaminated waste materials) to be undertaken must comply with the applicable environmental legislative requirements. Table 2 provides a summary of the applicable legislation and regulations for the proposed remediation works.

Table 2: Applicable Legislation / Regulation

Legislation / Regulation	Applicability
Contaminated Land Management Act 1997	Establishes the process for investigating and remediating land.
Protection of the Environment Operations Act 1997 (POEO Act)	Framework to minimise harm to the environment (in particular pollution of air and water and noise emissions) and not cause an offence under the Act. Discharge to stormwater may require a licence under the Act if required.
Protection of the Environment Operations (Waste) Regulation 2005	Transporters of waste (including Restricted Solid Waste and Hazardous Waste) are required to be licensed under the Act. Some waste disposal / processing facilities are required to be licensed under the Act. Requirements in relation to transportation, collection, storage or disposal of waste.
State Environment Planning Policy No 55 – Remediation of Land	SEPP 55 specifies consent requirements for remediation, specifies certain considerations that are relevant for rezoning land, and requiring that remediation is conducted to meet certain standards and notification requirements.
Work Health and Safety Act 2011	All works to be conducted in accordance with WHS Act.
Work Health and Safety Regulation 2011	All works to be conducted in accordance with WHS Regulations.
SafeWork NSW	Notifications required for asbestos removal, hazardous chemicals, lead, and demolition.

The site remediation process, validation works, and reporting prescribed within this document should be conducted with reference to the following industry standards, guidelines, and codes of practice:

i. National Environment Protection (Assessment of Contamination) Measure, 1999, as amended;

ii. NSW EPA (1997) *Guidelines on Assessing Banana Plantation Sites*

iii. NSW EPA (2003) *Guidelines for the Vertical mixing of Soil on Former Broad-Acre Agricultural Land*

iv. Australian Standard AS 4482.1 Part 1 – Non-volatile and Semi-Volatile Compounds;

v. Australian Standard AS 4482.2 Part 2 – Volatile Compounds;

vi. NSW Government, Managing asbestos in or on soil, March 2014;

vii. How to safely remove asbestos code of practice, Safe Work Australia (2011) workcover.nsw.gov.au;

viii. Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres, 2nd Edition, April 2005;

ix. National Environment Protection Council (1998): NEPM on Ambient Air Quality;

x. NSW Office of Environment and Heritage (March 2004): Managing Urban Stormwater – Soils and Construction;

xi. NSW EPA (2014): Waste Classification Guidelines. Part 1: Classifying Waste;

xii. NSW DECCW (2005): Approved Methods for the Modelling and Assessment of Air Pollutants in NSW; and,

xiii. NSW DECCW (2007): Approved Methods for the Sampling and Analysis of Air Pollutants in NSW.

6.1 *NOTIFICATIONS AND PERMIT REQUIREMENTS*

All works related to the site remediation must be undertaken with the appropriate notifications and permits in place. A summary of the key notifications and permits which will be required prior to initiating works are listed below:

- Development consent for remediation works from the Department of Planning and Infrastructure.
- Any other relevant approvals should be submitted and approved before any works are carried out.

7 REMEDIATION OPTIONS AND STRATEGY

7.1 *REMEDIATION GOAL*

The site is proposed to be redeveloped with the construction of residential seniors living apartments. The goal of remedial works is to provide sufficient engineering and management controls to make the site suitable (with respect to soil contamination) for the proposed development with accessible soils, to ensure protection of human health and the environment during and post remediation works, and to manage soils in a cost-effective manner.

7.2 *EXTENT OF REMEDIATION REQUIRED*

In regards to the Main Area of the site (Figure 2), one location exceeded the ecological criteria for benzo(a)pyrene, however this was not considered significant as the entire footprint of the proposed development will be excavated for the construction of a basement carpark, thus removing the fill material from site. Additionally, results of fill from the top three metres were compared to NSW EPA waste classification criteria for a preliminary waste classification and were within the criteria for classification as general solid waste.

Further investigation of the embankment area is required, as detailed in Section 5.5. Based on the site history, and the embankment area being subject to an EMP, remediation of PAH and Asbestos impacts is considered to likely be required. The RAP details the potential remedial solutions to be implemented should remediation be required following the results of the further investigations. Based on the site history and the CSM, PAH and asbestos were considered to be the likely COPC.

While remediation of the main area is not considered to be required, 4.5 m of fill is to be excavated from the main area of the site for basement carparking. This should be assessed in accordance with the data gap assessment in Section 5.5 and disposed of offsite at a waste facility licenced to and capable of accepting the waste. In accordance with the requirements of Section 4.3.7 of the NSW EPA 2017 *Guidelines for the NSW Site Auditor Scheme (3rd Edition)* the auditor is required to assess this waste, in consideration of this the material should be managed, handled and tracked in accordance with Sections 8.7, 8.9 and 8.10 of the RAP.

7.3 *REMEDIATION OPTIONS ASSESSMENT AND RATIONALE FOR SELECTION*

In accordance with the ANZECC / NHMRC (1992) Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites, the preferred order of options for site remediation and management are:

1. On-site treatment of the soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level;
2. Off-site treatment of excavated soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the site;

3. Removal of any contaminated soil to an approved site or facility, followed, where necessary, by replacement with clean fill (in this case there is no requirement for the importation of clean fill due to the excavation of the underground carpark); and
4. Consolidation and isolation of the soil on-site by containment within a properly designed barrier.

The guidance also considers that:

- If remediation is likely to cause a greater adverse effect than leaving the site undisturbed, then remediation should not proceed.
- In cases where it is not viable to remediate large quantities of soil with low level of contamination, alternative strategies should be considered or developed.
- On-site containment and capping may be considered where appropriate. In general, leaving contaminated material in-situ requires acceptable rationale that there is no immediate danger to the environment or community, the site has appropriate controls in place, the capping or containment has long-term stability, and does not include erection of a structure that may result in a risk of harm to public health or the environment.

A brief description of remedial methods is provided below.

7.3.1 *TREATMENT TECHNOLOGIES*

Treatment technologies are used to permanently and significantly reduce the toxicity, mobility or volume of contaminated wastes. Treatment technologies may be targeted towards in situ or ex situ remediation and may include biological, thermal, separation, and physical/chemical treatment and containment. Treatment technologies require various levels of assessment and approval prior to implementation.

7.3.2 *REMOVAL TO LANDFILL*

Removal to landfill involves physically moving impacted soil to an off-site location for storage, treatment or disposal. Waste must be assessed and managed in accordance with NSW EPA (2014) Waste Classification Guidelines. In some instances, waste soils must be treated and re-assessed prior to disposal. Waste soils must be disposed at licensed landfill premises that have the appropriate licence and is capable of accepting the waste.

7.3.3 *PHYSICAL BARRIER SYSTEMS (CAPPING)*

Physical barrier systems (or capping) limit access to the impacted material, mitigate surface water infiltration through the underlying material and control or reduce migration of the substances into the surrounding environment. This option can include creating horizontal or vertical barriers around and on top of the impacted material in place or relocating the impacted material to a constructed encapsulation area. In addition, the barrier may also be used to control the emission of odours and gases/vapours, reduce erosion and improve aesthetics.

7.3.4 *INSTITUTIONAL CONTROLS*

Institutional controls include measures such as land use restriction through zoning, site management (e.g. Environmental Management Plans) and access restrictions, restrictions on intrusive works and relocation of receptors. Although exposure can be reduced by these means, the impacted media are not directly remediated. Institutional controls can restrict design elements of a re-development.

7.4 *REMEDIAL OPTIONS ASSESSMENT*

A remedial options assessment for the site contamination is outlined in Table 3.

Table 3: Remedial Options Assessment

Remedial Method	Applicability	Method	Advantage	Disadvantage	Further Consider?
Polycyclic Aromatic Hydrocarbons (PAH)					
On-site treatment of PAH impacted soils and re-use on-site	• Yes	• On-site in-situ or ex-situ biological, chemical, or thermal treatment (Enhanced soil washing with surfactants, bio-stimulation/bio-augmentation, landfarming, bio-pile, chemox, thermal desorption)	• Reduced disposal volume and cost. • Soils can be re-used on-site. • If successful, no Environment Management Plan on property title required.	• Requires bench scale, pilot trial studies to determine effectiveness and potential impact on site and site surroundings. • Requires impact and geo-chemical assessment. • Requires long-contact time with impacted soil. • May not be suitable if other contaminants are found in the soil. • Nature of remediation method may require Regulatory approval.	• No
Off-site treatment of PAH impacted soils and return to the site	• Yes	• Off-site biological, chemical, or thermal treatment (Enhanced soil washing with surfactants, bio-stimulation/bio-augmentation, landfarming, bio-pile, chemox, thermal desorption.	• Reduction of waste to landfill. Reduced disposal volume and cost.	• Requires bench scale, pilot trial studies to determine effectiveness and potential impact on site and site surroundings. • Requires impact and geo-chemical assessment. • Requires long-contact time with impacted soil.	• No

Remedial Method	Applicability	Method	Advantage	Disadvantage	Further Consider?
				• May not be suitable if other contaminants are found in the soil. • Nature of remediation method will require Regulatory approval. • Double handling of soils. • Requires strict monitoring and tracking of soils and remedial method off-site. • Requires verification testing of returned soils and subject to ENM Order requirements. • May hold up construction if soils are not returned to site in a timely manner.	
Excavation, transport, and disposal of PAH impacted soils at licensed facility	• Yes	• Excavate and transport soils off-site (Waste Classification is subject to further sampling and analysis).	• Fast and effective. • Removes impacted material and subsequently any ongoing liability or need for any long-term management. • If successful, no Environment Management Plan on property title required.	• Increased disposal volume and cost. • Imported VENM/ENM and geotechnical considerations required to replace lost soil volume. • Additional site testing to determine extent and validation upon removal.	• Yes

Remedial Method	Applicability	Method	Advantage	Disadvantage	Further Consider?
				• Requires excavation in accordance with CEMP.	
On-site Containment of PAH impacted soils	• Yes	• Determine extent and concentration of PAH, survey location with coordinates and elevation. Contain PAH under hard-stand, cover with marker tape, and clean soil buffer.	• No excavations for off-site disposal required. • Reduced disposal volume and cost. • Soils can be left in-place on-site. • Reduction of waste to landfill.	• Potential reduction in land value. • Subject to further leachability testing for on-site re-use. • Requires long-term management - Environmental Management Plan (EMP) on property title required. • PAH soils to managed and handled via Construction Environment Management Plan (CEMP). CEMP would require site induction requirement's, control measures, and monitoring measures, and quality control measures to ensure that environmental controls are being implemented and are effective. • EMP/CEMP must be administered until PAH removal is confirmed. • May limit design elements of development.	• No

Remedial Method	Applicability	Method	Advantage	Disadvantage	Further Consider?
On-site relocation of PAH impacted soils to an area of less sensitive land use	• Yes	• Determine extent and concentration of PAH, relocate PAH impacted soils to areas of less sensitive land use such as roadways.	• No off-site disposal required. • Reduced disposal volume and cost. • Soils can be beneficially re-used on-site. • Reduction of waste to landfill. • No EMP required.	• Subject to further leachability testing for on-site re-use. • PAH soils to managed and handled via Construction Environment Management Plan (CEMP). CEMP would require site induction requirement's, control measures, and monitoring measures, and quality control measures to ensure that environmental controls are being implemented and are effective. • EMP/CEMP must be administered until PAH removal is confirmed. • May limit design elements of development.	• Yes
Asbestos					
On-site containment of Asbestos	• Yes	• Determine extent of asbestos, survey location with coordinates and elevation. Contain asbestos beneath clean soil cover (1.0 m) under hard-stand, cover with marker tape, and clean soil buffer.	• No excavations for off-site disposal required. • Reduced disposal volume and cost. • Soils can be left in-place on-site if no human health risk. • Reduction of waste to landfill.	• Potential reduction in land value. • Requires long-term management - Environmental Management Plan (EMP) on property title. • Asbestos soils to managed and handled via Asbestos	• No

Remedial Method	Applicability	Method	Advantage	Disadvantage	Further Consider?
				Management Plan and Asbestos Register. AMP requires site induction requirement's, control measures, monitoring measures, and quality control measures to ensure that environmental controls are being implemented and are effective. • AMP and Asbestos Register must be administered until asbestos removal is confirmed. • May limit design elements of development.	
Excavation, transport, and disposal of Asbestos impacted soils at licensed facility	• Yes	• Excavate and transport soils off-site.	• Fast and effective. • Removes impacted material and subsequently any ongoing liability or need for any long-term management. • If successful, no Asbestos Management Plan or Asbestos register on property title required.	• Increased disposal volume and cost. • Imported VENM/ENM and geotechnical considerations required to replace lost soil volume. • Additional site testing to determine extent and validation upon removal.	• Yes

Remedial Method	Applicability	Method	Advantage	Disadvantage	Further Consider?
				• Requires excavation in accordance with environmental controls. • Requires clearance and site air monitoring (if fibrous asbestos) by Occupational Hygienist.	

Based on the remedial options assessment, the applicable and preferred remedial option for the COPCs is likely to be a combination of excavation, transportation and disposal to a licensed facility.

Excavation, transportation and reuse of impacted soils in an area of the site which has a less sensitive land and onsite encapsulation of impacted materials are also discussed.

These options however, will need to be re-evaluated based on the outcomes of additional assessment of soil at the site which are proposed to characterise soils.

It is noted that all remediation works at the site must be undertaken in accordance with a Construction Environment Management Plan to mitigate risks to workers and the public during earthworks at the site.

8 REMEDIATION METHODS

8.1 *OFFSITE DISPOSAL*

Excavation and offsite disposal at a suitably licenced waste disposal facility consists of physically removing the contaminated medium and therefore the contamination from the site. This method is considered likely to be the most suitable remediation approach as this approach has low technological risk and provides a fast, effective remediation methodology. This remediation method is considered suitable for both asbestos and PAH impacts.

The procedure for excavation and offsite disposal is as follows:

- The targeted area for remediation is set out onsite;
- The area is excavated to the target depth, with soils either excavated directly to trucks for offsite disposal at a suitably licenced waste facility capable of accepting the waste, or stockpiled onsite for offsite disposal at a later date;
- Waste classification of the material for offsite disposal is required prior to offsite disposal. Waste classification can be carried out insitu or following stockpiling of the material, in accordance with Section 9;
- Following excavation of the impacted soils, validation of the excavation should be carried out in accordance with Section 9.

8.2 *RETENTION OF IMPACTED MATERIALS ONSITE*

Onsite treatment of impacted soils by excavation, transport and placement of materials in an area of the site which has a less sensitive proposed land use is another option and is considered to be relatively low cost, has low technological risk and provides a fast, effective remediation methodology.

The reuse of impacted soils on an area of the site with a less sensitive land use is therefore considered suitable for remediation of PAH impacted soils. This methodology is not considered likely to be suitable for asbestos impacted soils.

The procedure for excavation and reuse onsite is as follows:

- The targeted area for remediation is set out onsite;
- The area is excavated to the target depth, with soils either excavated directly to trucks for transport to the designated reuse area, or stockpiled near the remediation area for transport at a later date;
- Following transport to the reuse area, the soils are then placed either in stockpile or by spreading and compaction to an engineering standard (if required);
- Following excavation of the impacted soils, validation of the excavation should be carried out in accordance with Section 9.

If required in order to meet design final contours for the site, uncontaminated material may be excavated from the less sensitive areas in order to create suitable void space in the areas of less sensitive land use, for the impacted materials which are to be relocated. If this is required the excavated uncontaminated materials could be used to backfill the excavated hotspots (once validation of remediation has been confirmed), be used beneficially on other areas of the site requiring fill materials or alternatively be suitable waste classified and disposed of at an offsite location, capable of accepting the waste materials (most likely to be classified as VENM).

8.3 *ONSITE ENCAPSULATION*

Onsite encapsulation of the impacted material consists of excavation of the impacted soil and placement of the soil at a suitable location onsite, for example under a proposed roadway. Onsite encapsulation will require specific design in consultation with the site auditor, Council and other stakeholders, and may require an Environmental Management Plan to be prepared for the site.

The impacted soil excavation will require validation in accordance with the validation requirements outlined in Section 9 and the impacted soils may require further assessment.

Onsite encapsulation is considered to likely be suitable for the PAH and/or asbestos impacted soils.

8.4 *ONSITE CONTAINMENT*

Onsite containment of the impacted material consists of excavation of the impacted soil and placement of the soil at a suitable location onsite or retention of impacted material insitu and management of human health or environmental risks by disrupting contaminant migration or exposure pathways. Onsite containment will require consultation with the site auditor, Council and other stakeholders, and may require an Environmental Management Plan to be prepared for the site.

Onsite containment is currently employed at the site under the EMP (Aecom 2010), for the embankment and apron areas of the site. The containment is provided by a jute layer, overlain by

mulch derived from planted vegetation. Based on aerial photograph review from the construction phase of the embankment, it appears that the jute layer was overlain by a growing medium during the works.

Where excavation and relocation is undertaken the impacted soil excavation will require validation in accordance with the validation requirements outlined in Section 9 and the impacted soils may require further assessment.

Onsite containment is considered to likely be suitable for the PAH and/or asbestos impacted soils.

8.5 *REMEDIATION SEQUENCING*

The sequencing and timing of remediation at the site will be under control of the Site Manager who will have control of all aspects of the construction (i.e. timing, stakeholder engagement, permits, technical, plant and site management, waste management, environmental controls and subcontractor management). It is noted that at this time the site staging plan has not been finalised. Following finalisation of the construction staging plan the RAP should be reviewed and updated if required to suit the proposed staging plan. An indicative sequence of site construction and remediation is provided below:

1. Notifications given, and permit requirements obtained;
2. Installation of environmental, safety, traffic management, construction utilities, site boundary, and waste management controls;
3. Mobilisation of site amenities;
4. Investigation of areas identified for further assessment in the RAP;
5. Update of the RAP;
6. Remediation works executed in accordance with the RAP and the preferred remediation approach; and
7. Validation sampling and analyses remediated areas.

8.6 *PRELIMINARIES*

Prior to undertaking any works, the nominated remediation contractor should prepare health, safety and environment plans (HESPs) to ensure that potential hazards related to the work are identified and control measures are implemented. Safe work method statements should be prepared for tasks required to be undertaken by both the environmental consultant and the remediation contractor to complete their respective scopes of work.

The remediation contractor is to confirm that all necessary environmental management, notifications, permits and safety controls are in place.

Service plans will be requested from the Dial Before You Dig service and from the Council as necessary to identify the location of underground services at the site.

8.7 *SITE PREPARATION*

The following Table 4 summarises the measures that should be implemented prior to remediation works at the site.

Table 4: Site Preparation

Item	Description
Site Access	Access to the site remediation area will be controlled by the remediation contractor performing the works and the site will be off limits to all non-essential personnel. The public will not have access to this area of the site.
Site Signage	Signage will be installed on the site, with direction to key areas (including to decontamination units, wash down areas, exits, etc.) and traffic restrictions. Signage at the main access points will include after-hours contact details.
Fencing or Hoarding	The site is to be secured with perimeter security fencing which must be maintained around the site and internal excavation areas if physical barriers are not already in place. Shade cloth should be installed on fences and hoardings. Additional fencing should be erected where required to secure work areas and exclusion zones. Regular maintenance and repair of all retained fences and hoardings within and surrounding the site will be undertaken during the period of the remediation work.
Traffic Management	It is the remediation contractor's responsibility to liaise with others on the property outside the designated site works boundary, and adjacent to the site, to ensure works are completed in accordance with directions from the Site Manager. The remediation contractor may need to excavate, and transport impacted soils off-site. Driving through the impacted areas is to be avoided and dust suppression is to be undertaken where trafficking is unavoidable. Transport of materials to and from site will need to consider traffic management options which take into account the size of the site and any access restrictions to the site. The site access and exit roads are to be monitored for spillage and tracking from the site and are to be kept clean with street sweeper following waste removal off-site.
Decontamination Facilities	The remediation contractor shall isolate or eliminate the risk of cross-contamination or off-site transport of hazardous or contaminated materials via the vehicle tyres by manual removal and wheel washing facility. A wheel washing facility will be required for vehicles leaving the remediation area of the site, either for waste disposal or other activities, based on site conditions, to minimise dust and soil emitting off-site. A decontamination facility for workers (hand and eye washing facilities etc.) should be installed for use during the works. These facilities should be clearly signposted and indicated to site workers during site inductions.
Supply of Utilities	The installation and commissioning of all temporary site services (e.g. electricity, water, sewerage and telecommunications) required for the duration of the works should be installed to the requirements of the appropriate regulatory authorities and should be installed outside areas of proposed excavations. All approvals in

Item	Description
	respect to the installation, operation and eventual removal of temporary services shall be obtained.
Site Contractor's Facilities	All site accommodation and facilities required for the remediation works will be established in conformance with relevant regulations and authority's requirements. Existing site infrastructure may be utilised for this purpose (if present). Licensed persons in accordance with statutory requirements will carry out all connections. The following facilities may need to be established adjacent to or in close proximity to the site for the site works: • site offices; • amenities; • work sheds (including decontamination facilities) and changing areas for the use of the remediation contractor, subcontractors and consultants; • temporary site sheds; • bins for rubbish generated by personnel.
Waste Management	Unless materials are removed from site upon excavation, designated waste management areas are to be set up on or near to the site to manage impacted excavated soil for disposal or impacted soils stored on the site are to be managed in accordance with approved environmental controls.

8.8 *SOIL STOCKPILE MANAGEMENT*

In the occurrence of soil stockpiling onsite, stockpile management procedures, soil erosion and sedimentation controls, and procedures to manage contamination must be applied to all stockpiled material.

The location of the stockpiles should be selected to fit with the expected stages of the project. In addition to the general requirements and assumptions for excavations noted above, these additional requirements apply to stockpiled soils:

- The remediation contractor is responsible for the selection, location and preparation of surfaces for the placement of stockpiles. Stockpiles will only be placed at approved locations.
- Stockpiles will be strategically located to mitigate environmental impacts while facilitating material handling requirements.
- The remediation contractor is responsible for tracking the movement of materials between excavations and stockpiles.
- Stockpiles must be managed by the remediation contractor to mitigate the effects of dust, odour, vapours, and liquid run-off.
- Potentially asbestos impacted stockpile shall be kept moist and shall be covered by plastic sheet if left overnight.

- During excavation, soils must be characterised by visual and olfactory means, and placed in segregated stockpiles based on field screening methods described below.
- The remediation contractor must excavate soils to minimise cross-contamination of soil types, contamination, and liquids.
- Contaminated materials will only be stockpiled in locations that do not pose any risk of environmental impairment of the stockpile area or surrounding areas (i.e. sealed surfaces such as sealed concrete, asphalt, high density polyethylene or a combination of these).
- Stockpiles will only be constructed in areas of the site that have been located and prepared in accordance with the requirements of this RAP.
- All such preparatory works will be undertaken prior to the placement of material in the stockpile.
- Access routes will be established around the material stockpiles to enable access from adjoining traffic routes.

8.8.1 *STOCKPILE WASTE CLASSIFICATION*

Classification of stockpiled materials to be removed from the site will be undertaken in accordance with the NSW EPA Waste Classification Guidelines (2014).

8.8.2 *STOCKPILE ASSESSMENT AND SAMPLING METHODOLOGY*

Stockpile assessment and sampling methodology should be in general conformance with the referenced regulatory and guidance documents within this RAP and as directed by the environmental consultant. In addition, reference is made to the following document for general guidance on stockpile sampling methodology:

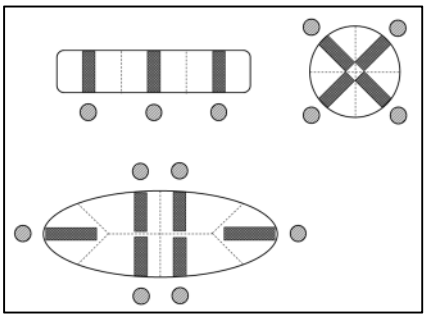
- AS1141.3.1-2012, Methods for sampling and testing aggregates, Method 3.1: Sampling - Aggregates
- Cement Concrete & Aggregates Australia, Guideline to Sampling for the Extractive Industry, August 2006
- ASTM D6009-12, Standard Guide for Sampling Waste Piles

The method of stockpile field screening assessment and sampling shall consider the size of the stockpile, the expected degree of homogeneity, the known history, the expected contaminant distribution, contaminant volatility and physical characteristics, the space availability needed to interrogate the contents of a stockpile, the qualifications of the sampling environmental consultant and equipment operator, the quality of sampling equipment, and the environmental controls in-place.

8.8.3 *GENERAL GUIDANCE FOR FIELD SCREENING STOCKPILES OF VOLUME UP TO 200M³*

- Sketch and measure the stockpile dimensions, location, and immediate vicinity impediments and record this information on the Field Inspection Form.
- Collect minimum 10 field screening samples from the stockpile for visual, olfactory and/or PID measurement (where volatile contaminants are present). The screening samples should be discrete and collected evenly throughout the stockpile via a systematic grid.
- The 10 samples should be collected in both bag for PID measurement and clean glass jar(s) for laboratory analyses and be of suitable volume for analyses.
- Screening samples should be collected by opening the stockpile using mechanical means (i.e. backhoe) or penetrating the stockpile using hand auger or push tube. Examples of stockpile partitioning are shown in Figure 4 below as reproduced from AS11413.1-2012.
- Sampling should penetrate the entire depth of the stockpile.
- Samples should be handled with appropriate personal protective equipment.
- The samples should be collected using decontaminated equipment.
- Samples should be taken a minimum 200 mm from the soil exposed surface.

Figure 4 Example Stockpile Partitioning (Source: Reproduced from AS11413.1-2012).



8.8.4 *GENERAL GUIDANCE FOR FIELD SCREENING STOCKPILES OF VOLUME GREATER THAN 200M³:*

For stockpiles greater than 200 m^3, the minimum number of field screening PID samples should include 10 samples for the first 200 m^3 and then 1 sample per 25 m^3. Example: a stockpile of 350 m^3 should include a minimum of 16 field screening samples.

8.8.5 *LABORATORY ANALYTICAL FREQUENCY*

The minimum number of soil samples required for analytical testing will be based on the NSW EPA Sampling Design Guidelines, Schedule B2, Table 4, NEPM 2013, and the Victorian EPA Publication IWRG 702.

The number of samples for analytical purposes is primarily based on the soil volume (e.g. either less or greater than 200 m^3) and the method of assessment as either:

Method 1: Highest individual measured concentration; or,

Method 2: Comparison of the calculated 95% Upper Confidence Limit of the Average Concentration against the adopted criteria.

Stockpiles Less than 200m^3

For stockpiles less than 200 m^3, the minimum number of samples for analyses utilising assessment Method 1 is reproduced from Table 4 Schedule B2, NEPM 2013 and IWRG702 in Table 5 below:

Table 5: Minimum number of samples for stockpile 200 m^3 or less (minimum of 3 then 1:25m^3)

Soil Volume, m^3	Minimum Number of Samples for Analyses
<75	3
75 - <100	4
100 - <125	5
125 - <150	6
150 - <175	7
175 - <200	8
>200	1:25

Where assessment Method 2 is required for stockpiles less than 200 m^3, a recommended minimum number of ten samples should be analysed.

Stockpiles Greater than 200m^3

For stockpiles greater than 200 m^3, the minimum number of samples for analyses utilising assessment Method 1 or Method 2 is reproduced from IWRG702 in Table 6 below:

Table 6: Minimum number of samples for stockpile soil volumes greater than 200 m^3

Soil Volume, m^3	Minimum Number of Samples at 1:25 m^3	Minimum number of samples to calculate 95%UCL of the Average Concentration
300	12	10
400	16	10
500	20	10
600	24	10
700	28	10
800	32	10
900	36	10
1000	40	10
1500	60	10
2000	80	10
2500	100	10
3000	120	12 (1:250)

Soil Volume, m^3	Minimum Number of Samples at 1:25 m^3	Minimum number of samples to calculate 95%UCL of the Average Concentration
4000	160	16 (1:250)
4500	180	18 (1:250)
5000	200	20 (1:250)
>5000	1:25 m^3	1:250 m^3

*: Taken from Table 3 of EPA Publication IWRG 702

Based on the site history information waste material will be assessed for the following COPCs:

- TRH;
- PAH;
- Metals;
- OCP; and
- Asbestos

8.9 *CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN REQUIREMENTS*

The Remediation contractor shall develop a Construction Environmental Management Plan (CEMP) that describes the measures to reduce adverse impact of the construction activities on the environment and sensitive receptors (e.g. residential properties to the south). The CEMP is to include, as a minimum:

- placement of site accommodation, toilets, storage compounds and personal decontamination units;
- vehicle access and areas where access is to be restricted;
- enclosure or delineation of the site for safety;
- protection of existing vegetation;
- methods of odour, dust, and vapour control;
- dust and asbestos trigger levels for action;
- noise mitigation and monitoring methods;
- site drainage management measures;
- control of discharges from and within the site;
- methods of control of erosion on the site;
- methods of controlling surface run off from the site;
- methods of controlling discharges to watercourses or drains so that they comply with EPA and Sydney Water requirements;
- location and procedures (including spill contingencies) for refuelling and chemical storage on site; and

- material stockpile areas and sediment control.

8.10 *WASTE MATERIALS TRACKING*

Materials excavated or removed from the site should be tracked in order to provide detailed and accurate information about the location and quantity of all materials both on- and off-site from the time of their excavation until their disposal. The disposal locations will be determined by the remediation contractor. Over and above waste dockets supplied by the receiving landfill, the following information is to be documented by the remediation contractor:

- Origin of material on the site;
- material type and description;
- approximate volume (m^3);
- time and date of excavation and transport;
- truck licence and registration number.

This information, along with the landfill docket number, is to be provided to the environmental consultant so as to be included in the validation report.

As per the Protection of the Environment Operations (Waste) Regulations 2014, as at 1 July 2015, it is required that transport of more than 100 kg of asbestos waste or more than 10 m^2 of asbestos sheeting is recorded with a unique code to allow NSW EPA to monitor their movement from site of generation to disposal.

8.11 *ONSITE MATERIALS TRACKING*

Materials excavated and transported from one area of the site to another should be tracked in order to provide detailed and accurate information about the location and quantity of all materials. The following information should be recorded for material.

- Origin of material on the site;
- material type and description;
- approximate volume (m^3);
- time and date of excavation and transport; and
- Location of the material reuse onsite.

8.12 *SOIL OFF-SITE DISPOSAL*

Following receipt of waste classification results, the total volumes of stockpiled material for offsite disposal will be transported by a licenced transporter to an appropriately licensed facility for disposal. Prior to the disposal of waste materials from the site, the remediation contractor will seek written approval from the receiving facility to accept the waste.

8.13 *ONGOING MONITORING/ MANAGEMENT*

The preferred remediation approaches are designed to treat contaminated material, remove contaminated materials from the site and dispose at a licenced facility or contain contaminated materials to prevent exposure of future site users to the contaminants, such that there remains no risk to human health. If this approach is validated as successful, the requirement for on-going monitoring or management to ensure continued protection of human health and the environment will not be required.

8.14 *SITE REINSTATEMENT*

Imported materials may be required to reinstate some of the excavated areas, excavations will be backfilled with imported virgin excavated natural material (VENM) or Excavated Natural Material (ENM) as defined in the NSW EPA general resource recovery order "The Excavated Natural Material Order 2014". All material must be certified as suitable for the intended use.

VENM/ENM sourced from a quarry or other supplier, should either be accompanied by a certified letter stating that the material is VENM/ENM or ideally come with chemical certification by means of confirmatory validation data from the source site. It may also be prudent for the environmental consultant supervising the works to visit the source site to assess the potential for contamination. Observations will be made by the consultant during importation/use to confirm that the material is consistent with the documentation. Geotechnical considerations with respect to backfilling (drainage of the material, compaction, density) should be taken into account by the remediation contractor (with the possibility of engaging a suitably qualified geotechnical consultant to provide advice on backfilling specifications).

During the importation of validated fill material for site reinstatement, if needed, receipts and dockets will be provided by the supplier of the material for every truck or load of material that is trucked into site. These dockets will also need to be kept on file as part of the remediation documentation.

Landscaping soil and garden mixes are an exception to the requirement of VENM due to their processed nature. This material would need to be approved on a case by case basis prior to being used on site and provision of any compliance certificates, product information sheets and the preparation by a reputable landscape supplier. Laboratory testing will be required at the discretion of the Site Auditor and environmental consultant on site.

8.15 *REMEDIAL CONTINGENCIES*

The proposed remedial option should be effective in dealing with the identified impacts, however contingency strategies may be required in the event of certain scenarios.
Anticipated potential remedial contingencies are detailed in Table 7.

Table 7: Remedial Contingencies

Potential issues	Proposed Corrective Actions	Responsible Person	Communication and Additional Sampling/Monitoring
Excavation becomes unmanageable due to mud	Improve drainage collection system; add geotextile/gravel in problem areas; strip off mud/slurry materials. Drains, gutters, roads and access ways shall be maintained free of sediment. Site personnel or dedicated site manager to remain vigilant of breaches of sediment controls.	Remediation contractor	Advise site manager of potential breaches. Breaches are to be recorded in the daily site log and provided to the Client and the appointed environmental consultant or site environmental officer. No additional monitoring/sampling required unless stormwater drains are inundated with evidence of contaminated materials from site.
Excessive stormwater runoff in drains or excavation areas	Minimise active contaminated work area; improve stormwater diversion. Check control measures are adequate to prevent surface water runoff entering and leaving excavation and stockpile areas. Temporary bunding or diversion drain, impermeable sheeting placed under stockpiles, silt fences/hay bales surrounding stockpiles and protect existing drains with silt/sediment mats or bunds. Regularly inspect drains to ensure that they are protected from runoff.	Remediation contractor to contact Environmental consultant to test any accumulated water.	Breaches are to be recorded in the daily site log and provided to the Client and the appointed environmental consultant. No additional monitoring/sampling required unless stormwater drains are inundated with evidence of contaminated materials from site. Water accumulated in excavations to be sampled by environmental consultant for applicable contaminants of concern. Management/disposal options to be formulated based on analytical results.
Excessive dust	Use water sprays or water fogging equipment; stop dust-generating activity until better dust control can be achieved or apply interim capping systems on stockpiles or exposed material. Stop work in high wind conditions.	Remediation contractor	Breaches are to be recorded in the daily site log. Monitoring/sampling required where removal of asbestos is occurring in accordance with licenced asbestos removalist's asbestos control plan.
Heavy rain, wind, or inclement weather	Temporarily stop work. Ensure site security is stable. Ensure sediment and surface water controls are operating correctly. If possible, divert surface water away from active work areas or excavations. Cover stockpiles with tarp and weights.	Remediation contractor	None.
Equipment failures	Maintain spare equipment or parts; keep rental options available or shut down affected	Remediation contractor	Sample any impacted stockpiled materials (TRH, BTEX compounds and PAHs) and determine appropriate

Potential issues	Proposed Corrective Actions	Responsible Person	Communication and Additional Sampling/Monitoring
	operations until repairs are made. Clean up the spill with absorbent material. Stockpile the impacted material in a secure location.		disposal/treatment option based on an assessment of analytical results.
Unexpected contamination findings (such as areas of fly tipping or potentially contaminated fill)	Stop work immediately and consult with a specialist as to appropriate management options. Further details are included in Unexpected Finds Management Plan Appendix A.	Remediation contractor	Sampling and laboratory testing of potentially contaminated material to determine appropriate management options based on an assessment of analytical results. Analyses may include heavy metals, TRH, BTEX compounds, PAHs, and asbestos (as required).
Neighbour or community complaints	Stop works and implement control measures to address complaint (if possible).	Remediation contractor	Coordinate a community consultation process prior to and during the works. Notify relevant Project Managers following complaint. Report complaint as per Client management procedures.
Selected remedial options are not effective	It is anticipated that the proposed RAP will be effective in dealing with the on-site impact, however, alternative remedial methods will be identified and applied, in consultation with the Client and other stakeholders, as appropriate.	Remediation contractor	Unidentified impacts at the site will need additional sampling to assess appropriate remedial action.

9 VALIDATION PLAN

Validation sampling will be undertaken following removal of impacted or contaminated soils during the site works to ensure that the horizontal and vertical extent of impacts are removed. Sampling will be conducted in accordance with relevant NSW EPA guidance to confirm whether the identified contamination has been adequately removed from the excavated areas and whether any further remediation is required.

Based on the soil results to date for the site, the contaminants of potential concern (COPC) are identified as:

- PAH and asbestos located on the eastern embankment.

All validation samples collected from the remediation areas will also be analysed for the identified COPC.

Where other COPCs are identified during site works or additional investigations, these COPCs will be added to the validation suite where necessary.

Soils at the base and walls of excavations will be assessed against the site criteria outlined in Section 5 as well as consideration for statistical analyses of results where appropriate in accordance with NEPM 2013.

9.1 *VALIDATION SAMPLING*

Validation sampling should be carried out as required, as outlined below.

9.1.1 *EXCAVATED AREAS*

A systematic and judgemental sampling regime will be adopted for validation of areas where impacted soils have been removed by excavation.

Following excavation of impacted areas, the walls and base of each excavation area will be field screened and documented for the following characteristics:

- visual and olfactory evidence of impact;
- spatial relationship to known impacts; and,
- geologic or hydrogeological evidence of preferential pathways.

Systematic grid-based samples retrieved in-situ will be collected from the walls and base of excavations and analysed at a frequency of one sample per 25 m^2 and increased depending on field observations. Judgemental samples will also be collected where distinct soil differences occur.

If validation samples detect contaminants in excess of the site assessment criteria, additional material will be excavated and treated, until the area can be successfully validated.

9.1.2 *FILL STOCKPILE AREAS*

If the material from excavated areas is stockpiled onsite, and the stockpiled material is assessed to have the potential to leach in excess of the stipulated criteria, validation of the footprint of the stockpiled material will be required. Validation should be undertaken in a similar manner to excavated areas, as detailed in Section 11.1.1.

9.1.3 *VALIDATION PLAN SUMMARY*

The validation plan will be proposed once further sampling at the site has been carried out. This will ensure that sufficient and effective validation of the areas of concern is carried out. This RAP will be amended as further sampling results are received and assessed.

9.1.4 *WASTE CLASSIFICATION*

For remediation areas requiring off-site disposal of soils the following chemical contaminants should be analysed in accordance with the NSW EPA (2014) Waste Classification Guidelines: Part 1 Classifying Waste, November 2014:

- Heavy Metals;
- PAH;
- Moderately harmful pesticides list in table 1 of waste classification guidelines;
- TRH;
- BTEX; and
- Scheduled chemicals list in table 1 of waste classification guidelines.

9.1.5 *IMPORTED VENM*

VENM, sourced from a quarry or other supplier, should either be accompanied by a certified letter stating that the material is VENM, and ideally be accompanied by analytical data from the source site.

CES will undertake an inspection of the source of the material, and if necessary complete sampling of the material, to assess potential for contamination. Observations will be made by the consultant during importation/use to confirm that the material is consistent with the documentation.

Geotechnical considerations with respect to backfilling (drainage of the material, compaction, density) should be taken into account by the remediation contractor (with the possibility of engaging a suitably qualified geotechnical consultant to provide advice on backfilling specifications).

During the importation of validated fill material for site reinstatement, receipts and dockets are to be provided by the supplier of the material for every truck or load of material that is trucked into the site. These dockets will also be required to be kept on file as part of the site reinstatement documentation.

9.1.6 *IMPORTED ENM*

Where ENM is to be imported to the site for use as backfill, the material should be sampled and assessed in accordance with the NSW EPA Resource Recovery Order, ENM Order 2014 prior to being imported to the site.

9.1.7 *IMPORTED MATERIAL VALIDATION*

Any VENM or ENM imported to site for use must be accompanied by suitable documentation to demonstrate that the material meets with the classification of VENM or the ENM General Resource Recovery exemption issued by the NSW EPA. Fill that is not accompanied by adequate certification shall be rejected from Site.

Prior to and following placement, the imported material will be inspected for any visual signs of contamination, foreign material or variations in material type to that expected from the source site. The inspection will include:

- Inspection for obvious sign of contamination or unacceptable characteristics including odours, discolouration, waste materials (slag, ash, building wastes, containers, rubbish) and potential asbestos containing materials (including fibro, cement pipes and compressed cement sheeting); and
- Confirmation that the material is what is expected from the source site (e.g. ripped sandstone, shale, clay soil etc).

Any material exhibiting signs of contamination or that is not the expected material will be rejected. To confirm the suitability of the material for use on-site from a contamination perspective, ongoing validation testing of the material imported to the site will be undertaken.

The validation testing will involve as a minimum:

- Collection of a minimum of three samples per VENM source site under 15,000m^3 or one sample per 5,000m^3 for source sites where greater than 15,000m^3 will be sourced of VENM imported to the site; and
- Laboratory analysis of the material at a NATA registered laboratory for a suite of common contaminants including heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn); Total Petroleum Hydrocarbons (TPH); Benzene, Toluene, Ethylbenzene, Total Xylenes (BTEX), Polycyclic Aromatic Hydrocarbons (PAH), Organochlorine Pesticides (OCP), and asbestos.

The results will be compared to the SAC applicable to the area of the site where the material is to be placed as detailed below:

- HIL A, HSL A – Residential areas;
- HIL B, HSL B – Low-high density residential

Where an imported material does not meet the SAC, the material should be considered unsuitable and rejected from site.

9.1.8 *METHOD OF SAMPLE COLLECTION*

Care will be taken to ensure that representative samples are obtained and that the integrity is maintained, particularly when dealing with potentially volatile or semi-volatile compounds. Specific sampling procedures for each method of collection are provided below in following sections.

9.1.9 *SAMPLE COLLECTION*

Samples will be collected using either a decontaminated stainless steel trowel or by using new nitrile gloves for each sample and placing the soil directly into laboratory supplied containers.

9.1.10 *DECONTAMINATION PROCEDURES*

The following decontamination procedures will be adopted for sampling equipment.

9.1.11 *SAMPLING EQUIPMENT*

Sampling equipment, such as trowels, will be washed between sampling events using Decon 90 (or similar laboratory grade detergent) initially followed by adequate rinsing with clean potable and de-ionised water. To check the adequacy of the decontamination protocol, rinsate samples will be collected for analysis.

9.1.12 *SAMPLE CONTAINERS*

Soil and groundwater sample containers will comprise glass or plastic containers, as required, supplied by either the primary or secondary laboratory. The containers will be completely filled leaving no headspace, labelled with the job number, date, unique sampling point identification and initials of the project environmental scientist/engineer.

9.1.13 *METHOD OF SAMPLE STORAGE AND HANDLING*

The samples will immediately be placed in an esky / cool box in which ice has been added, to keep the samples below a temperature of approximately 4ºC. At the end of each day, the samples in the cool box will be transported to laboratory (within holding times).

9.1.14 *SAMPLE LOGGING*

A log of excavation works and soil/groundwater samples collected will be completed during fieldwork by a qualified environmental engineer/scientist. The log records the following data:

- Sample number and depth;
- Soil classification, colour, consistency or density, odour and moisture content;
- Groundwater colour, odour, suspensions;
- Depth of excavation;
- Excavator bucket refusal;
- Method of excavation; and

- The depth of first encountered free water.

9.1.15 *QA / QC DOCUMENTATION*

While on site, the supervising engineer/scientist will be required to fill out a copy of a 'sample register', which documents:

- Time of sample collection;
- Weather;
- Unique sample identification number; and
- Sample location and depth.

All samples will be classified in the field based on soil/fill/groundwater characteristics and obvious signs of contamination such as discolouration or odour will be noted on a log.

All samples, including QC samples, will be transported to the primary and check laboratories under Chain-of Custody (COC) procedures and maintained in an ice-filled cooler. The following details will be recorded on the COC form:

- Site identification;
- The sampler;
- Nature of the sample;
- Collection time and date;
- Analyses to be performed;
- Sample preservation method;
- Departure time from site; and
- Dispatch courier(s).

9.2 *FIELD SCREENING*

Although not anticipated, where volatile contaminants are encountered, field screening will be undertaken to screen potentially contaminated material being removed from the excavations for the presence of volatile compounds. Field screening will be conducted using a Photo-Ionisation Detector (PID) or similar instrument capable of measuring Volatile Organic Compounds (VOCs) in air.

The instrument will be operated using the controlled headspace method in accordance with a documented procedure by appropriately trained persons. Full documentation will be provided relating to the calibration of the instrument, the samples analysed, gas screening results and site observations. These results will be compiled and presented in the validation report.

The presence of elevated levels of VOCs in imported material will result in that batch of material being rejected.

9.3 *QUALITY ASSURANCE AND QUALITY CONTROL PROGRAM (QA/QC)*

The proposed field and laboratory QA/QC programme for this project is consistent with National Environmental Protection Council (NEPC, 1999 as amended 2013) requirements. The programme consists of the following:

- Laboratory blind replicates at 1 in 20 (5 %) samples or one per batch; and
- Split samples (intra-lab duplicates) at 1 in 20 (5 %) samples or one per batch.

9.3.1 *FIELD QA/QC PROGRAMME*

Field QA/QC consists of the application of documented quality work procedures and the collection of field QC samples listed above.

9.3.1.1 *Environmental Samples*

The environmental samples collected for the validation programme are representative samples of soil/groundwater collected for analysis. Environmental samples are the original samples taken from a particular location and other samples are blind replicates or split samples of the original.

9.3.1.2 *Blind Replicate Samples*

Blind replicate samples are provided by the collection of two similar samples from the same location or successively from the same monitoring bore. These samples are preserved, stored, transported, prepared and analysed in an identical manner to environmental samples.

9.3.1.3 *Split Samples*

Split samples provide a check on the analytical proficiency of the laboratories. Split samples are collected from the same location or successively from the same monitoring bore. Split samples must be taken from the same location as the blind replicate, thus becoming a triplicate sample. However, split samples are not taken as often as blind replicates. Spilt samples (triplicates) are preserved, stored, transported, prepared and analysed in an identical manner to environmental samples, but are sent for testing to a different laboratory.

9.3.1.4 *Trip Spike*

Laboratory-prepared VOC spikes consisting of distilled, de-ionised water or sand spiked with known concentrations of BTEX should be included in QA/QC programmes where light fraction TPH, BTEX and other VOCs concentrations are being measured. Laboratory-prepared VOC spikes should be included at a rate of one per sample batch submitted for VOC analysis. These samples are to be submitted for BTEX analysis with resulting concentrations compared with the concentrations of the known additions. Generally, samples are spiked with concentrations of 10,

10, 10 and 30 ppm of benzene, toluene, ethylbenzene and total xylenes, respectively. The purpose of these samples is to monitor VOC losses during transit.

9.3.1.5 *Trip Blank*

Trip blanks consisting of pre-washed bottles containing distilled or de-ionised water and appropriate preservatives or laboratory-prepared sand blank containing acid-washed quartz sand will be supplied by the analytical laboratory. The role of trip blanks is to detect potential contamination during sample transport. These samples reside in transport vessels during sampling activities and are not opened in the field. Typically, one trip blank is submitted with each batch of samples for VOC analysis. Trip blanks are analysed at the laboratory as regular samples or only for volatile organic compounds, as deemed appropriate.

9.4 *VALIDATION REPORTING*

Following the remediation and validation works, a validation report will be prepared in accordance with the NSW EPA (2011) *Guidelines for Consultants Reporting on Contaminated Sites*. The validation report will detail the extent and nature of the remedial works undertaken, characterisation and disposal of contaminated soils, the validation of imported clean fill and topsoil (if any) and will consider the overall status of the site.

The report will include the following sections:

- executive summary;
- scope of works and objectives;
- site identification;
- site history;
- site conditions and surrounding environment;
- geology and hydrogeology;
- previous investigation results;
- summary of the RAP;
- validation criteria;
- nature and extent of the remediation undertaken;
- sampling and analysis plan and sampling methodology;
- field and laboratory QA/QC;
- results of the validation sampling and sampling of imported fill materials;
- information supplied by the remediation contractor (such as waste disposal documentation);
- discussion of the land use suitability at the completion of remedial works; and,

- conclusions.

It should be noted that to enable the validation report to be produced, the remediation contractor will be required to supply the following to the environmental consultant:

- the quantities and types of waste disposed;
- details of the receiving facility/facilities accepting waste from the site;
- disposal dockets for the waste disposed;
- details of any imported materials (including VENM certification, laboratory results, origin and supplier, exemption details, quantities and areas of placement), survey data (including surveys of excavations and following backfilling works).

10 WORK HEALTH AND SAFETY

All works conducted at the site as part of the remediation or site excavation process will comply with the Work Health and Safety Act 2011 and associated Regulations.

The remediation contractor will prepare a work health and safety (WHS) plan that outlines the risks and control measures of site remedial works. The plan should cover site specific requirements associated with the asbestos and PAH's contamination known to be present within fill and natural soils at the site.

The environmental consultant will prepare a WHS Plan for the sampling works it will undertake.

Typically, the WHS plan should address the following issues:

- regulatory requirements;
- responsibilities hazard identification and control;
- air monitoring (including action levels) during excavation and construction (if necessary);
- noise;
- odours;
- chemical hazard control;
- handling procedures;
- personal protective equipment (PPE);
- work zones;
- decontamination procedures;
- emergency response plans;
- contingency plans; and
- incident reporting.

The plan should include emergency contact numbers such as police, fire brigade, hospital and contact details for all relevant personnel. Response to any incidents occurring on site should be in accordance with the plan. The plan should include an Induction and Tool Box Discussion Register.

All those working or visiting the site should be inducted into the plan.

11 SITE MANAGEMENT PLAN

11.1 *HOURS OF OPERATION*

Remediation work hours will only be permitted during the following times, subject to Council approval:

- Monday to Friday: 7:00 am to 6:00 pm
- Saturday: 8:00 am to 1:00 pm.
- Sundays or Public holidays: No work permitted.

Emergency work is permitted outside of these hours.

11.2 *SITE SIGNAGE AND CONTACTS*

Signage will be installed on the site, with direction to key areas (including to decontamination units, wash down areas, exits, etc.) and traffic restrictions. Signage at the main access points will include after-hours contact details of the remediation contractor and site manager.

11.3 *SITE ACCESS*

Transport of materials to and from site will need to consider traffic management options which take into account the size of the site and any access restrictions to the site. The site access and exit roads are to be monitored for spillage and tracking from the site and are to be kept clean with street sweeper following waste removal off-site.

During the remediation works, perimeter fencing will be erected to restrict public access to the work area. Only authorised personnel will be permitted to enter the remediation works area.

Vehicle access will be managed at the entry access point to the site to reduce the tracking of potential contaminated soils around and off-site. This shall be achieved by sweeping the entry on an as-needed basis. Any collected material shall be treated as contaminated material and will be disposed of as required.

11.4 *SEDIMENT AND RUNOFF MANAGEMENT*

A soil and water management plan must be implemented for the control of sediments and runoff leaving or entering the site. All control measures must be installed in accordance with Managing Urban Stormwater: Soil and Construction Volume 1, 4th Edition, NSW Government, March 2004. In the event excavated materials may be required to be stockpiled on site, the material will be required to be stockpiled in a designated location and covered to prevent dust emissions or wash-out during potential rainfall events. Methodology for stockpiling of materials on-site is provided in this RAP.

Drainage and sediment erosion control is required to mitigate the potential for:

- Migration of clean and impacted soil off-site and across the site itself; and

- Migration of clean and impacted surface water and groundwater off-site and across the site itself.

Migration of clean or impacted soil off-site can increase the sediment load in receiving waters and storm water drains, while impacted soils may also release contaminants into these environments. Migration of impacted surface and/or groundwater off-site may result in the release of contaminants into sensitive receiving waters or public utilities (sewer or storm water). Migration of impacted soil, surface water or groundwater across the site may also lead to re-contamination of remediated portions of the site.

Uncontrolled migration of clean surface water across the site may cause erosion and result in transport of soil and sediment off-site. Drainage and erosion controls to be implemented may include the following:

- Hay-bale and geofabric fences to control soil erosion;
- The use of silt/sediment mesh to control surface water run-on or run-off. Where possible, clean run-off should be diverted around the site to minimise the volume of water requiring management; and
- Temporary bunding.

These sediment control features may be placed around:

- The individual site boundaries (up, across and down gradient);
- Soil stockpiles (if created);
- Excavation areas; and
- Stormwater drains.

Appropriate regulatory and utility permits will be required to allow disposal of run-off to either the stormwater or the sewer. Review of the permitting regulations will need to be done with the local authority and/or water authority managing the sewer (storm and sewerage) network.

11.5 *AIR QUALITY*

11.5.1 *DUST CONTROL*

The greatest potential for dust generation may occur during soil treatment or excavation, stockpiling and reinstatement works. Control procedures for the site should be implemented on an as needed basis and could include the following:

- Use of hand held water sprays or hoses to dampen exposed soil and fill surfaces. However, it is important to recognise that there is an environmental risk associated with the generation of excessive and / or contaminated run-off and this should be managed accordingly;
- Stockpiling material in small stockpiles;
- Covering stockpiles; and
- Staging works to take advantage of the prevailing winds to minimise the impact of dusts.

11.5.2 *ODOUR*

Odour is not anticipated be an issue at the site during the excavation and remediation works however if required odour issues can be mitigated by covering of soils, and mist sprays/odour suppressants at site boundaries.

The following measures are generally used to mitigate odour, if generated:

- Minimise working area within odorous soils;
- All stockpiles will be covered to prevent odour dispersion and potential off gassing;
- Excavation works should take advantage of the prevailing winds to minimise the dispersal of nuisance odours to any neighbouring properties; and
- Use of odour suppressant such as Biosolve or suitable alternative may be applied to stockpiled excavated material to reduce odour.

11.5.3 *POTENTIAL VAPOUR EXPOSURE IN SUBSURFACE AREAS*

Occupational health and safety requirements must be met to prevent exposure from impacted soil and / or groundwater during excavation and soil management works. It is not anticipated that soils impacted by volatile contaminants will be encountered, however if encountered the risks to site workers should be managed as outlined below.

Prior to excavation works, or access to utility pits, control measures to protect against exposure to vapour inhalation should be implemented. These measures might include but are not limited to:

- Using a photo-ionisation detector (PID) in the operator breathing zone;
- Setting PID action levels;
- Using respirators or implementing ventilation measures if action levels are exceeded; and
- Stopping work and accessing methods of eliminating vapour exposure.
- Assessment of confined spaces on-site and in nearby off-site utility pits or other sub-surface structures is to be done only by appropriately trained and accredited confined space personnel.

Occupational health and safety requirements under NSW legislation or industry codes of practice must be met for entry into confined spaces such as trenches during future building works.

11.5.4 *NOISE*

The remediation works shall comply with the NSW EPA Interim Construction Noise Guideline, NSW Department of Environment and Climate Change, July 2009.

11.6 *ASBESTOS MANAGEMENT*

Previous investigations and the PSI assessment did not detect asbestos fibres in samples collected from fill materials in extensive sampling and analysis undertaken at the site. It is noted however that one piece of bonded ACM was encountered on the embankment area of the site. In consideration of the above the risk of asbestos in site soils is considered to be low.

If asbestos is found in site soils during the further investigations or during the site works the following should be considered in order to manage the risks associated with asbestos

The works associated with the remediation and management of asbestos and asbestos contaminated soils should carried out in accordance with the relevant legislation including:

Legislation/Regulation	**Key Project Requirements**
Protection of the Environmental Operations Act 1997 (POEO Act) and Regulations	Undertake all activities so as to minimise harm to the environment with regards to asbestos
Protection of the Environment Operations (Waste) Regulation	Requirements in relation to transportation, collection, storage or disposal of asbestos waste.
Environmental Planning and Assessment Act 1979	Compliance with development consent conditions issued by the Consent Authority to manage effects on the environment.
National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)	Compliance with the new NEPM guidelines and the referenced documentation – in particular Western Australia Department of Health – Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites (GARMACS) in Western Australia, May 2009.

And, as appropriate:

- Work Health and Safety Act 2011.
- Work Health and Safety Regulation 2011.
- Workcover NSW – How to Safely Remove Asbestos, Code of Practice (2011).
- Workcover NSW – How to Manage and Control Asbestos in the Workplace (2011).
- Workcover NSW – How to Manage Work Health and Safety Risks (2011).
- Australian Standard AS 1319-1994, Safety Signs for the Occupational Environment; and
- Australian Standard AS 4360-2004, Risk Management.

Specific legislative requirements also referred to in this RAP are:

- The Work Health and Safety Act requires all persons who conduct a business or undertaking (PCBU) to ensure that, as reasonably practicable, workers and other persons are not put at risk from work carried out as part of the business or undertaking.
- The PCBU must undertake a risk assessment of asbestos containing materials and eliminate the exposure of persons at the workplace from airborne asbestos. The exposure standard

for asbestos must not be exceeded. Air monitoring must be carried out during the removal of friable asbestos.

- All forms of asbestos are a prohibited carcinogenic substance. The use of asbestos containing materials is prohibited apart from the purpose of sampling and analysis, maintenance, removal, disposal, encapsulation or enclosure.
- A Class B licence is required for removal of the bonded ACM, where the quantities exceed $10m^2$.
- A Class A licence is require for removal of friable asbestos.
- The PCBU must provide health monitoring to a worker if they are involved in asbestos removal work and is at risk of exposure to asbestos when carrying out the work.
- Excavated soil found to contain asbestos during the bulk earthworks will be removed from site by an appropriately licensed asbestos removal contractor and disposed of in accordance with current NSW EPA guidelines and relevant industry codes of practice.
- Asbestos waste is a trackable waste in accordance with NSW EPA guidelines and must be tracked in accordance with NSW EPA requirements.

12 SUMMARY AND RECOMMENDATIONS

This RAP has been prepared to further assess the contamination status of the site. The results of previous investigations at the site are discussed and data gaps and further investigations identified (Section 5.5).

Remediation, if required following the further investigations, should be carried out in accordance with Sections 8-11.

This RAP is considered suitable to confirm or otherwise that the site is suitable for the proposed high density residential use. If the additional investigations identify impacts which pose an unacceptable risk to human health or the environment, implementation of the remedial actions detailed in Sections 6-11 is considered suitable to make the site suitable for the proposed high-density land use.

This RAP should be revised following further investigation detailed in Section 5.5 if required based on the investigation results. Revision of the RAP should be carried out in accordance with the process detailed in Section 1.4.

13 LIMITATIONS OF THIS REPORT

This report has been prepared for use by the client who commissioned the works in accordance with the project brief and based on information provided by the client. The advice contained in this report relates only to the current project and all results, conclusions and recommendations should be reviewed by a competent person with experience in geotechnical and environmental investigations before being used for any other purpose. CES accepts no liability for use or interpretation by any person or body other than the client. This report must not be reproduced except in full and must not be amended in any way without prior approval by the client and CES.

This report does not provide a complete assessment of the environmental status of the site and is limited to the scope defined therein. It is noted that areas of the site could not be investigated due to the presence of structures including the residential property and presence of ponds. Should information become available regarding conditions at the site including previously unknown sources of contamination, CES reserves the right to review the report in the context of the additional information.

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Figures

CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55 Grandview Street, Pymble, NSW, 2073
ph 8569 2200 fax 9983 0582

Title:

Figure 1: Site Location Plan

CES Project ID:	Date:
CES170303-SD	09/08//2017
Prepared By:	Checked By:
I. Wong	D. Lowe

CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55 Grandview Street, Pymble, NSW, 2073
ph 8569 2200 fax 9983 0582

Title:

Figure 2: Site Layout Plan

CES Project ID:	Date:
CES170303-SD	17/08/2018
Prepared By:	Checked By:
T. Goodbody	D. Lowe

CONSULTING EARTH SCIENTISTS
Suite 3, Level 1
55 Grandview Street, Pymble, NSW, 2073
ph 8569 2200 fax 9983 0582

Title:

Figure 3: Proposed Borehole Location Plan

CES Project ID:	Date:
CES170303-SD	17/08/2018
Prepared By:	Checked By:
T. Goodbody	D. Lowe

Appendix A
Development Plans

AMENDMENTS

ISSUE	DESCRIPTION	APPROVED	DATE
P1	Preliminary Issue	JS	31/07/17
P2	Preliminary Issue for Consultant Co-ordination	JS	11/08/17
P3	Preliminary Issue for Consultant Co-ordination	CR	29/08/17
A	Issue for Development Application	JS	31/08/17
B	Revised Issue for Development Application	JS	6/09/17
C	Incorporate Council comments		23/02/18

Department Legend

- Amenities
- BOH
- Circulation
- Communal
- Communal Outdoor
- PARKING BUILDING A
- PARKING BUILDING A STAFF
- PARKING BUILDING B
- PARKING BUILDING B VISITOR
- PARKING BUILDING C
- PARKING BUILDING C VISITOR
- PARKING BUILDING D
- PARKING BUILDING D VISITOR
- PARKING BUILDING E
- PARKING BUILDING E VISITOR
- PARKING BUILDING F
- PARKING BUILDING F STAFF
- PARKING CAFE
- PARKING MEDICAL CENTRE
- PARKING RESTURANT
- PARKING RETAIL
- PARKING VISITOR
- Retail
- Service
- Store
- Calculating...

PARKING SCHEDULE_Standard Parking Bays

Building_No	Comments	Count
A	Standard Car Parking Bay	5
B	Standard Car Parking Bay	39
C	Standard Car Parking Bay	30
D	Standard Car Parking Bay	34
E	Standard Car Parking Bay	38
F	Standard Car Parking Bay	8
Surplus	Standard Car Parking Bay	6

Total Number of Standard Parking Spaces: 160

PARKING SCHEDULE_Visitor

Building_No	Comments	Count
V-B	Visitor	8
V-C	Visitor	8
V-D	Visitor	7
V-E	Visitor	8

Total Number of Visitor Parking Spaces 31

PARKING SCHEDULE_Commercial

Building_No	Comments	Count
D	Medical	5
D	Restaurant	12
D	Retail	1

Total Number of Parking Spaces: 18

PARKING SCHEDULE_RACF

Building_No	Comments	Count
A	RACF STAFF	5
F	RACF STAFF	5

Total Number of RACF Staff Parking Spaces: 10

PARKING SCHEDULE_Accessible

Building_No	Comments	Count
	Accessible Car Parking Bay	14

Total Number of Accessible Parking Spaces 14

Notes:
- SEPP Seniors: Schedule 3.5 Requires 5% of the total number of car parking spaces must be designated to enable the width of the space to be increased to 3.8m
- Minimum required parking Accessible Car Spaces 233 (total required car parking spaces) x 0.05 = 11.65 spaces
- Standard Car Parking Bay 2.4m x 5.4m to AS 2890.1:2004
- Storage Note: 3.2m³ overbonnet storage provided
- Visitor = 1 space per 5 ILU's
- 2.5m minimum clear height to accessible parking bays. Provide bollard in accordance with AS2890.6-2009 Figure 2.2 & 2.3

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DEVELOPMENT APPLICATION

APPROVED BY: JS
CHECKED BY: JS

CLIENT
Mushan Project Management

DRAWING
FLOOR PLAN - BASEMENT 1

DATE	SCALE @ A1	DRAWN
31/08/17	1 : 250	CR,AK,CW,CT

PROJECT No.	DRAWING No.	ISSUE
2016097	DA-099	C

PROJECT
Potts Hill Seniors Living

Lot 1, Pier 8-9, 23 Hickson Road
Walsh Bay New South Wales 2000 Australia
T 61 2 9290 2722 F 61 2 9290 1150
E sydney@jacksonteece.com
Jackson Teece Chesterman Willis Pty Ltd
Trading as Jackson Teece
ABN 15 083 837 290
Nominated Architect Ian Brodie (4275)

JACKSON TEECE

AMENDMENTS

ISSUE	DESCRIPTION	APPROVED	DATE
P1	Preliminary Issue	JS	31/07/17
P2	Preliminary Issue for Consultant Co-ordination	JS	11/08/17
A	Issue for Development Application	JS	31/08/17
B	Incorporate Council comments		23/02/18

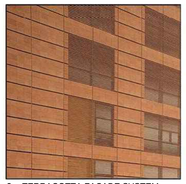
1 South Elevation- Building E & B

2 South Elevation- Building F & A

MATERIAL PALETTE

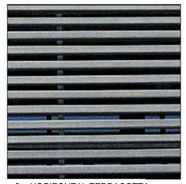

1. TERRACOTTA FINS


2. TERRACOTTA VERTICAL SCREENS


3. TERRACOTTA FACADE SYSTEM

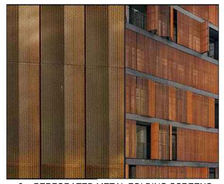

4. GLASS BALUSTRADE


5. EXPRESSED PFC TO SLAB EDGE MICACEOUS IORN OXIDE PAINT FINISH, NATURAL GREY


6. HORIZONTAL TERRACOTTA SUNSCREEN TO POOL FACADE


7. TEXTURED PRECAST CONCRETE


8. FIBRE CEMENT SOFFIT LINING PAINT FINISH: WHITE


9. PERFORATED METAL FOLDING SCREENS


10. HORIZONTAL ALUMININUM VENETIAN BLINDS

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ABBREVIATIONS

BAL-01	Framed glass balustrade
BAL-03	1800mm high balcony dividing wall.
CD-02	Cladding- Terracotta Facade System
CD-03	
COL	Column Off-form concrete finish
CONC-01	Precast concrete, paint finish.
D-01	Solid Core Fire Door
D-02	Glazed Sliding Door
D-03	Glazed Sliding Door
PFC-01	PFC Slab edge detail. Micaceous iron oxide paint finish. Natural Grey
R-01	Render / Plaster
SCE-01	External Screen - Vertical Terracotta Baguette 50x50mm
SCE-02	External Screen - Vertical Terracotta Baguette 100x50mm
SCE-10	Perforated Metal Screen
STO	Storage
W-1	Window Type 1. - Full Height Glazed Window Aluminium Frame (size as shown on architectural drawings)
W-2	Window Type 2. - Full Height Shop Front Glazing Aluminium Frame (size as shown on architectural drawings)
W-4	Window Type 4. - Hinged Window (planter access) High level Vent Panel Aluminium Frame (1600w x1700h)
W-5	Window Type 5. - Hinged Window (planter access) High level Vent Panel Aluminium Frame (1600w x3100h)
W-6	Window Type 6. - Glazed Window Aluminium Frame with Spandrel Panel (900w x 2700h)
W-7	Window Type 7. - Glazed Window Aluminium Frame with Spandrel Panel (900w x 4100h)

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DEVELOPMENT APPLICATION

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DRAWING
ELEVATIONS - 05

DATE	SCALE @ A1	DRAWN
31/08/17	1 : 200	CR,AK,CW,CT

PROJECT No.	DRAWING No.	ISSUE
2016097	DA-304	B

PROJECT
Potts Hill Seniors Living

Lot 1, Pier 8-9, 23 Hickson Road
Walsh Bay New South Wales 2000 Australia
T 61 2 9290 2722 F 61 2 9290 1150
E sydney@jacksonteece.com
Jackson Teece Chesterman Willis Pty Ltd
Trading as Jackson Teece
ABN 15 083 837 290
Nominated Architect Ian Brodie (4275)

JACKSON TEECE

AMENDMENTS

ISSUE	DESCRIPTION	APPROVED	DATE
P1	Preliminary Issue	JS	31/07/17
P2	Preliminary Issue for Consultant Co-ordination	JS	11/08/17
A	Issue for Development Application	JS	31/08/17
B	Incorporate Council comments		23/02/18

1 West Elevation-Building A

2 West Elevation-Building B & C

ABBREVIATIONS

BAL-01	Framed glass balustrade
BAL-03	1800mm high balcony dividing wall.
CD-02	Cladding- Terracotta Facade System
CD-03	
COL	Column Off-form concrete finish
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W-6	Window Type 6. - Glazed Window Aluminium Frame with Spandrel Panel (900w x 2700h)
W-7	Window Type 7. - Glazed Window Aluminium Frame with Spandrel Panel (900w x 4100h)

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DEVELOPMENT APPLICATION

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CHECKED BY: JS

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Mushan Project Management

DRAWING
ELEVATIONS - 06

DATE	SCALE @ A1	DRAWN
31/08/17	1 : 200	CR,AK,CW,CT

PROJECT No.	DRAWING No.	ISSUE
2016097	DA-305	B

PROJECT
Potts Hill Seniors Living

MATERIAL PALETTE

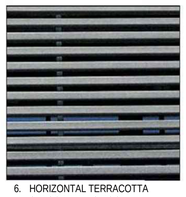

1. TERRACOTTA FINS


2. TERRACOTTA VERTICAL SCREENS


3. TERRACOTTA FACADE SYSTEM


4. GLASS BALUSTRADE


5. EXPRESSED PFC TO SLAB EDGE MICACEOUS IORN OXIDE PAINT FINISH, NATURAL GREY


6. HORIZONTAL TERRACOTTA SUNSCREEN TO POOL FACADE


7. TEXTURED PRECAST CONCRETE


8. FIBRE CEMENT SOFFIT LINING PAINT FINISH: WHITE


9. PERFORATED METAL FOLDING SCREENS


10. HORIZONTAL ALUMININUM VENETIAN BLINDS

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Walsh Bay New South Wales 2000 Australia
T 61 2 9290 2722 F 61 2 9290 1150
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JACKSON TEECE

www.zoic.com.au