Site Audit Report
Proposed Bunnings Warehouse, Hillsdale NSW

Prepared for:

Bunnings Group Ltd

Prepared by:
ENVIRON Australia Pty Ltd

Date:
September 2013

Project Number:
AS121487

Audit Number:
GN 468

ENVIRON

3 September 2013 Our Ref: AS121487

Bunnings Group Ltd
Locked Bag 30
Granville NSW 2142

Dear Philip

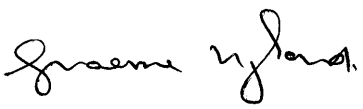
Re: Site Audit Report - Proposed Bunnings Warehouse, Hillsdale NSW

I have pleasure in submitting the Site Audit Report for the subject site. The Site Audit Statement, produced in accordance with the NSW Contaminated Land Management Act 1997 follows this letter. The audit was commissioned by Bunnings Group Ltd to assess the suitability of the site for its intended use.

The audit was initiated to respond to a request for information from the council of the City of Botany Bay in relation to their consideration of Development Application DA11/224 dated 13 April 2012.

Thank you for giving me the opportunity to conduct this audit. Please call me on 9954 8100 if you have any questions.

Yours faithfully,
ENVIRON Australia Pty Ltd



Graeme Nyland
EPA Accredited Site Auditor 9808

cc: City of Botany Bay
EPA – Statement only

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 31st October 2012. For more information about completing this form, go to Part IV.

PART I: Site audit identification

Site audit statement no. GN 468

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:	Graeme Nyland	Company:	ENVIRON Australia Pty Ltd
Address:	Level 3, 100 Pacific Highway (PO Box 560)		
	North Sydney NSW	Postcode:	2060
Phone:	02 9954 8100	Fax:	02 9954 8150

Site details

Address: 140-148 Denison Street and 25-49 Smith Street, Hillsdale, NSW

Postcode: 2036

Property description *(attach a list if several properties are included in the site audit)*

Lot B DP 323369, Lots 1, 2, 3 & 4 DP 373787, Lot A DP 24380, Lots 1, 2, 3, 4, 5, 6 & 7, DP 24380, Lot B DP 406437, Lot 1 DP 18290, and Lot A DP 345700

A plan of these identifiers is attached at the end of Part I of this Statement

Local Government Area: City of Botany Bay

Area of site (e.g. hectares): Approximately 2.7 Ha

Current zoning: Under Botany Bay Local Environmental Plan 2013 the site is as follows:

- B5 Business Development:
  - Lot B DP 323369
  - Lots 1, 2, 3 & 4 DP 373787
  - Lot A DP 24380
  - Lots 1, 2, 3, 4, 5, 6 & 7 DP 24380
  - Lot B DP 406437

- R2 Low Density Residential
  - Lot 1 DP 18290
  - Lot A DP 345700

To the best of my knowledge, the site **~~is/~~is not*** the subject of a declaration, order, agreement or notice under the *Contaminated Land Management Act 1997* or the *Environmentally Hazardous Chemicals Act 1985*.

Declaration/Order/Agreement/Proposal/Notice* no(s): N/A

Site audit commissioned by

Name: Phillip Drew Company: Bunnings Group Limited

Address: 11 Shirley Street, Rosehill NSW

Postcode: 2142

Phone: 9846 7334 Fax: 9846 7530

Name and phone number of contact person (if different from above)

N/A

Purpose of site audit

☑ A. To determine land use suitability *(please specify intended use[s])*

Commercial (Bunnings Warehouse)

~~OR~~

☐ ~~B(i) To determine the nature and extent of contamination, and/or~~

☐ ~~B(ii) To determine the appropriateness of an **investigation/remedial action/management plan***, and/or~~

☐ ~~B(iii) To determine if the land can be made suitable for a particular use or uses by implementation of a specified **remedial action plan/management plan*** *(please specify intended use[s])*~~

.....

Information sources for site audit

Consultancy(ies) which conducted the site investigation(s) and/or remediation

- CAVVANBA Consulting
- Consulting Earth Scientists
- Environmental Investigation Services

Title(s) of report(s) reviewed:

- "Preliminary Geotechnical Assessment Report: Proposed Commercial / Industrial Development, 140 Denison Street, Hillsdale, NSW", 6 March 2007, Consulting Earth Scientists (CES)
- "Groundwater Sampling Results and Field Observations 25-49 Smith Street, Hillsdale NSW", 14 January 2010, CAVVANBA consulting (CAVVANBA)
- "Review of Contamination Issues Potential Bunnings Development Site 25-49 Smith Street, Hillsdale NSW", 19 January 2010, CAVVANBA
- "Groundwater Monitoring Event 25-49 Smith Street, Eastgardens NSW" 12 June 2012, CAVVANBA
- "Risk Assessment Review, 25-49 Smith Street, Eastgardens NSW", 21 September 2012, CAVVANBA
- "Environmental Site Assessment for Proposed Warehouse Development at 148 Denison Street, Hillsdale", January 2012, Environmental Investigation Services
- "Site Inspection Report, 148 Denison Street, Eastgardens NSW", 21 September 2012, CAVVANBA
- "Environmental Management Plan, 25-49 Smith Street and 140-148 Denison Street Hillsdale NSW", June 2013 and earlier drafts dated October 2012 and February 2013, CAVVANBA

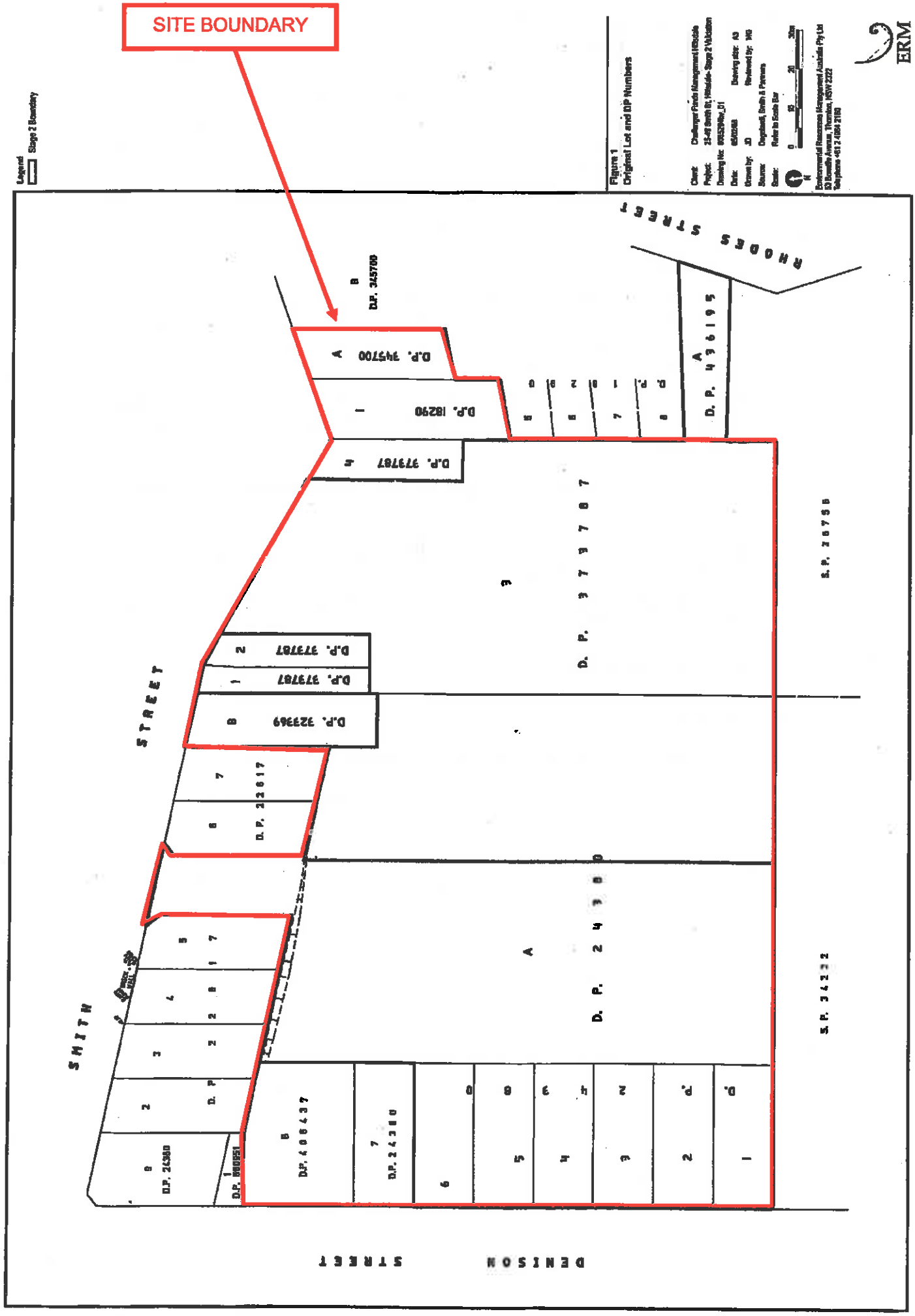
Other information reviewed (including previous site audit reports and statements relating to the site)

- "Summary Site Audit Report 25 Smith Street, Hillsdale NSW", October 2003, ENVIRON, and Site Audit Statement GN 183
- "Site Audit Report 140 Denison Street, Hillsdale NSW", October 2006, ENVIRON, and Site Audit Statement GN 183-1B
- "Site Audit Report Stage 2 and Stage 3 of 25 to 49 Smith Street, Hillsdale, NSW", March 2008, ENVIRON, and Site Audit Statements GN 183-2B & GN 183-3B

Site audit report

Title:... Site Audit Report – Proposed Bunnings Warehouse, Hillsdale NSW

Report no. GN 468 (ENVIRON Ref: AS 121487) Date: September 2013


SITE BOUNDARY
Legend
Stage 2 Boundary
Figure 1
Original Lot and DP Numbers
ERM
RHODES STREET
SMITH STREET
DENISON STREET
D.P. 345700
D.P. 18290
D.P. 737787
D.P. 737787
D.P. 737787
D.P. 323369
D.P. 223617
D.P. 406437
D.P. 243980
D.P. 1060951
D.P. 24380
D. P. 436195
D. P. 737787
D. P. 243980
S.P. 26758
S.P. 34222

PART II: Auditor's findings

Please complete either Section A or Section B, **not** both. *(Strike out the irrelevant section.)*

Use Section A where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land use(s).

Use Section B where the audit is to determine the nature and extent of contamination and/or the appropriateness of an investigation or remedial action or management plan and/or whether the site can be made suitable for a specified land use or uses subject to the successful implementation of a remedial action or management plan.

Section A

☑ **I certify that, in my opinion, the site is SUITABLE for the following use(s)** *(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)* .....~~

subject to compliance with the following environmental management plan *(insert title, date and author of plan)* **in light of contamination remaining on the site: ...**

Environmental Management Plan, 25-49 Smith Street and 140-148 Denison Street Hillsdale NSW", June 2013, CAVVANBA

~~**OR**~~

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

Overall comments...

Investigations works have been undertaken across the site. Remedial works were reviewed in the previous site audit reports referenced in Part 1.

Remedial works removed bonded asbestos fragments from the sandy soils to the extent practicable. However some further asbestos pieces and/or associated fibres may be encountered during site development.

There are residual petroleum hydrocarbon impacts in groundwater including phase separated hydrocarbons (waste oil) and associated soil impacts over a small area of the site. Groundwater is at a depth of approximately 6 m or greater.

Fill containing asbestos and/or unexpected soil conditions may be present beneath the buildings that remain.

Contaminants (asbestos pieces and petroleum hydrocarbon) that remain in soil and groundwater are to be managed according to the Environmental Management Plan (EMP) as follows:

- Capping site with buildings, concrete or bitumen pavement
- Placement of a geofabric marker layer covered by a minimum of 0.5 m of uncontaminated material in landscaping areas (areas not otherwise capped with buildings or hardstand)
- Placement of marker layer in service trenches and backfilling with clean soil
- Implementing management controls during development and during future breaches of the capping.

The EMP applies during demolition and redevelopment of the site. The EMP will also apply to the site during operation.

The EMP applies to any areas of land surplus to the development (including appropriate capping of these areas) unless additional investigation, remediation and validation or management is conducted to demonstrate suitability of the relevant part of the site for its intended use.

The EMP may not be adequate to manage risk at the site in the event land is redeveloped for a different land use to that currently proposed. Review of the EMP would need to be undertaken to determine applicability and relevance to a different use.

This Site Audit Statement and accompanying Site Audit Report will be provided to Council by the Auditor so they can be noted on the Section 149 certificate for the site. The EMP is appended to the Site Audit Report.

The EMP is to be reviewed at the completion of the development and it is recommended that it is updated to reflect the site condition at the time.

Abstraction and use of groundwater on site should not be conducted without applicable regulatory approvals and without assessing the groundwater's suitability for the proposed use.

~~**Overall comments**~~

PART III: Auditor's declaration

I am accredited as a site auditor by the NSW Environment Protection Authority under the *Contaminated Land Management Act 1997* (Accreditation No. 9808).

I 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... 3/9/2013

Section B

Purpose of the plan[1] which is the subject of the audit ...

I certify that, in my opinion:

- ☐ **the nature and extent of the contamination HAS/HAS NOT* been appropriately determined**

AND/OR

- ☐ **the investigation/remedial action plan/management plan* IS/IS NOT* appropriate for the purpose stated above**

AND/OR

- ☐ **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 remedial action plan/management plan* *(insert title, date and author of plan)*

...

subject to compliance with the following condition(s):

...

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

**** Strike out as appropriate***

PART IV: Explanatory notes

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

How to complete this form

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

The auditor is to complete either Section A or Section B of Part II, **not** both.

In **Section A** the auditor may conclude that the land is *suitable* for a specified use(s) 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 remediation or investigation of the site was needed to render the site fit for the specified use(s). Any **condition** imposed should be limited to implementation of an environmental management plan to help ensure the site remains safe for the specified use(s). The plan should be legally enforceable: for example a requirement of a notice under the *Contaminated Land Management Act 1997* (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*.

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.

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 whether land can be made suitable for a particular land use or uses upon implementation of a remedial action or management 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.

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.

In **Part III** the auditor certifies his/her 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:

EPA (NSW)
Contaminated Sites Section
PO Box A290, SYDNEY SOUTH NSW 1232
nswauditors@epa.nsw.gov.au

AND

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

Contents

List of Tables and Figures

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List of Abbreviations

ACM	Asbestos Containing Materials
AHD	Australian Height Datum
ALS	Australian Laboratory Services
ANZECC	Australian and New Zealand Environment and Conservation Council
BaP	Benzo(a)pyrene
BGL	below ground level
BTEX	Benzene, Toluene, Ethylbenzene & Xylenes
CLM Act	Contaminated Land management Act
CT	Certificate of Title
DP	Deposited Plan
DQO	Data Quality Objectives
EPA	Environment Protection Authority (NSW)
ESA	Environmental Site Assessment report
ha	Hectare
km	Kilometres
LOR	Limit of Reporting
m	Metres
Metals	As: Arsenic, Cd: Cadmium, Cr: Chromium, Cu: Copper, Fe: Iron, Ni: Nickel, Pb: Lead, Zn: Zinc, Hg: Mercury, Se: Selenium
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Litre
m BGL	Metres below ground level
µg/L	Micrograms per Litre
NATA	National Association of Testing Authorities
Na	not applicable
NC	Not Calculated
ND	Not Detected
ng/L	Nanograms per Litre
NEHF	National Environmental Health Forum
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
n	Number of Samples
OCPs	Organochlorine Pesticides
OH&S	Occupational Health & Safety
OPPs	Organophosphorus Pesticides
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PID	Photoionisation Detector
PQL	Practical Quantitation Limit
pH	a measure of acidity, hydrogen ion activity
PSH	Phase Separated Hydrocarbon
QA/QC	Quality Assurance/Quality Control
RPD	Relative Percent Difference
SAR	Site Audit Report
SAS	Site Audit Statement
SILs	Soil Investigation Levels
SVOCs	Semi Volatile Organic Compounds
TPHs	Total Petroleum Hydrocarbons
VENM	virgin excavated natural material
VOCs	Volatile Organic Compounds
-	On tables is "not calculated", "no criteria" or "not applicable"

1 Introduction

A site contamination audit has been conducted in relation to the site at 140-148 Denison Street and 25-49 Smith Street, Hillsdale, NSW (the audit site).

The audit was conducted to provide an independent review by an EPA accredited auditor of whether the land is suitable for any specified use or range of uses i.e. a "site audit" as defined in Section 4 (1) (b) (iii) of the NSW *Contaminated Land Management Act 1997* (the CLM Act).

The Auditor has previously completed Site Audit Statements and Site Audit Reports for 140 Denison Street and 25-49 Smith Street as follows:

- "Summary Site Audit Report 25 Smith Street, Hillsdale NSW", October 2003, and Site Audit Statement GN 183
- "Site Audit Report 140 Denison Street, Hillsdale NSW", October 2006, and Site Audit Statement GN 183-1B
- "Site Audit Report Stage 2 and Stage 3 of 25 to 49 Smith Street, Hillsdale, NSW", March 2008, and Site Audit Statements GN 183-2B & GN 183-3B

These sites comprise a large portion of the subject site. Since the completion of these two audits, 148 Denison Street has been added to the subject site area. 148 Denison Street is a former commercial/industrial property.

Findings in relation to 148 Denison Street are reviewed in this site audit report along with findings from activities over the remainder of the site since the previous audits.

Details of the audit are:

Requested by:	Philip Drew on behalf of Bunnings Group
Request/Commencement Date:	16 May 2012
Auditor:	Graeme Nyland
Accreditation No.:	9808

1.1 Scope of the Audit

Since the completion of the site audit reports and statements discussed above further groundwater investigations have been completed at 25-49 Smith Street in relation to residual hydrocarbon contamination including phase separated hydrocarbons in groundwater adjacent to a former waste oil UST. Additionally, the parcel of land referred to as 148 Denison Street has been added to the site and an environmental site assessment was completed. A geotechnical investigation was completed at 140 Denison Street.

Therefore, the scope of the audit included:

- Review of previous Site Audit Reports and Site Audit Statements
- Review of the report completed for 140 Denison Street since completion of GN 183-1B:
    - "Preliminary Geotechnical Assessment Report: Proposed Commercial / Industrial Development, 140 Denison Street, Hillsdale, NSW", 6 March 2007, Consulting Earth Scientists (CES)

- Review of reports completed for 25-49 Smith Street since completion of GN 183-2B and GN183-3B:
    - "Groundwater Sampling Results and Field Observations 25-49 Smith Street, Hillsdale NSW", 14 January 2010, CAVVANBA consulting (CAVVANBA)
    - "Review of Contamination Issues Potential Bunnings Development Site 25-49 Smith Street, Hillsdale NSW", 19 January 2010, CAVVANBA
    - "Groundwater Monitoring Event 25-49 Smith Street, Eastgardens NSW" 12 June 2012, CAVVANBA
    - "Risk Assessment Review, 25-49 Smith Street, Eastgardens NSW", 21 September 2012, CAVVANBA
- Review of the following reports for 148 Denison Street:
    - "Environmental Site Assessment for Proposed Warehouse Development at 148 Denison Street, Hillsdale", January 2012, Environmental Investigation Services (EIS)
    - "Site Inspection Report, 148 Denison Street, Eastgardens NSW", 21 September 2012, CAVVANBA
- Review of the environmental management plan and earlier drafts for 25-49 Smith Street and 140-148 Denison Street:
    - "Environmental Management Plan, 25-49 Smith Street and 140-148 Denison Street Hillsdale NSW", October 2012, CAVVANBA (draft)
    - "Environmental Management Plan, 25-49 Smith Street and 140-148 Denison Street Hillsdale NSW", February 2013, CAVVANBA (draft)
    - "Environmental Management Plan, 25-49 Smith Street and 140-148 Denison Street Hillsdale NSW", June 2013, CAVVANBA
- A site visit by the auditor, 15 May 2012.
- Discussions with Bunnings and with CAVVANBA who undertook the recent investigations.

1.2 Previous Audits

The initial audit (GN 183) was completed in October 2003 for **Lots A, 1, 2, 3, 4, 5 and 6 in DP 24380, Lot B in DP 323369 Lot 1, 2, 3 and 4 in DP 373787, Lots A and 1 in DP 345700 and Lot A in DP 436195**. GN 183 was undertaken to provide an independent review of the nature and extent of contamination and found that that the site had been generally well characterised and that no contamination that would preclude residential redevelopment had been found and that the site could be made and /or verified to be suitable for the proposed land uses provided various conditions relating to further assessment and remediation/ management of contaminated soils, underground storage tanks and assessment of groundwater were met.

The site known as 140 Denison Street was referred to as "Stage 1". The Site audit Report (SAR) completed in October 2006 (GN 183-1B) addressed **Part Lot A in DP 24380 and Lots 1, 2, 3, 4, 5 and 6 in DP24380**. Site Audit Statement (SAS) GN 183-1B found that Stage 1 was suitable for commercial/industrial use subject to compliance with an

Environmental Management Plan to manage the asbestos contamination remaining in the soil.

The site known as 25 to 49 Smith Street was divided into “Stage 2” and “Stage 3”. The SAR addressed both Stage 2 and Stage 3. The SAS for Stage 2 (GN 183-2B) addressed **Lot B DP323369, Lots 1, 2 and 3 DP 373787 and Part Lot A DP 24380**. GN 183-2B found that Stage 2 was considered suitable for “residential with minimal opportunity for soil access, including units” although noted that:

- “Remedial works have been undertaken across the site.
- Remedial works have removed bonded asbestos fragments from the sandy soils to the extent practicable; however some further asbestos pieces may be encountered during site development.
- There are residual petroleum hydrocarbon impacts in groundwater over a small area of the site. Groundwater is at 8 m depth. Abstraction and use of groundwater on site should not be conducted without applicable regulatory approvals and without assessing the groundwater’s suitability for the proposed use”.

The SAS for Stage 3 (GN183-3B) addressed **Lot A DP436195, Lot 1 DP18290, Lot A DP345700 and Lot 4 DP373787**. GN183-3B found that Stage 3 was suitable for “residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry”.

1.3 Background to the Audit

The current audit was initiated to respond to a request for information from the council of the City of Botany Bay in relation to their consideration of Development Application DA11/224 dated 13 April 2012. Council requested assessment by the environmental consultant of the new parcel of land at 148 Denison Street (Lot 7 DP 24380 and Lot B DP406437) and a revised Site Audit Statement confirming that the wider site remained suitable for the proposed use since the date of the previous site audits for the site.

At the date of completion of the audit the development application remained in a process of being assessed.

2 Site Details

2.1 Location

The site locality is shown on Attachment 1, Appendix A.

The site details are as follows:

Street address:	140-148 Denison Street and 25-49 Smith Street, Hillsdale, NSW 2036
Identifier:	Lot B DP 323369
	Lots 1, 2, 3 & 4 DP 373787
	Lot A DP 24380
	Lots 1, 2, 3, 4, 5, 6 & 7 DP 24380
	Lot B DP 406437
	Lot 1 DP 18290
	Lot A DP 345700
	(See Attachment 2, Appendix A)
Local Government:	City of Botany Bay
Owner:	Bunnings Group Limited
Site Area:	Approximately 2.7 ha

The boundaries of the site are defined by Denison Street to the west, Smith Street and fenced boundaries to the north and fenced boundaries to the east and south.

A plan of the site is presented on Attachment 2, Appendix A.

2.2 Zoning

Under Botany Bay Local Environmental Plan 2013 the site is as follows:

- B5 Business Development:
  - Lot B DP 323369
  - Lots 1, 2, 3 & 4 DP 373787
  - Lot A DP 24380
  - Lots 1, 2, 3, 4, 5, 6 & 7 DP 24380
  - Lot B DP 406437

- R2 Low Density Residential
  - Lot 1 DP 18290
  - Lot A DP 345700

2.3 Adjacent Uses

The site is located within an area of heavy and light industrial, commercial and residential land uses. The adjacent uses include:

- Botany Industrial Park, which includes chemical manufacturing, is located west of Denison Street

- A light industrial park which includes manufacture of pens, food services and printing works is located along the southern boundary
- Commercial premises including a car repair shop and equipment hire shop adjoin the site to the north. Residential properties are located north of Smith Street
- Residential properties are to the east.

2.4 Site Condition

A site plan illustrating the site layout is presented in Attachment 3. During the auditor's inspection in May 2012 the following were noted:

- The site is cleared of buildings except for the former administration building in the east (shown mainly in Stage 3 on Attachment 3) and the removalist/storage buildings and associated infrastructure (148 Denison Street) in the north western corner of the site
- The site is essentially flat, sloping slightly to the south
- Most of the middle and eastern portions of the site are covered by sand/grass (except in the vicinity of the former administration building)
- Concrete/asphalt slabs remain in the western portion of the site and in the vicinity of 148 Denison Street
- An area of dumped rubbish was observed in the mid-western portion of the site along the driveway from Denison Road
- Some fibro pieces were seen in the northern part of the site, associated with fill and bricks.

A Sydney Water easement, understood to contain a sewer pipe, runs in a north-south direction near the eastern side of the site.

Based on their site inspection in January 2012, EIS describe the features of 148 Denison Street as:

- A warehouse occupied the entire eastern portion of the site. The building was constructed of corrugated fibrous cement and corrugated iron
- The southern section of the site was occupied by what appeared to be an office and storage space, thought to be constructed of brick and fibrous cement
- The north-western portion of the site was occupied by a free standing garage constructed of what appeared to be brick and fibrous cement
- A concrete driveway extended from the west section of the site to the central section of the site
- The central portion of the site appeared to be used as parking for removal trucks and as access to the warehouse
- An old steel crane was located along the entire length of the central section of the site
- The north and central section of the site was occupied by a concrete loading ramp which was approximately 1.2m higher than the site level
- The site was covered by concrete pavement except for the western portion which was grassed with two trees.

CAVVANBA also conducted an inspection of 148 Denison Street on the 3 August 2012 (reported 21 September 2012). CAVVANBA reported similar features to those described above and noted that no hydraulic system was observed in relation to the crane and that there were no visible signs of underground fuel storage, sumps or other subfloor features. The concrete appeared in good condition with no significant cracks or staining.

Access to 148 Denison Street was not available to the Auditor.

2.5 Proposed Development

It is understood that the site is to be redeveloped by Bunnings as a large retail warehouse. Plans provided indicate a level of undercroft car parking is proposed. The majority of the development is to be close to the existing ground level. However excavation appears to be required in some areas for the undercroft car park. With the exception of some minor landscaping areas, the developed site is to be covered in hardstand and/or building structures.

It is understood that the proposed development would include the demolition of the existing site buildings.

A portion of the land that is the subject of this audit is surplus to the requirements of the development. This includes the two lots which are zoned for residential use.

For the purposes of this audit, the ‘commercial/industrial’ land use scenario has been assumed.

3 Site History

3.1 140 Denison Street and 25-49 Smith Street Hillsdale

Details of the site history for 140 Denison Street and 25-49 Smith Street Hillsdale are included in previous SARs, based on information provided by the various consultants. The site history information indicated that this portion of the site had been used since the early 1950/60s primarily for manufacturing and light industrial purposes for the food industry. Uncertainties in the site history were identified as:

- Specific site use prior to the site's use for food manufacture are unknown
- The location of the drum storage area was unclear
- There was some uncertainty with respect to possible sumps, underground storage tanks and oil tanks beneath the paved areas of the site
- The extent and nature of fill across the site was unknown.

3.2 148 Denison Street Hillsdale

Information relating to the site history for 148 Denison Street was provided by EIS (January 2012) based on review of aerial photographs, land titles search, council records and Section 149 certificates, WorkCover database records and NSW EPA records and is summarised in Table 3.2

Table 3.2: Site History for 148 Denison Street Hillsdale

Date	Activity
Prior 1955	Site was privately owned and likely used for market garden activities.
1955 – 2012	Site used for light industrial purposes including a structural engineering workshop and bulk storage warehouse.

In addition, EIS note:

- WorkCover have no records of underground storage tank licenses issued for the site
- There are no recorded notices listed on the registers kept by the NSW EPA under the Contaminated Land Management Act 1997 or the Protection of the Environment and Operations Act 1997.

In the auditor's opinion, the site history provides an adequate indication of past activities at the site. Based on the site inspection and history, the auditor considers that the most significant potential sources of historical contamination for 148 Denison Street include:

- Use of pesticides and herbicides during market garden activities
- Possible use of miscellaneous fill
- Use of asbestos containing building materials during construction of the light industrial warehouse and other buildings on the site.

4 Contaminants Of Concern

4.1 140 Denison Street and 25-49 Smith Street

Potential areas and contaminants of concern identified for 140 Denison Street and 25-49 Smith Street are included in the previous SARs. A summary of the areas of concern and associated potential contaminants are presented in Table 4.1.

Table 4.1: Potential contaminants for 140 Denison and 25-49 Smith

Area	Activity	Potential Contaminants
Transformer in Production Office	Oil spills and leaks	PCBs
Under buildings and pavements	Miscellaneous fill and pesticide spraying	Heavy metals, PAHs, OCPs, asbestos
Exposed areas	Cement sheeting from building materials	Asbestos
Former UST	Leaks and spills	Petroleum hydrocarbons, lead, naphthalene
Former diesel AST	Leaks and spills	Petroleum hydrocarbons, lead, naphthalene
Maintenance room used to store hydraulic oils, paints and degreasing fluids	Spills and leaks	Petroleum hydrocarbons, lead, PCBs, SVOCs
Water treatment plant	Spills	Caustic soda

The auditor considered that the analyte list used by the consultant adequately reflected the site history and condition of this portion of the site and that the analyte list was appropriate.

4.2 148 Denison Street Hillsdale

Potential areas of concern and associated potential contaminants identified by EIS for 148 Denison Street are summarised in Table 4.2.

Table 4.2: EIS's potential contaminants for 148 Denison

Area	Activity	Potential Contaminants
Whole site	Imported fill	Heavy metals, Petroleum hydrocarbons, PAHs, OCPs, OPPs, PCBs, Asbestos, VOCs* and SVOCs*
	Demolition of site buildings	
	Historical activities such as commercial/industrial activities and use of pesticides	

* It is noted that VOCs and SVOCs were only identified as potential contaminants in groundwater. This is considered reasonable given no sources of VOCs/SVOCs were identified in the site history.

The auditor considers that the areas and chemicals of concern identified by EIS adequately reflect the site history and condition and that the analyte list adopted is appropriate.

5 Stratigraphy and Hydrogeology

5.1 Stratigraphy

The regional geology of the site is described as consisting of medium to fine grained marine sand which was consistent with the findings of the reports reviewed as part of the previous audits. The stratigraphy reported by EIS based on the investigations of 148 Denison Street was generally consistent with the findings for the rest of the site. The stratigraphy across the site is summarised below.

Table 5.1: Site Stratigraphy

Depth (m)	Description
0.0 to 0.2	Concrete/asphalt Topsoil and grass cover over exposed areas (loamy sand with some plant roots
0.1 to 0.2 – 1.5	FILL Black brown sand in the northern section Brown sandy loam under the ramp Brown or grey sand/silty sand across the remainder of the site. Some ash, gravel, glass, concrete and terracotta fragments noted in some places. It is noted that boreholes BH6 and BH8 at 148 Denison Street were terminated at 1.5 m and 0.85 m respectively on a “possible” concrete slab
0.0 to 10.3 +	NATURAL SANDS and some silty SAND – Mostly grey/white/yellow; fine to medium grained; moist Coffee Rock (brown/orange sand) encountered in some locations in various thicknesses between 0.9 – 1.5 m BGL mostly along the northern and western portions of the site

5.2 Hydrogeology

Depth to groundwater across the site was reported in the various reports depths of approximately 6.5 to 10 m and subject to seasonal fluctuations.

Groundwater flow direction was assessed by CAVVANBA in the 21 September 2012 report to be towards the south west (although this assessment did not include data from the two wells on 148 Denison Street). This was consistent with the previously assessed flow direction.

Based on data from the two monitoring wells installed at 148 Denison Street EIS concluded that groundwater flow direction was from west to east across the site. However, the auditor notes that the use of two wells is not sufficient to triangulate a groundwater flow direction. Also, this flow direction was inconsistent with the south west flows calculated by CAVVANBA and the previous investigations for the remainder of the site (based on larger data sets). Based on the auditor’s review of the available groundwater data, the flow direction across the audit site is considered likely to be to the south west towards Botany Bay.

Twenty-one registered groundwater bores were identified by the consultant in the information reviewed for the previous site audit reports and were located within a 2 km radius in all directions from the site. All these bores were licensed for industrial or domestic

use. Consistent with these findings, EIS identified 13 registered industrial/domestic bores within a 500 m radius of 148 Denison Street. EIS also identified 1 bore registered for monitoring purposes.

The site is located over the Botany Sands Aquifer which was considered to be a potential sensitive ecological receptor due to bore water use in the area. The auditor notes that groundwater in the Botany Sands Aquifer is a resource that is widely abstracted and used mainly for irrigation, domestic and industrial purposes.

However, the site is located in the Groundwater Embargo Area gazetted on 22 August 2003 under the Water Act 1912 due to impacted groundwater from the Orica Site. Bore licences are precluded with the exception of dewatering, monitoring and remediation bores.

6 Evaluation of Quality Assurance and Quality Control

6.1 Data Reviewed for Previous Audits

Data reviewed for the previous audits for 140 Denison Street and 25-49 Smith Street Hillsdale has been reviewed as part of the previous audits and is documented in SARs. Overall, the quality of the data was found to be generally adequate for purpose.

6.2 Data Reviewed for this Audit

The auditor has assessed the overall quality of the groundwater data collected by CAVVANBA in 2010, 2011 and 2012 for 25-49 Smith Street and soil and groundwater data collected by EIS for 148 Denison Street in January 2012 by review of the information presented in the referenced reports.

The auditor's assessment follows in Tables 6.1 and 6.2.

Table 6.1: QA/QC – Sampling and Analysis Methodology Assessment

Sampling and Analysis Plan and Sampling Methodology	Auditor Comments
Data Quality Objectives	***EIS*** EIS defined specific DQOs in accordance with the seven step process outlined in DEC (2006). These were considered appropriate for the investigations conducted. ***CAVVANBA*** CAVVANBA did not specifically define DQOs as they noted that the data obtained was for the purpose of identifying gross contamination, if any, in groundwater and the presence of asbestos in surface fill. As the objectives of the investigations were clear and the sampling strategies were appropriate to achieve them, overall the Auditor considers that the omission of specific DQOs does not affect the outcome of the audit.
Sampling Pattern and Locations	***EIS*** **Soil:** EIS's investigation locations (at 148 Denison Street) were spaced based on a judgemental sampling plan as no specific contaminant sources were identified in the site history. EIS considered potential contamination to be associated with use of miscellaneous fill, building construction materials (including asbestos and lead paint) and historical use of pesticides and is therefore likely be randomly distributed. This is considered reasonable. EIS indicate that sampling was not undertaken beneath areas of the existing warehouses which were occupied by large shipping containers and that access to smaller buildings was not possible. The Auditor notes that the sampling locations are therefore not evenly spaced and the hotspot diameter cannot be determined. It is understood that the buildings at 148 Denison Street will be demolished as part of the site redevelopment and therefore it is possible that unexpected soil conditions beneath the buildings could exist. The Auditor also notes that the sampling locations do not appear to be located around the perimeter of buildings where contamination by building materials (such as asbestos and lead paint) may be

Table 6.1: QA/QC – Sampling and Analysis Methodology Assessment	
Sampling and Analysis Plan and Sampling Methodology	**Auditor Comments**
	more likely. **Groundwater**: Two monitoring wells were installed, one at the western end and one at the eastern end of 148 Denison Street. EIS indicated they had selected up and down gradient locations. The Auditor notes that the flow direction identified by ERM for the rest of the site was south westerly towards Botany Bay. The rational for the well locations selected by EIS is therefore unclear. ***CAVVANBA*** **Soil**: CAVVANBA did not conduct any intrusive soil investigations at 148 Denison Street. **Groundwater**: CAVVANBA sampled 8 existing wells on 25-49 Smith Street (CAVVANBA did not sample the two wells located on 148 Denson Street installed by EIS).
Sampling Density	***EIS*** **Soil:** The sampling density of eight locations over approximately 0.2 ha exceeds the minimum recommended by EPA (1995) "Sampling Design Guidelines". **Groundwater:** A total of two new groundwater wells were installed at 148 Denison Street. This density appears adequate. ***CAVVANBA*** **Soil:** CAVVANBA did not conduct any soil sampling.
Sample depths	***EIS*** Soil samples were collected and analysed from a range of depths, with the primary intervals at each location being the shallow fill (directly beneath the concrete slab, where present, 0.2-0.4m, or 0.0-0.3 m where no slab) and the underlying natural sand. In the Auditor's opinion, this sampling strategy was appropriate and adequate to characterise the primary material types.
Well construction	***EIS*** The two EIS wells (MW1 and MW4) were completed at between 9.6 and 10m depth, and were constructed of 50mm, class 18 tubing. The top of the screened intervals was at a depth of 3 m and extended to the base of the wells. The top of the screens should therefore extend well above the groundwater table which was encountered between 7 – 9 m during the EIS monitoring.
Sample Collection Method	***EIS*** **Soil**: Five of the eight bores were drilled using spiral flight augers and three using a hand auger for the locations with access restrictions. Soil samples were collected using an SPT split spoon sampler or directly from the auger when conditions did not allow the use of the STP and for hand augered holes.

Table 6.1: QA/QC – Sampling and Analysis Methodology Assessment	
Sampling and Analysis Plan and Sampling Methodology	**Auditor Comments**
	Although sampling from the auger is not ideal as it can result in loss of volatiles, there were no indications of volatile contamination noted on the logs and PID results were zero for all samples. Further volatiles were not identified as key contaminants of concern for the site other than those that may be associated with miscellaneous fill. This deficiency is therefore not considered to be of great significance. **Groundwater**: The two new wells were developed by EIS with a submersible electric pump and hose. Approximately 50 L was removed from each well during development. The wells were then left for six days between development and purging/sampling. Wells were purged of 6-7 L the temp, Eh, pH, EC and DO measurements were representative of steady state conditions. Samples were then collected using low flow peristaltic pump and tubing and placed in appropriate containers. ***CAVVANBA*** CAVVANBA indicates that the interface probe was not working for at least the January 2010 monitoring and that to assess the presence of PSH (both January 2010 and May 2012). CAVVANBA lowered a clear bailer into the water column and visually inspected the slug of water retrieved for PSH. The auditor notes that this method would be adequate to assess the presence or absence of PSH. However, would not be an adequate method for reliably assessing the thickness of the PSH in the water column. Wells were reportedly purged before sampling although specific details of how were not reported. Clear disposable polyethylene bailers were used to collect the groundwater samples as volatiles were not expected to be present. An interface probe was used to measure PSH in August and September 2012.
Decontamination Procedures	***EIS*** **Soil**: The SPT sampler and the spiral flight augers were decontaminated using a scrubbing brush and potable water and Decon 90, followed by rinsing with potable water after each sampling event. Sampling personnel used disposable nitrile gloves during sampling activities. **Groundwater**: The pump and hose used by EIS were flushed between sampling points with potable water followed by a pulse of demineralised water. ***CAVVANBA*** CAVVANBA used disposable bailers and indicate that all re-usable sampling equipment (2012 only) was decontaminated between locations. The 2010 sampling did not involve any re-usable equipment.

Table 6.1: QA/QC – Sampling and Analysis Methodology Assessment	
Sampling and Analysis Plan and Sampling Methodology	**Auditor Comments**
Sample handling and containers	***EIS & CAVVANBA*** Samples were placed into laboratory prepared and preserved sampling bottles and chilled during storage and subsequent transport to the labs.
Chain of Custody	***EIS & CAVVANBA*** Completed chain of custody forms were provided in the EIS and CAVVANBA reports. The Auditor notes that separate forms for the samples going to check laboratories were not provided and instructions were included on the forms for the primary laboratory to complete.
Detailed description of field screening protocols	***EIS*** Field screening for volatiles was undertaken on soil samples by EIS using a PID. PID screening procedure was provided and involved placing the samples in ziplock plastic bags and measuring VOCs in the headspace after allowing time for equilibration. PID readings are provided on chain of custody forms. The PID readings were reported as 0.1 – 0.0 ppm. Groundwater field parameters including pH, temperature, EC, DO, and Eh were measured by EIS during well development and purging/sampling. ***CAVVANBA*** CAVVANBA indicates that the groundwater quality meter was faulty and could not be used during the 2010 sampling. Details of groundwater field parameters for the 2012 monitoring were not reported.
Calibration of field equipment	***EIS*** PID and groundwater monitoring meter calibration certificates were provided by EIS. Both the PID and groundwater meter were calibrated on the days of use. ***CAVVANBA*** CAVVANBA indicates that the field equipment was calibrated in both 2010 and 2012 although the meter used in 2010 was faulty and unable to be used.
Sampling Logs	***EIS*** Soil logs are provided by EIS within the report, indicating sample depth and lithology. The logs report no significant indications of contamination were found other than ash at some locations in the fill. A separate sample register was not provided. EIS groundwater field sampling records were provided which indicated no significant signs of contamination were observed during sampling. ***CAVVANBA***

Table 6.1: QA/QC – Sampling and Analysis Methodology Assessment	
Sampling and Analysis Plan and Sampling Methodology	**Auditor Comments**
	CAVVANBA did not provide any groundwater field monitoring data.

Table 6.2: QA/QC – Field and Lab Quality Assurance and Quality Control	
Field and Lab QA/QC	**Auditor Comments**
Field quality control samples	***EIS*** EIS field quality control samples including inter and intra laboratory duplicates (soil), intra laboratory duplicate (groundwater), field blanks (soil and groundwater), a trip spike (groundwater) and a rinsate blank (soil) were undertaken at appropriate frequencies. EIS did not collect a groundwater wash blank sample however, as no significant levels of contamination were detected in either of the groundwater samples, this is not considered to affect the outcomes of the audit. EIS did not collect an inter-laboratory groundwater duplicate. Given the site history did not identify any sources of likely widespread groundwater contamination and that the analytical results were generally <LOR, this is not considered to affect the outcomes of the audit. ***CAVVANBA*** CAVVANBA collected intra and inter-lab duplicates, trip spikes and trip blanks with both the 2010 and 2012 groundwater monitoring. Wash blanks were not collected as disposable bailers were used to collect the samples.
Field quality control results	***EIS*** **Soil**: The RPDs for the intra-laboratory soil samples were generally acceptable, noting that where reported concentrations were <10 times the LOR an RPD greater than the generally acceptable range of 30-50 % (AS 4482.1 2005), is considered acceptable. Two exceptions were noted for lead and zinc which had RPDs of 62% and 142% respectively. The elevated RPDs were attributed the heterogeneity of the fill sample. This is considered reasonable. The higher duplicate value was adopted in the assessment. RPDs for the inter-laboratory soil duplicate sample were within the generally acceptable range except for two metals where the reported concentrations were < 10 times the LOR which is considered acceptable. The soil rinsate results were < LOR indicating no widespread cross contamination. Soil field blank results were <LOR indicating no cross contamination during transport **Groundwater**: The RPDs for the groundwater intra-laboratory sample collected by EIS were within acceptable limits

Table 6.2: QA/QC – Field and Lab Quality Assurance and Quality Control	
Field and Lab QA/QC	**Auditor Comments**
	The BTEX results for the trip spike ranged from 75-97% recovery indicating field preservation methods were appropriate. The groundwater field blank results were < LOR indicating no cross contamination during transport. ***CAVVANBA*** Results of the CAVVANBA field quality control samples were generally within acceptable limits except for intra-laboratory and inter-laboratory duplicates for heavy end TPH in 2010 and the inter-laboratory duplicate for heavy end TPH in 2012. CAVVANBA indicates that the variation in the results is not considered significant and that the highest result has been used in the assessment. The Auditor considers that variations in the heavy end TPH concentrations could be associated with droplets of PSH and are likely consistent with local variations in heavy end TPH concentrations at the site.
NATA registered laboratory and NATA endorsed methods	***EIS*** EIS used Envirolab Services as the primary analytical laboratory and National Measure Institute (NMI) as the check laboratory for soil samples. The laboratory certificates were NATA stamped. ***CAVVANBA*** CAVVANBA used ALS as the primary laboratory and LabMark as the secondary laboratory.The laboratory certificates were NATA stamped.
Analytical methods	***EIS & CAVVANBA*** Analytical methods were included in the laboratory test certificates.
Holding times	***EIS & CAVVANBA*** Review of the COCs and laboratory certificates indicate that the holding times had been met. EIS, CAVVANBA also comment that the samples were extracted and analysed within appropriate holding 0times.
Practical Quantitation Limits (PQLs)	***EIS & CAVVANBA*** Not all PQLs for the groundwater assessment were sufficiently low, with the following PQLs exceeding the relevant trigger values: • Anthracene 0.1 µg/L (EIS), 1 µg/L (CAVVANBA 2010), trigger value 0.01µg/L • Benzo(a)pyrene 0.5 µg/L (CAVVANBA 2012) trigger value 0.1 µg/L • Phenanthrene 1.0 µg/L (CAVVANBA 2012) trigger value 0.6 µg/L Given anthracene and phenanthrene have been detected above the trigger values in 2010 by CAVVANBA the elevated LORs adopted in 2012 mean some elevated PAHs could also have

Table 6.2: QA/QC – Field and Lab Quality Assurance and Quality Control	
Field and Lab QA/QC	**Auditor Comments**
	been present at the time of this later sampling. This has been considered by the auditor when drawing conclusion from the dataset.
Laboratory quality control samples	***EIS & CAVVANBA*** Laboratory quality control samples including duplicates, matrix spikes, surrogate spikes, LCS, and blanks were undertaken by the laboratory.
Laboratory quality control results	***EIS & CAVVANBA*** EIS, CAVVANBA report that the results from all laboratory quality control samples were within appropriate limits except for toluene (CAVVANBA 2010) surrogate recovery. A spot check of the results by the Auditor indicates that although generally within acceptable limits, the spike recoveries for SVOCs in groundwater (EIS) were in a few cases below the acceptable limit of 60-140%.
Data Quality Indicators and Data Evaluation (completeness, comparability, representativeness, precision, accuracy)	***EIS*** EIS outlined predetermined data quality indicators (DQIs) were set for laboratory analyses including blanks, replicates, duplicates, laboratory control samples, matrix spikes, surrogate spikes and internal standards. These were discussed with regard to the five category areas. EIS did not discuss what actions may be required if data do not meet the expected objectives. ***CAVVANBA*** CAVVANBA did not identify predetermined DQIs as the assessments were aimed at identifying gross contamination in groundwater and confirming changes in groundwater condition since previous monitoring.

In considering the data as a whole the Auditor concludes that:

- The soil data collected by EIS is generally of sufficient completeness, comparability, representativeness, precision and accuracy to provide an adequate assessment of the overall soil conditions at 148 Denison Street, although there is some uncertainty as to the conditions beneath and around the perimeter of the existing buildings, particularly with respect to the extent of asbestos.
- Groundwater data for 148 Denison Street is generally considered to reflect the overall conditions across this part of the site. Overall, the groundwater data is of sufficient completeness, comparability, representativeness, precision and accuracy to provide a framework for decision making at the site.
- Groundwater data collected by CAVVANBA in 2010 and 2012 is considered reliable for the purpose of identifying areas of gross groundwater contamination and confirming changes in groundwater conditions at 25-49 Smith Street as per the objectives of the investigations. The thickness of PSH measured in the wells is considered an indication only where measured with a bailer.

7 Environmental Quality Criteria

The auditor has assessed the soil data provided by EIS in reference to Soil Investigation Levels for Urban Redevelopment Sites in NSW (SIL Column 4 – 'commercial/industrial', Appendix B) in DEC Guidelines for the NSW Site Auditor Scheme (2006).

EPA (1994) *Guidelines for Assessing Service Station Sites* have also been referred to for assessing TPH and BTEX results. These guidelines relate to sensitive land uses and are therefore conservative when applied to the site.

There were no national or EPA approved guidelines for asbestos in soil relating to human health at the time of the investigations. DEC (2006) state that auditors must exercise their professional judgement when assessing whether a site is suitable for a specific use. The DEC indicated that the position of the Health Department is that there should be no asbestos in surface soil.

The Auditor has assessed the groundwater data in reference to ANZECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* for marine waters. Trigger values (TVs) provided are concentrations that, if exceeded, indicate a potential environmental problem and 'trigger' further investigation. The marine 95% level of protection has been adopted for the current review. Some have been modified based on bioaccumulation or acute-toxicity or potential toxicity to particular species.

Low reliability ANZECC (2000) TVs have been used where they exist for the individual PAHs (Appendix B). However, a trigger level for total PAHs within groundwater is not provided within the ANZECC (2000) guidelines. As such, the threshold level of 3 µg/L from the EPA (1994) *Guidelines for Assessing Service Station Sites* has been adopted.

There are no reliable Australian criteria for TPH in groundwater. The current NSW EPA position is that there should be no free phase product in groundwater, and that the aromatic components of dissolved-phase TPH in groundwater should be assessed using the ANZECC (2000) TVs where available. These guidelines include criteria for some BTEX compounds and for some polycyclic aromatic hydrocarbons.

Where relevant Australian groundwater criteria have not been available the LOR has been used in conjunction with a consideration of the site history and field observations as an initial screen.

Since completion of the investigations, the National Environment Protection (Assessment of Site Contamination) Measure has been amended (NEPM 1999 [2013]). Advice from the EPA is that NEPM (1999 [2013]) must be applied to works completed after April 2013. For works completed prior to April 2013 application of NEPM 1999 [2013]) is optional. Works reviewed for this audit were completed prior to April 2013 and NEPM (1999 [2013]) has not been applied for this audit. In the context of the dataset reviewed, the auditor considers that application of NEPM (1999 [2013]) over the guidelines listed above would not result in additional remediation being required.

It is noted that the NEPM (1999 [2013]) includes health screening levels for asbestos. For bonded asbestos, the applicable level for commercial/industrial sites is 0.05%. While it is probable that the overall amount of asbestos on the site is less than 0.05%, this has not been quantified and the asbestos is to be managed as discussed in Section 13.

The environmental quality criteria referenced by the auditor for soil are consistent with those adopted by EIS with the exception that EIS have also considered phytotoxicity guidelines. Given the site is proposed for commercial / industrial use, this assessment has not been considered necessary by the auditor.

For groundwater the auditor has referenced the ANZECC marine water quality guidelines. EIS uses the ANZECC fresh water quality guidelines as well as the Australia Drinking Water guidelines, and CAVVANBA references the fresh and marine guidelines as well as the Australian drinking water guidelines and the ANZECC/ARMCANZ recreational water quality guidelines. CAVVANBA also references the CRC (2011) HSLs for vapour intrusions risks from groundwater in sand. Given there was generally no volatile petroleum hydrocarbon contamination detected in groundwater at the site, the use of these criteria are not considered relevant by the auditor.

Overall, given the results obtained, the auditor considers that these discrepancies do not affect the overall conclusions reached by EIS, CAVVANBA and the auditor.

8 Evaluation of Soil Analytical Results

8.1 Summary of Data Reviewed for Previous Audits

Data collected for 140 Denison Street and 25-49 Smith Street Hillsdale has been reviewed as part of previous audits and is documented in those SARs. Evaluation of the soil data in previous audits is summarised as follows:

- Concentrations of PAHs elevated above the assessment criteria for commercial/industrial land were detected in sand containing ash at two locations. The maximum concentration reported for total PAHs was 1218 mg/kg and for benzo(a)pyrene was 69 mg/kg.
- Minor concentrations of heavy end petroleum hydrocarbons (maximum concentration reported was 480 mg/kg) were detected but at concentrations well below the assessment criterion at various locations across the site in shallow soils and was associated with the PAH impact described above and with minor leaks and spills as a result of parked vehicles.
- Lead (maximum concentration reported was 5560 mg/kg, above the assessment criterion for commercial/industrial land use) was detected in fill in the Stage 3 portion of the site.
- Fragments of asbestos containing materials (ACM) were observed during various works across the site and asbestos was detected in selected samples analysed by the laboratory correlating to observations of fragments.
- Other potential contaminants including petroleum hydrocarbons, semi volatile organic compounds, metals, PCBs and pesticides were not detected at levels of concern.

Various remedial works were undertaken to address the impacts identified above and are summarised in Section 10.

8.2 Summary of Data Reviewed for this Audit

Soil samples collected from 148 Denison Street were tested for PAHs, petroleum hydrocarbons, asbestos, organochlorine and organophosphorus pesticides, and heavy metals. Eighteen soil samples were collected from both sandy fill (12) and natural sandy soils (6), to a maximum depth of 10.5 m depth, however, the majority of samples were collected from the shallow sandy fill between 0.0 to 1.5 m depth.

The results have been assessed against the environmental quality criteria and are summarised in Table 8.1. Soil sampling locations are shown on Attachment 4, Appendix A.

Table 8.1: Soil Analytical Results – 148 Denison Street - Summary Table (mg/kg)

Analyte	n	Detections	Maximum	n > EPA (1994)	n > SIL Column 4 (DEC 2006)
Asbestos	10	<LOR*	NA	NA	NA
Arsenic	18	3	11	NA	0
Cadmium	18	4	4.2	NA	0
Total Chromium	18	12	90	NA	0

Table 8.1: Soil Analytical Results – 148 Denison Street - Summary Table (mg/kg)

Analyte	n	Detections	Maximum	n > EPA (1994)	n > SIL Column 4 (DEC 2006)
Copper	18	11	51	NA	0
Lead	18	13	770	NA	0
Nickel	18	11	37	NA	0
Zinc	18	17	1100	NA	0
Mercury (inorganic)	18	9	0.6	NA	0
OCP	18	1	0.1	NA	0
OPP	18	0	NA	NA	0
PCBs	18	0	NA	NA	NA
TPH (C_6-C_9)	18	0	NA	0	NA
TPH (C_{10}-C_{36})	18	0	NA	0	NA
BTEX	18	0	NA	0	NA
Total PAHs	18	10	3.23	NA	0
Benzo(a)Pyrene	18	10	0.33	NA	0

* asbestos was detected in one sample but was below the limit of reporting (LOR)
n number of samples
NA No criteria or value available/used

The auditor notes that given the generally low concentrations detected, separating the data for fill and natural horizons was not considered necessary as both data sets were consistent.

The soil data and PID results indicate that there is unlikely to be widespread soil contamination at the 148 Denison Street portion of the site other than possible asbestos either in surface soil (particularly around buildings) or buried. It is also possible that fill of unknown quality could be present beneath buildings which have not been assessed due to access constraints. These finding are generally consistent with the soil results for the remainder of the site assessed for the previous site audit reports post remediation which were found to be acceptable in the context of commercial/industrial use.

In January 2010 CAVVANBA completed a site inspection of 25-49 Smith Street to further assess the site for the presence of asbestos cement sheeting fragments on the surface. The visual inspection found that “asbestos was found at low frequency across the surface of the site, with the exception of one area where ACMs were observed at high frequency.... ACMs were also observed mixed with rubbish and other types of waste located near MW220107-01.” Overall, CAVVANBA concluded that ACM are located across the audit site. These findings are generally consistent with the findings of the previous audits.

8.3 Consultant’s Conclusion for 148 Denison Street

Based on the data summarised above, EIS (January 2012) concluded that 148 Denison Street *can be made suitable for the proposed development provided that the following recommendations are implemented:*

1. *Some additional investigation is undertaken to better assess and minimise the volume of fill classified as Restricted Soils Waste in the vicinity of BH6. Restricted Solid Waste is more expensive to dispose of than General Soil Waste;*
2. *Some additional investigation is undertaken to better assess and minimise the volume of fill classified as General Solid Waste containing asbestos in the vicinity of BH1. This should be undertaken by excavating a series of test pits in the area after the site has been vacated. If more asbestos is encountered at reportable concentrations an asbestos management plan and monitoring may be required during removal;*
3. *During any further investigation EIS would also consider it prudent to undertake some screening for acid sulfate soils to at least 1 m below the proposed basement level*
4. *Inspections are undertaken during demolition and excavation works to assess any unexpected conditions or subsurface facilities that may be discovered between investigation locations (including the potential for buried asbestos beneath the existing slabs). This should facilitate appropriate adjustment of the works programme and schedule in relation to the changed site conditions. Inspections should be undertaken by experienced environmental personnel. If the potential for contamination of the soils and or groundwater is identified during the inspection, additional works and validation testing may be required.*

The auditor considers that points 1 and 2 relate to waste management and do not affect the suitability of the site for commercial/ industrial land use. The auditor notes EIS made this comment based on a maximum total concentration of lead of 770 mg/kg which was below the health based assessment criterion for commercial/industrial land use.

In relation to point 3, the auditor notes that a deep basement is not currently proposed and the site is located in an area mapped as “no known occurrence” of acid sulfate soils. Potential risk posed by acid sulphate soils could be managed by an unexpected finds protocol during development. Therefore, the auditor is of the opinion that the risk posed by potential acid sulphate soils does not affect the suitability of the site for the proposed use.

In relation to point 4, the auditor considers that the risk of unexpected finds can be managed by an unexpected finds protocol during development. CAVVANBA has also subsequently noted that some fragments of asbestos containing materials may be present on 148 Denison Street.

The overall conclusions of the auditor based on the investigations reviewed for this site audit report, in relation to suitability of the site for the proposed land use, are presented in Section 15.

9 Evaluation of Groundwater Analytical Results

9.1 Summary of Data Reviewed for Previous Audits

Previous groundwater sampling over the site indicated that groundwater was characterised by low levels of metals. In the auditor's opinion, the groundwater analytical results were generally consistent across the site and were adequately investigated. The results indicate that substantial impacts to groundwater were not detected(except for a small area of petroleum hydrocarbons near a former UST discussed further below and in Section 10) which was consistent with the soil results and field observations.

Further investigations in association with a waste oil UST were reviewed for this site audit report as discussed in the following section.

9.2 Summary of Data Reviewed for this Audit

Since the completion of the previous audits, additional groundwater investigations have been completed by CAVVANBA at 25-49 Smith Street in January 2010, May 2012 and August 2012 and two new wells have been installed and sampled by EIS in January 2012 at 148 Denison Street. Groundwater samples from eight existing wells at 25-49 Smith Street were analysed for petroleum hydrocarbons (including TPH and BTEX) and PAHs. Groundwater from the two new wells at 148 Denison Street were analysed for heavy metals, petroleum hydrocarbons (including TPH and BTEX), PAHs and volatile organics (VOCs).

Site plans illustrating the location of the existing wells at 25-49 Smith Street as well as the two new wells at 148 Denison Street is presented in Attachments 4 and 5, Appendix A. Results for samples collected from 148 Denison Street are presented in Table 9.1 and for the two rounds of monitoring from 25-49 Smith Street in Table 9.2.

Table 9.1: Groundwater Analytical Results for 148 Denison Street - (µg/L)

Analyte		TVs	MW1	MW4
Date Sampled			10-Jan-2012	10-Jan-2012
Heavy Metals	Arsenic	2.3	<1	<1
	Cadmium	0.7	<0.1	<0.1
	Chromium	4.4	<1	<1
	Copper	1.3	<1	<1
	Lead	4.4	<1	<1
	Nickel	7	<1	<1
	Zinc	15	2	5
	Mercury (inorganic)	0.1	<0.5	<0.5
TPH	C_6-C_9	LOR	<10	<10
	C_{10}-C_{14}	LOR	<50	<50
	C_{15}-C_{28}	LOR	<100	<100
	C_{29}-C_{36}	LOR	<100	<100

Table 9.1: Groundwater Analytical Results for 148 Denison Street - (µg/L)				
Analyte		**TVs**	**MW1**	**MW4**
Date Sampled			**10-Jan-2012**	**10-Jan-2012**
	Total TPH (C_6-C_{36})	LOR	<LOR	<LOR
Monocyclic Aromatic Hydrocarbons	Benzene	700	<1	<1
	Toluene	180	<1	<1
	Ethyl benzene	5	<1	<1
	Total Xylenes	75	<1	<1
Polynuclear Aromatics	Napthalene	50	<0.1	<0.1
	Acenaphthylene	LOR	<0.1	<0.1
	Acenaphthene	LOR	<0.1	<0.1
	Fluorene	LOR	<0.1	<0.1
	Phenanthrene	0.6	<0.1	0.3
	Anthracene	0.01	<0.1	<0.1
	Fluoranthene	1	<0.1	0.1
	Pyrene	LOR	<0.1	0.1
	Benzo(a)anthracene	LOR	<0.1	<0.1
	Chrysene	LOR	<0.1	<0.1
	Benzo(b,k)fluoranthene	LOR	<0.1	<0.1
	Benzo(a)pyrene	LOR	<0.1	<0.1
	Indeno(1,2,3-c,d)pyrene	LOR	<0.1	<0.1
	Dibenzo(a,h)anthracene	LOR	<0.1	<0.1
	Benzo(g,h,i)perylene	LOR	<0.1	<0.1
	Total PAHs*	3	<LOR	0.5
VOCs		LOR	<LOR	<LOR
Total SVOCs		LOR	<LOR	<LOR

LOR Limit of Reporting

TV Trigger values

Note – No PSH was detected

The groundwater results for 148 Denison Street are consistent with the site history that did not identify any likely sources of significant groundwater contamination. On the basis of the available groundwater data, the potential for widespread significant groundwater contamination across 148 Denison Street is considered to be low.

Table 9.2: Evaluation of Supplementary Groundwater Analytical Results for 25-49 Smith Street Summary Table (µg/L)

Analyte	n	TVs	6 January 2010			15 May 2012		
			Detections	Maximum	n >ANZECC Marine (2000)	Detections	Maximum	n >ANZECC Marine (2000)
PSH*	8	-	2	**Present**	na	2	**Present**	na
TPH (C_6-C_9)	6	LOR	0	na	na	0	na	na
TPH (C_{10}-C_{14})	6	LOR	3	900	na	0	na	na
TPH (C_{15}-C_{28})	6	LOR	6	4520	na	3	1370	na
TPH (C_{29}-C_{36})	6	LOR	6	2130	na	3	1130	na
BTEX	6	5-700	0	na	na	0	na	na
Benzo(a) Pyrene	6	LOR	0	na	0	0**	na	na
Naphthalene	6	50	1	1.7	0	0	na	na
Anthracene	6	0.01	3**	**1.7**	3	0**	na	na
Fluoranthene	6	1	3	**1.3**	1	0	na	na
Phenanthrene	6	0.6	4	**10.2**	3	0**	na	na
Total PAHs	6	3	4	23.8	na	0	na	na

* Where PSH detected, no groundwater sample was collected
** LOR exceeds the TV
Bold Concentration exceeds TV
n number of samples
na not applicable

The groundwater monitoring by CAVVANBA in January 2010 and May 2012 at 25-49 Smith Street identified PSH in MW220107-01 and MW220107-02, both located near the former waste oil UST and likely just outside the area in which the remediation was completed as summarised in Section 10 and reviewed in the SAR for Stage 2 (GN 183-1B).

PSH in MW220107-01 was reported as >80 cm in January 2010 and >200 cm in May 2012. In both January 2010 and May 2012 the PSH in MW220107-02 was reported as being <5 cm thick.

The PSH was described as a black, viscous, oil-like product with a waste-oil like odour. These observations are consistent with heavy end hydrocarbon contamination, which is also consistent with the dissolved phase results which did not identify any significant volatile petroleum hydrocarbon contamination. The auditor notes that PSH and/or dissolved phase heavy end hydrocarbon contamination was detected in all of the eight wells sampled by CAVVANBA in 2010 and in five of the eight wells in 2012.

The auditor notes that the thickness of PSH was measured in January 2010 and May 2012 using a disposable bailer whereby the “the presence or absence of PSH was evaluated by slowly lowering approximately half the length of the clear bailer into the water column”. The

auditor notes that this method would be adequate to assess the presence or absence of PSH. However, it does not reliably assess the thickness of the PSH in the water column.

The groundwater monitoring by CAVVANBA at 25-49 Smith Street in January 2010 and May 2012 are consistent with previous groundwater monitoring in this part of the site which identified the presence of PSH in MW220107-01 and MW220107-02 in 2007 to 2008 and confirm the findings of the earlier SAR and statements (GN 183-2B and -3B) that “There are residual hydrocarbon impacts in groundwater over a small area of the site.”

CAVVANBA conducted a risk assessment review (21 September 2012) and the scope included bail down tests to determine the “true” thickness of PSH as opposed to the “observed” thickness at MW012207-01. The test was conducted on 3 August 2012. Approximately 10 L of PSH was bailed out. Recovery was measured with an interface probe over 1.5 hours. CAVVANBA considered that the test was incomplete due to viscosity of the product and difficulty in identifying the interface. The thickness of PSH was estimated to be approximately 25 cm during this test.

During this test a sample of the PSH was collected and analysed for TPHs, BTEX, PAHs and phenols. CAVVANBA stated that analysis of the PSH indicated a diesel/waste oil product. However, the auditor notes that the laboratory certificate provided to the auditor for the PSH analysis states: “*The sample PSH-1 has a similar GC/FID chromatographic profile which is consistent with presence of shale -oil.”* The laboratory states that the product identification is qualitative only, based on visual comparison of the chromatogram to those of known petroleum products. Overall, based on the reported site history and field observations the auditor considers that the PSH is more likely to be associated with diesel/waste oil than “naturally occurring” shale oil.

PSH was measured by CAVVANBA again in MW012207-01 on 13 August 2012 and 24 August 2012 with an interface probe. Approximately 25 cm of PSH was reported by CAVVANBA for both events.

10 Evaluation of Remediation

The remediation was reviewed and evaluated as part of earlier SARs and statements (GN 183-1B, -2B and -3B) and is documented in those reports. A summary is provided below:

- Concentrations of PAHs elevated above the assessment criteria for commercial/industrial land use associated with sand fill containing ash were excavated from two areas in Lot A DP 24380. The visually identifiable layers of ash impacted soils were excavated and subsequently validated for commercial/industrial land use.
- Concentrations of lead above the assessment criterion for commercial/industrial land use were detected in fill in an area of Stage 3. The impacted fill was excavated and subsequently validated for commercial/industrial land.
- Fragments of asbestos containing materials were observed in fill during investigations and remedial works. Various areas were excavated to remove some of the asbestos containing materials and the soils were disposed offsite.
- Soils that had included asbestos containing materials from Stage 2 was sifted to remove asbestos prior to being placed on Stage 1. Approximately 2000 m^3 of soil from the upper 0.4 m was excavated from 140 Denison Street (Stage 2). The material was physically inspected by the contractor with rakes and fragments of cement sheet that were encountered were removed. The material was then placed within the northern portion of 140 Denison Street as “potentially asbestos impacted fill” (base on the assumption that it is not practicable to guarantee removal of all of the asbestos through the removal process).
- An emu pick for asbestos containing materials was conducted over Stage 2.
- Seven USTs and one AST were removed from the site. Field observations indicating only minor contamination impacts associated with six of the USTs. These observations were confirmed through validation sampling. More significant impacts were associated with the waste oil UST as discussed below.

The earlier SARs concluded that the excavation and validation remedial works for PAHs, lead and removal of the USTs were adequate. Asbestos that remained at the site was to be managed.

Remedial excavations for one of the seven USTs (the waste oil tank) extended to a depth of 9 m after installation of temporary sheet piling. Due to access restrictions (proximity to a sewer pipe) and groundwater ingress not all impacted soils could be removed. Further assessment of groundwater in this area was conducted as part of the studies reviewed for this SAR.

11 Contamination Migration Potential

The contamination migration potential was reviewed and evaluated as part of earlier SARs and statements (GN 183, GN 183-1B, -2B and -3B) and is documented in those reports. The new information collected since these previous audits have not altered the conclusion in relation to potential for contamination migration.

In summary, the potential for offsite migration of contamination from soil or groundwater is considered low.

12 Assessment of Risk

CAVVANBA (September 2012) completed a review of the following risk assessment that had been previously been reviewed as part of GN 183-2B and GN 183-3B:

- "Quantitative Health and Environmental Risk Assessment, 25-49 Smith Street, Hillsdale, Sydney," dated April 2007 by ERM.

CAVVANBA completed the review based on the information that had become available since the date of the previous site audit report and statements. The new information considered by CAVVANBA was:

- Current site conditions
- Proposed commercial warehouse land use
- Fingerprint analysis of the PSH
- CRC Care (2011) HSLs

On the basis of this review, CAVVANBA concluded that "Based on the type of contamination, i.e. no BTEX, the remedial and validation works previously conducted, the 2007 risk assessment results, and the adopted HSLS, it is considered that there is a low potential for vapour intrusion risk."

The auditor notes that the CRC Care (2011) HSLs are not strictly applicable to a waste oil source. However, overall the auditor agrees with the conclusion made by CAVVANBA that there is a low potential for vapour intrusion risk from the contamination identified within groundwater on the site. This opinion is based on the following:

- The groundwater impacts are localised
- The contaminants are not particularly volatile, with the majority comprising heavy end hydrocarbons
- The volatile component of the PSH makes up a small proportion of the total mass (reported by CAVVANBA as <1% and by ALS as 4020 mg/kg TPH C6-C9 out of 661300 mg/kg for C6-C36; and 2930 mg/kg of total PAHs (i.e. equivalent to less than 1% as stated by CAVVANBA)
- Groundwater contamination is located at depth (deeper than 6 m) with sandy soil overlying
- Biodegradation of the volatile fraction is likely occurring as oxygen penetration in sand is generally good (even down to 6 m) and expected to remain a key attenuation process even with a new (large) building constructed on the site
- The proposed development is a large slab-on-grade commercial building which would facilitate significant attenuation of any volatile contamination that may reach the surface and intrude into the building

Risk from accidental contact with groundwater is negligible because of the depth to water and because abstraction and use of groundwater cannot be legally conducted without regulatory approvals.

Based on assessment of results against relevant guidelines and consideration of the overall investigations and remediation that has been completed, it is the auditor's opinion that:

- There is a risk that undetected bonded asbestos or asbestos fibres may be encountered during redevelopment works which could pose a risk to human health if not adequately managed
- There is a risk that fill materials of unknown quality or other unexpected finds of contamination including asbestos could be present, for example beneath the buildings that remain
- There is a risk that excavations to depth (deeper than approximately 6 m) could exposure impacted and/or odourous soils associated with residual hydrocarbon smearing at the groundwater table in the vicinity of the residual waste oil. The most likely contaminants are heavy end hydrocarbons
- There is a risk that impacted and/or odourous soils associated with residual hydrocarbon remain in the Sydney Water easement near the location of the former USTs
- Phytotoxicity of the various metals in soils should be considered if the fill materials are to be used for landscaping at the site

Overall, the risk of major or widespread contamination that would have a significant impact on the proposed commercial/industrial development is assessed to be low. The auditor considers that the identified risks can be managed through implementation of the EMP, discussed in Section 13.

13 On-going Site Management

CAVVANBA proposes the ongoing management of remnant contamination at the site through the following document, which is attached in Appendix C:

- "Environmental Management Plan, 25-49 Smith Street and 140-148 Denison Street, Hillsdale NSW" dated June 2013 by CAVVANBA Consulting.

In summary the key issues requiring management are:

- Remedial works have removed bonded asbestos fragments from the sandy soils to the extent practicable. However some further asbestos pieces and/or associated fibres may be encountered during site development
- There are residual petroleum hydrocarbon impacts (waste oil) in groundwater (and associated soil impacts at depth) over a small area of the site. Groundwater and soil impacts are at a depth of approximately 6 m or greater
- Limited assessment has been undertaken beneath the former administration building in the east and the removalist/storage buildings and associated infrastructure on 148 Denison Street in the north western corner of the site. Asbestos containing materials and/or unexpected soil conditions could exist beneath the buildings.

In summary the procedures to manage these key issues are:

- Capping the site (where applicable the capping will include buildings, concrete or bitumen pavement associated with the proposed development)
- Placement of a geofabric marker layer followed by a minimum of 0.5 m of excavated natural material in landscaping areas (areas not otherwise capped with buildings or hardstand)
- Placement of marker layer in service trenches and backfilling with clean soil
- Implementing management controls during development and during future breaches of the capping layers:
    - Induction of site workers in relation to the presence of contamination and the required controll measures
    - Workers to be appropriately licensed and trained
    - Minimal disturbance of potentially contaminated soil
    - Daily emu-bobs to remove all visible ACMs
    - Dust suppression to minimise wind borne asbestos fibres
    - Air monitoring at project boundaries
    - Personnel protective equipment
    - Any potentially impacted material generated during excavations or piling from depths greater than 2 m is assessed for potential contamination
    - Any soil or groundwater to be removed should be appropriately managed by appropriate storage, handling and classification and disposal of any wastes generated

- Development of a hydrocarbon odour and vapour management plan (if needed)
- Implement unexpected finds protocol if other potential contaminants are identified.

- Review of management requirements in the event the site is to be redeveloped for another use in the future or when surplus land is to be divested.

Table 13.1 presents an assessment of the EMP.

Table 13.1: Assessment of the EMP

Item	Auditor Comments
Site Specific stand alone document	The various lot and DP numbers are specified and a site plan clearly delineating site features respective lot and DP numbers is provided. The auditor is of the opinion that the EMP is long and complex and does not clearly describe the required management controls in manner that could be readily understood by a lay person. However, the site is owned by Bunnings and is to be developed and managed by Bunning into the future. Bunnings have confirmed by email that they understand the requirements of the EMP and are prepared to implement them during development. Therefore, the EMP is acceptable. A clearer more concise EMP would be required if to be implemented by a third party.
Plan Objectives	Objectives are provided in Section 1.2 and are stated as follows: "The objective of this EMP is to manage risks posed by residual contamination at the site, so that it does not pose an unacceptable risk to human health or the environment during construction and operation. The information provided is intended to assist a person conducting work in the development of their own project specific environmental and work health and safety (WHS) management, described herein as their systems of work."
When does the EMP apply?	The EMP applies during demolition and redevelopment of the site. The EMP will also apply during operation of the site. The EMP applies to any areas of land surplus to the development (including appropriate capping of these areas) unless additional investigation, remediation and validation or management is conducted to demonstrate site suitability for the end land use. The EMP may not be adequate to manage risk at the site in the event land is redeveloped for a different land use or if surplus land is divested. Review of the EMP would need to be undertaken to determine applicability and relevance to the specific use. The EMP is to be reviewed at the completion of the development and if necessary updated to reflect changes to the site condition. Section 7.1 of the EMP states when the EMP should be reviewed as follows: • During future redevelopment (beyond the current proposed Bunnings warehouse development) • When there is a change in the scope of the project • When roles or responsibilities are changed/require updating • Following significant environmental incidents • Where it is highlighted that a particular activity/action is not effective and requires review • When there is a need to improve performance in an area of

Table 13.1: Assessment of the EMP	
Item	**Auditor Comments**
	environmental impact • Where surplus land is divested • At the completion of any environmental audits.
Contamination Issues	The contaminants of concern are identified and characterised. The EMP addresses how the contaminants of concern will be managed and these measures are generally appropriate.
Responsibilities	The EMP details those responsible for environmental management and implementing the EMP. Overall it is the responsibility of Bunnings to ensure the EMP is implemented. The EMP indicates that it the responsibility of the planning authority to: • Provide public notification of the existence of the EMP on appropriate property records, including future planning certificates that may be prepared for the site as created under Section 149 of the Environmental Planning and Assessment Act 1979. • Enforce the EMP through the relevant provisions of the Environmental Planning and Assessment Act 1979 and planning instruments that apply to the land, such as consent conditions. The above would apply to any revisions of the EMP.
Timeframe	The EMP states that it will apply indefinitely including to surplus land, or until further information is available to demonstrate that the risks are no longer present.
Public notification mechanisms to ensure potential purchasers or other interested parties are aware of the restrictions i.e. Section 149 or placing a covenant on the title of land under the CLM Act to require maintenance of remediation under the Act.	Section 1.4 of the EMP refers to public notification of the existence of the EMP on appropriate property records, including future planning certificates that may be prepared for the site as created under section 149 of the Environmental Planning and Assessment Act (EP&A) 1979. Section 1.4 of the EMP also refers to enforcement of the EMP through the relevant provisions of the EP&A Act and planning instruments that apply to the land, such as consent conditions.
Will be or can reasonably be made to be legally enforceable?	The EMP could be enforceable through development consent conditions.
Are the Council in agreement with the EMP?	For the EMP and any revisions to be enforceable, they need to be included in development consent conditions. The Site Audit Statement and Site Audit Report will be provided to Council by the Auditor and it is recommended that they be noted on the s.149 certificate for the site. To make the EMP more accessible, it has been included as Appendix C to this SAR.

The appropriate conditions for the implementation of a Environmental Management Plan stated under Section 3.4.6 of DEC (2006) Contaminated Sites: Guidelines for the NSW Site auditor Scheme (2nd Ed.) have been met, namely:

- The EMP has been reviewed by the auditor
- The provisions of the EMP can be made to be legally enforceable (i.e. Development Consent conditions) in site redevelopment
- There will be appropriate public notification of restrictions applying to the site through a notification on the Section 149 Certificate for the site
- The remnant contamination is not considered to pose an unacceptable risk to onsite or offsite environments.

Based on the above, and considering that Bunnings have confirmed that they understand what is required under the EMP and have agreed to implement it the Auditor considers that the EMP will generally provide an adequate framework for the management of asbestos containing materials, remnant hydrocarbon contamination and unexpected finds at the site.

The EMP is to be reviewed at the completion of the development and the Auditor recommends that it be updated to reflect the site condition at the time.

14 Compliance with Regulatory Guidelines and Directions

The audit was completed to address a request for information from council in relation to a development application (DA 11/224). Council requested that *"a revised Site Audit Statement should be provided to confirm that with these increases in groundwater contamination that the site is still suitable for the proposed uses, and whether any ongoing management of this contamination is required for site to be suitable for the respective uses."* Council required that the audit applied to the wider site including 148 Denison Street.

The owner has been notified of the presence of groundwater contamination including phase separated hydrocarbons. The owner has been advised that the presence of phase separated hydrocarbons triggers a duty to report under Section 60 of the Contaminated Land Management Act 1997. At the date of this site audit report the site was not on the list of NSW contaminated sites notified to the EPA held on the NSW EPA's website. Based on the information reviewed in relation to the PSH the auditor is of the opinion that it does not present a risk to site use or offsite migration.

The EMP indicates that it is the responsibility of council (or applicable consent authority) to:

- Provide public notification of the existence of the EMP on appropriate property records, including future planning certificates that may be prepared for the site as created under Section 149 of the Environmental Planning and Assessment Act 1979.
- Enforce the EMP through the relevant provisions of the Environmental Planning and Assessment Act 1979 and planning instruments that apply to the land, such as consent conditions.

15 Conclusions and Recommendations

Based on the information obtained since the previous audits, the conclusions in relation to 148 Denison Street and 25 - 49 Smith Street have generally remained unchanged. However, 25 - 49 Smith Street site is now being assessed for 'commercial/industrial' land use rather than the more sensitive residential land use assessed for the previous site audit report and statement. The portion of the site referred to as 148 Denison Street was not covered by the previous audits. EIS concluded that 148 Denison Street *"can be made suitable for the proposed development"* provided that certain the recommendations were implemented as discussed in Section 8.

Overall, based on the information reviewed during this and the previous audits and observations made on site, and following the Decision Process for Assessing Urban Redevelopment Sites in DEC (2006) Guidelines for the NSW Site Auditor Scheme, the auditor concludes that the audit site (25-49 Smith Street and 140-148 Denison Street Hillsdale NSW) is suitable for 'commercial/industrial' land uses subject to compliance with the following environmental management plan:

- Environmental Management Plan, 25-49 Smith Street and 140-148 Denison Street Hillsdale NSW, June 2013, CAVVANBA

This Site Audit Report and accompanying Site Audit Statement will be provided to City of Botany Bay to be noted on the Section 149 certificate for the site. It is recommended that the EMP is reviewed after site development and revised to be applicable to the specific development. The EMP applies to any land surplus to development unless additional investigation, remediation and validation or management is conducted to demonstrate site suitability for the end land use.

16 Other Relevant Information

This audit was conducted on the behalf of Bunnings Group Limited for the purpose of assessing whether the land is suitable for the proposed commercial/industrial uses i.e. a “Site Audit” as defined in Section 4 (1) (b) (iii) of the CLM Act.

This summary report may not be suitable for other uses. The various consultants included limitations in their report. The audit must also be subject to those limitations. The Auditor has prepared this document in good faith, but is unable to provide certification outside of areas over which he had some control or is reasonably able to check.

The Auditor has relied on the documents referenced in Section 1 of the Site Audit Report in preparing his opinion. If the Auditor is unable to rely on any of those documents, the conclusions of the audit could change.

It is not possible in a Site Audit Report to present all data which could be of interest to all readers of this report. Readers are referred to the referenced reports for further data. Users of this document should satisfy themselves concerning its application to, and where necessary seek expert advice in respect to, their situation.

Appendix A: Attachments

Attachment 1: Site Locality

Attachment 2: Site Identification

Attachment 3: Site Layout

Attachment 4: Soil and Groundwater Investigation Locations, 148 Denison Street

Attachment 5: Groundwater Investigation Locations, 25-49 Smith Street

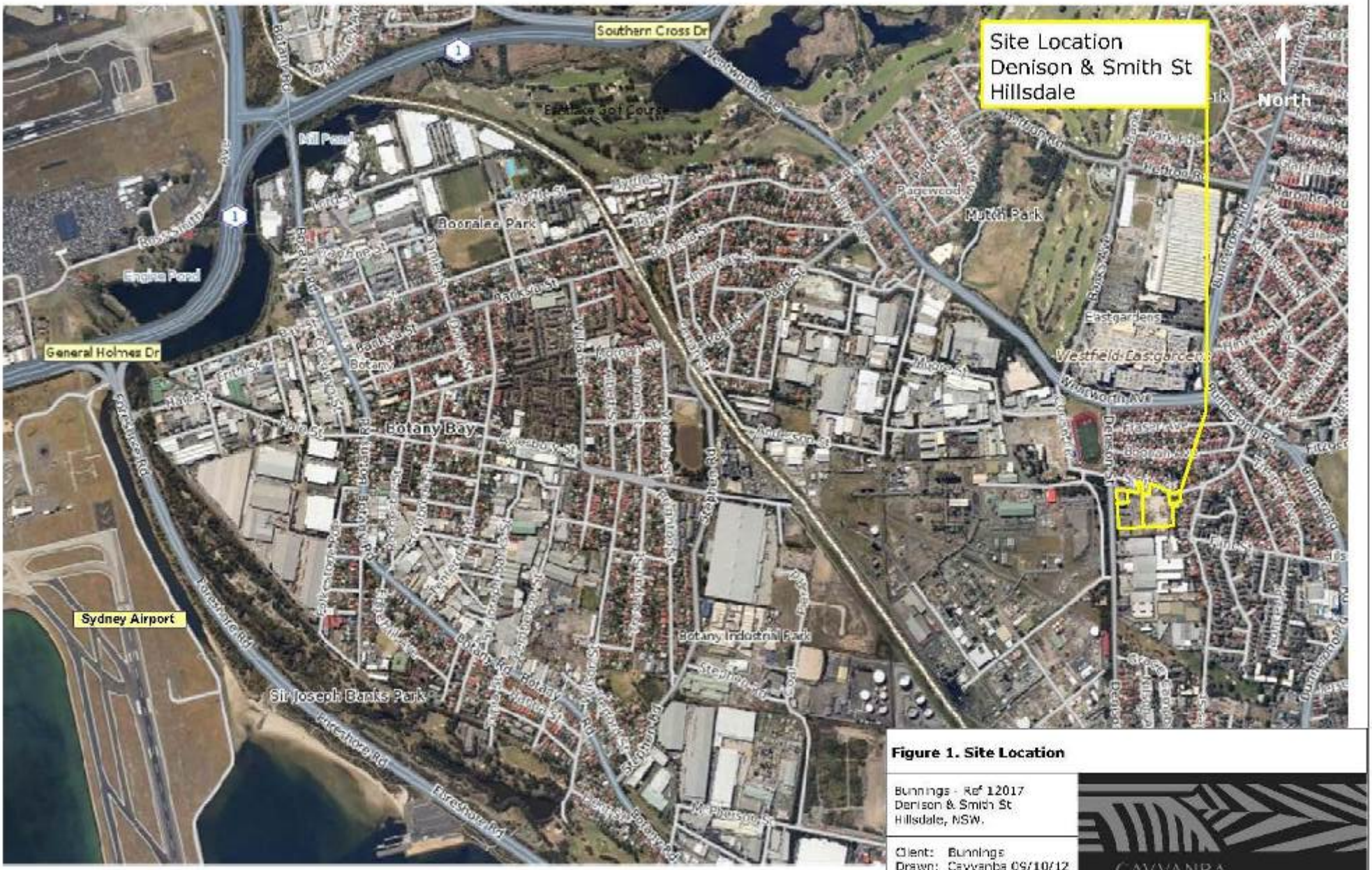


Figure 1. Site Location

Bunnings - Ref 12017
Denison & Smith St
Hillsdale, NSW.

Client: Bunnings
Drawn: Cavvanba 09/10/12
Source: SIX

CAVVANBA
consulting

Attachment 1: Site Locality

Attachment 2: Site Identification

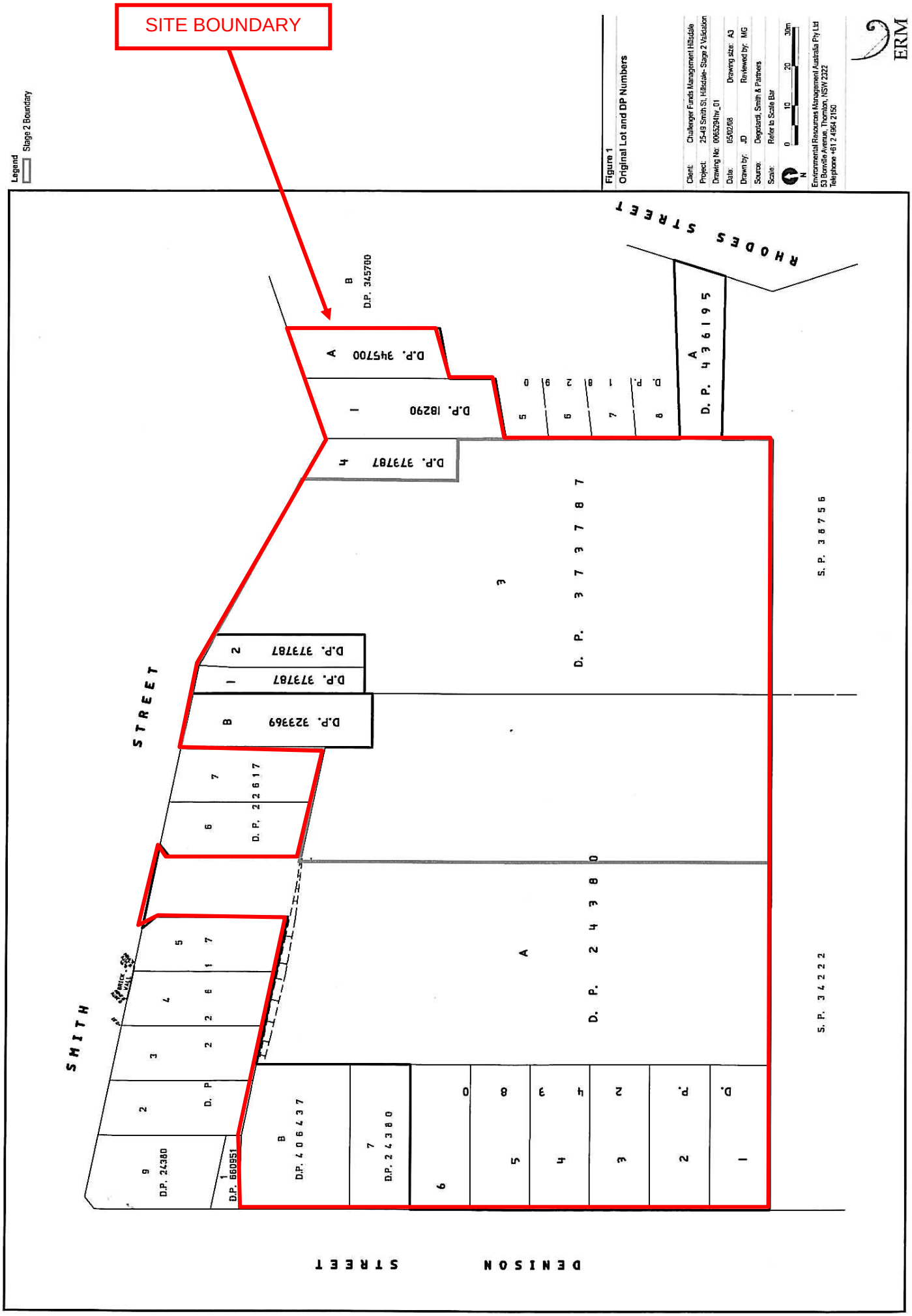


Figure 2. Site identification and property descriptions

Bunnings - Ref 12017
Denison & Smith St
Hillsdale, NSW.

Client: Bunnings
Drawn: Cavvanba 09/10/12
Source: Landpartners/SIX

CAVVANBA consulting

Attachment 3: Site Layout

Attachment 4: Soil and Groundwater Investigation Locations, 148 Denison Street

LEGEND:

- Approximate site boundary
- BH1 (0.2) — Borehole location, number and depth of fill (m)
- Groundwater monitoring well location

NOTES:
Figure 2 has been recreated from Google Earth Pro.

The borehole locations presented on this plan have been established from site measurements only and should not be construed as survey points.

Reference should be made to the report text for a full understanding of this plan.

0 2 4 6 8 10

ENVIRONMENTAL INVESTIGATION SERVICES

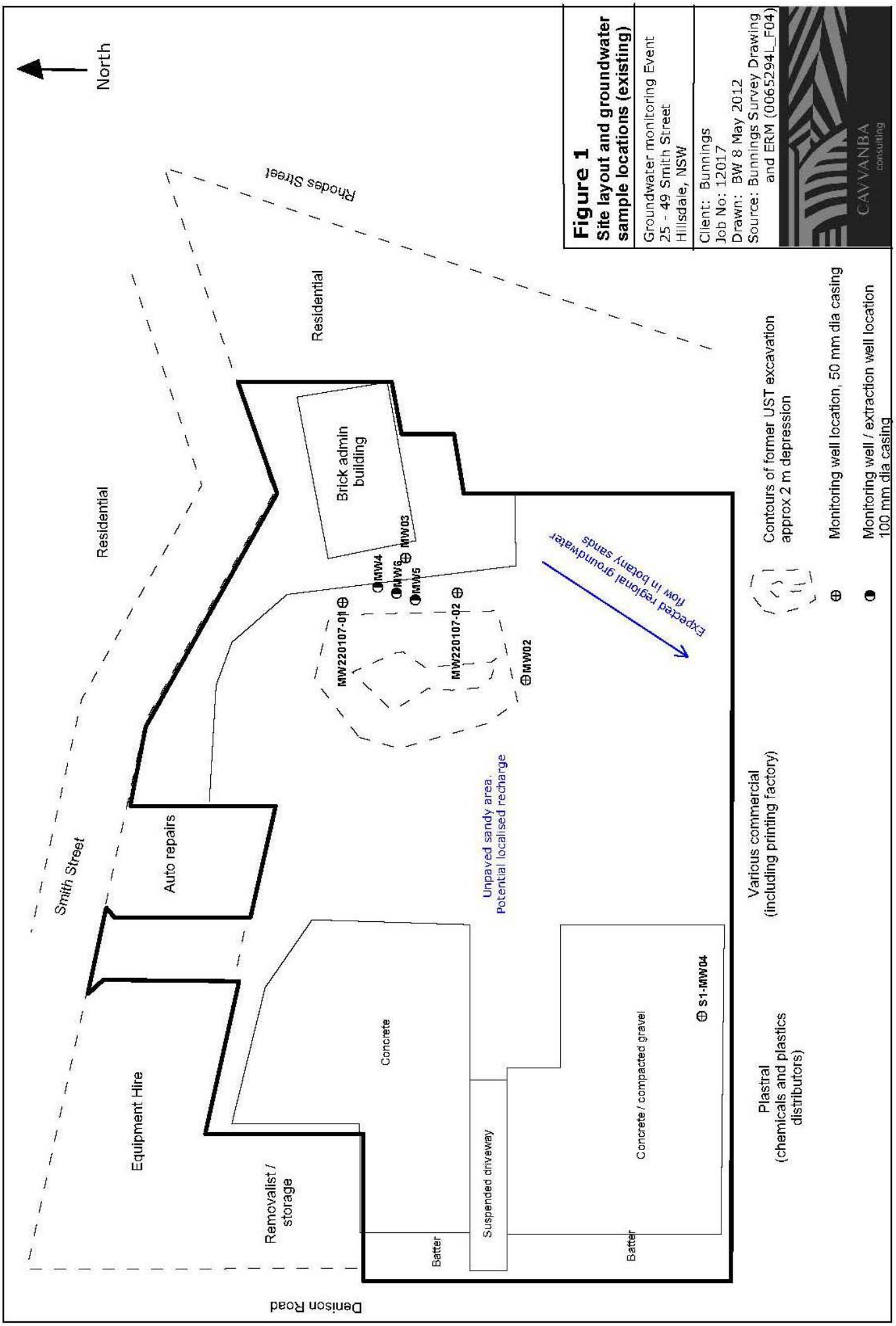
Project number: E25429K

Title: BOREHOLE & MONITORING WELL LOCATION PLAN

Figure: 2

Address: 148 DENISON STREET, HILLSDALE, NSW

Attachment 5: Groundwater Investigation Locations, 25-49 Smith Street



Appendix B:
Soil and Groundwater Criteria

Soil investigation levels for urban development sites

Department of Environment and Conservation NSW (April 2006)

Substance	Health-based investigation levels[1] (mg/kg)				Provisional phytotoxicity-based investigation levels[2] (mg/kg)
	Residential with gardens and accessible soil (home-grown produce contributing < 10% fruit and vegetable intake; no poultry), including children's day-care centres, preschools, primary schools, townhouses, villas (NEHF A)[3]	Residential with minimal access to soil including high-rise apartments and flats (NEHF D)	Parks, recreational open space, playing fields including secondary schools (NEHF E)	Commercial or industrial (NEHF F)	
	Column 1	Column 2	Column 3	Column 4	Column 5
Metals and metaloids					
Arsenic (total)	100	400	200	500	20
Beryllium	20	80	40	100	–
Cadmium	20	80	40	100	3
Chromium (III)[4]	12%	48%	24%	60%	400
Chromium (VI)	100	400	200	500	1
Cobalt	100	400	200	500	–
Copper	1,000	4,000	2,000	5,000	100
Lead	300	1,200	600	1,500	600
Manganese	1,500	6,000	3,000	7,500	500
Methyl mercury	10	40	20	50	–
Mercury (inorganic)	15	60	30	75	1[5]
Nickel	600	2,400	600	3,000	60
Zinc	7,000	28,000	14,000	35,000	200
Organics					
Aldrin + dieldrin	10	40	20	50	–
Chlordane	50	200	100	250	–
DDT + DDD + DDE	200	800	400	1,000	–
Heptachlor	10	40	20	50	–
PAHs (total)	20	80	40	100	–
Benzo(a)pyrene	1	4	2	5	–
Phenol[6]	8,500	34,000	17,000	42,500	–
PCBs (total)	10	40	20	50	–
Petroleum hydrocarbon components[7]					
> C16–C35 (aromatics)	90	360	180	450	–
> C16–C35	5,600	22,400	11,200	28,000	–
> C35 (aliphatics)	56,000	224,000	112,000	280,000	–
Other					
Boron	3,000	12,000	6,000	15,000	–[8]
Cyanides (complex)	500	2,000	1,000	2,500	–

Soil investigation levels for urban development sites Department of Environment and Conservation NSW (April 2006)					
Substance	**Health-based investigation levels[1] (mg/kg)**				**Provisional phytotoxicity-based investigation levels[2] (mg/kg)**
	Residential with gardens and accessible soil (home-grown produce contributing < 10% fruit and vegetable intake; no poultry), including children's day-care centres, preschools, primary schools, townhouses, villas (NEHF A)[3]	Residential with minimal access to soil including high-rise apartments and flats (NEHF D)	Parks, recreational open space, playing fields including secondary schools (NEHF E)	Commercial or industrial (NEHF F)	
	Column 1	Column 2	Column 3	Column 4	Column 5
Cyanides (free)	250	1,000	500	1,250	–

1 The limitations of health-based soil investigation levels are discussed in Schedule B(1) Guidelines on the Investigation Levels for Soil and Groundwater and Schedule B(7a) Guidelines on Health-based Investigation Levels, *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPC 1999)

2 The provisional phytotoxicity-based investigation levels proposed in this document are single number criteria. Their use has significant limitations because phytotoxicity depends on soil and species parameters in ways that are not fully understood. They are intended for use as a screening guide and may be assumed to apply to sandy loam soils or soils of a closely similar texture for pH 6–8.

3 National Environmental Health Forum (NEHF) is now known as enHealth.

4 Soil discolouration may occur at these concentrations.

5 Total mercury

6 Odours may occur at these concentrations.

7 The carbon number is an 'equivalent carbon number' based on a method that standardises according to boiling point. It is a method used by some analytical laboratories to report carbon numbers for chemicals evaluated on a boiling point GC column.

8 Boron is phytotoxic at low concentrations. A provisional phytotoxicity-based investigation level is not yet available.

Notes:

This table is adapted from Table 5-A in Schedule B(1): Guidelines on Investigation Levels for Soil and Groundwater to the National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC 1999).

Soil investigation levels (SILs) may not be appropriate for the protection of ground water and surface water. They also do not apply to land being, or proposed to be, used for agricultural purposes. (Consult NSW Agriculture and NSW Health for the appropriate criteria for agricultural land.)

SILs do not take into account all environmental concerns (for example, the potential effects on wildlife). Where relevant, these would require further consideration.

Impacts of contaminants on building structures should also be considered.

For assessment of hydrocarbon contamination for residential land use, refer to the Guidelines for Assessing Service Station Sites (EPA 1994).

Threshold Concentrations for Sensitive Land Use – Soils Guidelines for Assessing Service Station Sites (NSW EPA 1994)	
Contaminant	**Threshold Concentration (mg/kg)**
TPH (C_6-C_9)	65
TPH (C_{10}-C_{36})	1,000
Benzene	1
Toluene	1.4
Ethylbenzene	3.1
Xylenes (total)	14

Trigger Values (TV) for Screening Marine Water Quality Data (µg/L) for Slightly to Moderately Disturbed Ecosystems (ANZECC 2000)		
Contaminant	**Threshold Concentration (µg/L)**	**Guideline Source**
Metals and Metalloids		
Arsenic – As (III/V)	2.3/4.5	Low reliability trigger values (95% level of protection) from Volume 2 of ANZECC (2000)
Cadmium – Cd	0.7	ANZECC (2000) 99% protection level due to potential for bio-accumulation or acute toxicity to particular species.
Mercury – Hg	0.1	
Nickel – Ni	7	ANZECC (2000) 99% protection level due to potential for toxicity.
Manganese – Mn	80	Low reliability trigger values (derived from the mollusc figure) from Volume 2 of ANZECC (2000)
Chromium – Cr (III/VI)	27.4/4.4	ANZECC (2000) 95% protection levels.
Copper – Cu	1.3	
Cobalt – Co	1	
Lead – Pb	4.4	
Zinc – Zn	15	
Aromatic Hydrocarbons		
Benzene	700	Low reliability trigger values (95% level of protection) from Volume 2 of ANZECC (2000)
Toluene	180	
Ethylbenzene	5	
o-xylene	350	
m-xylene	75	
p-xylene	200	
Polycyclic Aromatic Hydrocarbons		
Naphthalene	50	ANZECC (2000) 99% protection level due to potential for bio-accumulation or acute toxicity to particular species.
Anthracene	0.01	Low reliability trigger values from Volume 2 of ANZECC (2000) ANZECC (2000) 99% protection level due to potential for bio-accumulation or acute toxicity to particular species.
Phenanthrene	0.6	
Fluoranthene	1	
Benzo(a)pyrene	0.1	
Chlorinated Alkanes and Alkenes		
Tetrachloroethene (PCE)	70	Low reliability trigger values (95% level of protection)
1,1,2-Trichloroethene (TCE)	330	
Vinyl chloride (chloroethene)	100	
1,1,1-Trichloroethane (1,1,1-TCA)	270	
1,1-Dichloroethene	700	
1,1-Dichloroethane	250	
1,2-Dichloroethane	1900	
1,1,2-Trichloroethane	1900	Moderate reliability trigger values (95% level of protection) from Volume 2 of ANZECC (2000)
Chloroform	370	Low reliability trigger value (95% level of protection)
Non-Metallic Inorganics		
Ammonia Total – NH_3 (at pH of 8)	910	ANZECC (2000) 95% protection levels.
Cyanide (Free or unionised HCN)	4	

While the low reliability figures should not be used as default guidelines they will be useful for indicating the quality of groundwater migrating off-site.

Trigger Values (TV) for Screening Fresh Water Quality Data (µg/L) for Slightly to Moderately Disturbed Ecosystems (ANZECC 2000)		
Contaminant	**Threshold Concentration (µg/L)**	**Guideline Source**
Metals and Metalloids		
Arsenic – As (III/V)	24/13	ANZECC (2000) 95% protection levels.
Boron - B	370	ANZECC (2000) 95% protection levels (figure may not protect key test species from chronic toxicity)
Cadmium – Cd	0.2	ANZECC (2000) 95% protection levels.
Nickel – Ni	11	
Manganese – Mn	1900	ANZECC (2000) 95% protection levels (figure may not protect key test species from chronic toxicity)
Mercury – Hg	0.06	ANZECC (2000) 99% protection level due to potential for bio-accumulation or acute toxicity to particular species.
Chromium – Cr (III/VI)	3.3/1.0	Low reliability trigger values (95% level of protection) from Volume 2 of ANZECC (2000) for Cr (III) and Co
Cobalt – Co	2.8	
Copper – Cu	1.4	ANZECC (2000) 95% protection levels.
Lead – Pb	3.4	
Zinc – Zn	8.0	ANZECC (2000) 95% protection levels (figure may not protect key test species from chronic toxicity)
Aromatic Hydrocarbons		
Benzene	950	Moderate reliability trigger values (95% level of protection) from Volume 2 of ANZECC (2000)
Toluene	180	Low reliability trigger values (95% level of protection) from Volume 2 of ANZECC (2000)
Ethylbenzene	80	
m-xylene	75	
o-xylene	350	Moderate reliability trigger values (95% level of protection) from Volume 2 of ANZECC (2000)
p-xylene	200	
Polycyclic Aromatic Hydrocarbons		
Naphthalene	16	ANZECC (2000) 95% protection level due to potential for bio-accumulation or acute toxicity to particular species.
Anthracene	0.01	Low reliability trigger values from Volume 2 of ANZECC (2000) ANZECC (2000) 99% protection level due to potential for bio-accumulation or acute toxicity to particular species.
Phenanthrene	0.6	
Fluoranthene	1	
Benzo(a)pyrene	0.1	
Organochlorine Pesticides		
Aldrin	0.001	Low reliability trigger values from Volume 2 of ANZECC (2000)
DDE	0.03	
Dieldrin	0.01	
Endosulfan α	0.0002	
Endosulfan β	0.007	
Chlordane	0.03	ANZECC (2000) 95% protection levels
DDT	0.006	
Lindane	0.2	
Endosulfan	0.03	ANZECC (2000) 99% protection level due to potential for bio-accumulation or acute toxicity to particular species.
Endrin	0.01	
Heptachlor	0.01	
Organophosphorus Pesticides		
Azinphos methyl	0.01	ANZECC (2000) 99% protection level due to potential for bio-accumulation or acute

Trigger Values (TV) for Screening Fresh Water Quality Data (µg/L) for Slightly to Moderately Disturbed Ecosystems (ANZECC 2000)		
Contaminant	**Threshold Concentration (µg/L)**	**Guideline Source**
		toxicity to particular species.
Methoxychlor	0.005	Low reliability trigger values from Volume 2 of ANZECC (2000)
Dementon-S-methyl	4	
Chloropyrifos	0.01	ANZECC (2000) 95% protection levels
Diazinon	0.01	ANZECC (2000) 95% protection levels
Dimethoate	0.15	
Fenitrothion	0.2	
Malathion	0.05	
Parathion	0.004	
Non-Metallic Inorganics		
Total Ammonia as N (pH of 8)	900	ANZECC (2000) 95% protection levels
Cyanide (Free or unionised)	7	
Nitrate	700	Moderate reliability trigger values (95% level of protection) from Volume 2 of ANZECC (2000)
NO_x	40	ANZECC (2000) Default trigger values for physical and chemical stressors for slightly disturbed ecosystems in lowland rivers of South-east Australia. The trigger values for TP and TN are 25 µg/L and 350 µg/L, respectively, for east flowing coastal rivers in NSW.
Total Nitrogen	500	
Total Phosphorous	50	
Ammonium ($NH4^+$)	20	
Chlorine	3	ANZECC (2000) 95% protection levels.
Phenols		
Phenol	320	ANZECC (2000) 95% protection levels
2,4-dimethylphenol	2	Low reliability values (95% level of protection) from Volume 2 of ANZECC (2000)
Chlorinated Alkanes and Alkenes		
Tetrachloroethene (PCE)	70	Low reliability trigger values (95% level of protection) from Volume 2 of ANZECC (2000)
1,1,2-Trichloroethene (TCE)	330	
Vinyl chloride (chloroethene)	100	
1,1,1-Trichloroethane (1,1,1-TCA)	270	
1,1-Dichloroethene	700	
1,1-Dichloroethane	90	
1,2-Dichloroethane	1900	
Chloroform	370	
1,1,2-Trichloroethane	6500	Moderate reliability trigger values (95% level of protection) from Volume 2 of ANZECC (2000)
Chlorinated Aromatic Hydrocarbons		
1,3-dichlorobenzene	260	Moderate reliability trigger values (95% level of protection) from Volume 2 of ANZECC (2000)
1,4-dichlorobenzene	60	
1,2,4-trichlorobenzene	85	
Hexachlorobenzene	0.05	Low reliability values (95% level of protection) from Volume 2 of ANZECC (2000). (QSAR derived)
Miscellaneous Industrial Chemicals		
Hexachlorobutadiene	0.04	Environmental Concern Level from Volume 2 of ANZECC (2000)

While the low reliability figures should not be used as default guidelines they will be useful for indicating the quality of groundwater migrating off-site.

Appendix C:
Environmental Management Plan

Environmental Management Plan

25 -49 Smith Street and

140 - 148 Denison Street, Hillsdale NSW

June 2013, Ref. 12017

CAVVANBA
consulting

Cavvanba Consulting Pty Ltd
ABN: 37 929 679 095

1/66 Centennial Circuit
PO Box 2191
Byron Bay NSW 2481

t: (02) 6685 7811
f: (02) 6685 5083
inbox@cavvanba.com

www.cavvanba.com

Report Details

Report:

Environmental Management Plan

25 - 49 Smith Street and 140 - 148 Denison Street
Hillsdale NSW

Ref. 12017

for

Bunnings Group Limited

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This document was prepared in accordance with the scope of services described in Cavvanba's proposal and our Standard Trading Conditions, for the sole use of Bunnings Group Limited, their agents and the relevant regulatory authorities and auditor. This document should only be used for information purposes, to allow a person conducting a business or undertaking (PCBU) to integrate this information into their systems of work (see Section 1 for definitions).

CAVVANBA consulting

1/66 Centennial Circuit
PO Box 2191
Byron Bay NSW 2481
t (02) 6685 7811
f (02) 6685 5083

Ross Nicolson
Senior Environmental Scientist

Date: 07/06/2013

Marc Salmon
Principal Environmental Scientist

Date: 07/06/2013

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1.0 Introduction

This *information environmental management plan (EMP)* has been developed by Cavvanba Consulting on behalf of Bunnings Group Limited, for the management of a site located at 25 - 49 Smith Street and 140 - 148 Denison Street, Hillsdale NSW 2036. The site's location is shown in Figure 1, the site layout is shown in Figures 2 – 4, and the draft site plans for the proposed site are included in Appendix A.

This EMP was prepared in accordance with Cavvanba's proposal of 3 May 2012 to Bunnings and their acceptance on 11 May 2012, and associated correspondence. This EMP should be read in full, including Cavvanba's general limitations, Section 1.7.

This EMP addresses the potential for a person conducting work beneath sections of the site to be exposed to the following three contaminated land issues that require management:

- asbestos may be present as both fibres and cement sheeting fragments within soils across the site;
- waste oil, petroleum hydrocarbon contamination within groundwater and associated soils at depth, identified in a limited area of the site; and
- uncontrolled fill, and uncertainties associated with subsurface conditions, mainly on 148 Denison Street.

For full details and investigation background regarding the remediation and validation works at this site, the previous reports detailed in Section 1.4 should be sourced.

1.1 Scope of this EMP

The scope of this EMP includes management controls for the site that apply:

- during demolition and construction;
- throughout future occupation and operation; and
- for future maintenance or redevelopment.

This EMP is not intended to require additional controls for day to day aboveground general site maintenance such as lawn mowing, trimming and minor landscaping works.

1.2 Objective

The objective of this EMP is to manage risks posed by residual contamination at the site, so that it does not pose an unacceptable risk to human health or the environment during construction and operation. The information provided is intended to assist a person conducting work in the development of their own project specific environmental and work health and safety (WHS) management, described herein as their *systems of work*.

Any recommendations herein are for information purposes only, and users of this information should determine their specific requirements in accordance with their environmental and WHS systems of work. This EMP only addresses the issues related to contaminated land previously discussed. Other environmental and WHS issues will exist associated with any works being undertaken, potentially including other contaminants, and other risks, requirements and controls associated with such works are not addressed in this EMP.

1.3 Definitions

Environmental management plan (EMP) is used in various contexts, broadly including: *information EMPs*, for conveying important information in regard to environmental matters, and associated WHS issues, for acting upon in future plans and projects; *planning EMPs*, which are developed as part of an environmental impact assessment process for seeking approvals; *construction EMPs*, for providing specific plans and

operating procedures during construction works and *operational EMPs*, for providing specific plans and operating procedures during the operational use of a site.

Person conducting work is used in the context of the WHS legislation, i.e. a "person conducting a business or undertaking (PCBU)", where a 'person' may be an organisation or an individual, including a company, a government department, a local council, a builder (including principal contractors and sub-contractors), or a self-employed person operating their own business.

Systems of work is used to define all the actions and systems applied by PCBUs to manage their environmental and WHS requirements, including policies, management systems, training, inductions, specific plans, risk assessments, job safety analyses (JSAs), safe work method statements (SWMS), standard operating procedures (SOPs), and the like.

1.4 Implementation and responsibilities

Whilst the current contaminated land issues are present, this EMP applies during the life of the construction works, and throughout the operational life of the proposed development. During any future redevelopment, the requirements of this EMP should be considered and incorporated as appropriate.

City of Botany Bay

The responsibilities of Council, in the role of planning authority, are recommended to be limited to:

- Public notification of the existence of the EMP on appropriate property records, including future planning certificates that may be prepared for the site as created under section 149 of the *Environmental Planning and Assessment Act* (EP&A) 1979.

- Enforcement of the EMP through the relevant provisions of the EP&A Act and planning instruments that apply to the land, such as consent conditions.

Site owner/occupier

The site owner and/or occupier will be responsible for the implementation of the EMP, which will include the following:

- The assignment of individual responsibilities for implementing, maintaining, monitoring, and reporting each environmental requirement as discussed in this EMP.

- Ensuring that all works on-site are conducted in compliance with the EMP and regulatory requirements.

- Ensuring appropriate monitoring, corrective actions and reporting of the environmental requirements.

- Ensuring that all maintenance workers, contractors, subcontractors, employees and visitors conduct their work in accordance with the requirements of the EMP and the relevant WH&S requirements.

- Ensuring provision of updated information to the Environment Protection Authority (EPA), when significant changes to the contamination status of the site are detected. Information requirements to the EPA are to be conducted in accordance with the Section 60 reporting requirements of the *Contaminated Land Management (CLM) Act* 1997.

Person conducting work

Persons/organisations conducting work, including contractors and subcontractors, responsibilities include:

- Ensuring that the information within this construction/operational EMP is incorporated into their environmental and WHS systems of work.
- Ensuring that procedures exist within their systems of work to inform all employees, contractors or subcontractors of this and the associated requirements.
- Ensuring that all persons physically conducting work on-site understand and comply with the requirements of this EMP, and their associated systems of work, including training and inductions as required.
- Ensuring that their environmental and WHS systems of work include a 'stop work' procedure, such that if conditions are encountered which differ significantly from those described in this EMP or the referenced relevant documents, all persons physically conducting the works can appropriately stop work in a controlled manner.

Site workers' responsibilities include:

- Complying with the requirements of this EMP, as detailed in the systems of work under which they are operating.
- To actively engage in inductions, JSAs, tool box meetings and the like as specified in the systems of work under which they operate.
- To seek clarification from their supervisor if they are unsure of the requirements or their environmental/WHS responsibilities.
- To stop work and notify their supervisor if they know or suspect that works are being conducted in a manner which may result in environmental or WHS incidents or accidents.

Section 6 guides the integration of this EMP into the relevant systems of work for contractors. Reviewing and auditing of the implementation of the EMP and associated requirements are to be conducted by the site owner as specified in Section 7. A guide to the environmental management controls and responsibilities is included in Section 8.

The EMP does not address specific WH&S issues, and the site owner and/or occupier is responsible for ensuring that the design and implementation of the EMP and associated requirements are conducted in accordance with all relevant WH&S legislation and the appropriate information is to be incorporated into the contractors' specific safe work method statements (SWMS).

This EMP does not replace the responsibility of anyone conducting their work in accordance with the relevant environmental legislation. This EMP is provided for information purposes and should be used by the relevant parties to integrate the issues discussed herein into their work practices and systems of work.

Under Section 60 of the CLM Act, a person whose activities have contaminated land or a landowner whose land has been contaminated are required to notify the EPA when they become aware of the contamination (DECC 2009). If contamination is identified beneath the site that varies significantly from that described in this EMP and the other relevant

documents, a duty to report may exist by the person whose activities have contaminated the land or the landowner of the site.

1.5 Relevant documents

This EMP acts as a standalone document, however the following documents are considered relevant to the site and this EMP, and can be referred to if further information is required. It is noted that while extensive environmental investigations have been reported for this site, only reports considered germane or referenced in this EMP are listed below:

- Cavvanba (January 2010a) *Groundwater Sampling Results and Field Observations, 25 – 49 Smith Street, Hillsdale NSW*, (Ref. 10989L02 BGL02) letter report.
- Cavvanba (January 2010b) *Review of Contamination Issues, Potential Bunnings Development Site, 25 – 49 Smith Street, Hillsdale NSW,* (Ref. 10989L01 BGL01) letter report.
- Cavvanba *(21 September 2012) Risk Assessment Review, 25 – 49 Smith Street, Hillsdale NSW,* (Ref. 12017L02-BGL02) letter report.
- ERM (April 2007) *Quantitative Health and Environmental Risk Assessment, 25 – 49 Smith Street, Hillsdale Sydney,* (Ref. 0023115RP04).
- ENVIRON (October 2006) *Site Audit Report, 140 Denison Street, Hillsdale NSW, Hillsdale, NSW,* (Ref. 31-0234) and Site Audit Statement GN 183-1B by Graeme Nyland.
- ENVIRON (March 2008) Site Audit Report, *Stage 2 and Stage 3 of 25 to 49 Smith Street, Hillsdale, NSW,* (Ref. AS120234) and Site Audit Statement GN 183-2B by Graeme Nyland.
- ENVIRON (March 2008) *Site Audit Report, Stage 2 and Stage 3 of 25 to 49 Smith Street, Hillsdale, NSW,* (Ref. AS120234) and by Graeme Nyland.

1.6 EMP requirements

DEC (2006) describes that EMPs should:
- describe the nature and location of contamination remaining on-site;
- state the objectives of the plan;
- describe how contaminants will be managed;
- describe who will be responsible for the plan's implementation; and
- provide timeframes for implementation of the plan.

This EMP is in general conformance with the EPA made and approved guidelines, the NSW Government Construction Consultative Committee (CCC) (2009) *Environmental Management System Guidelines, 2nd Edition*, and Australian/New Zealand Standard (2004) *Environmental management systems – requirements for guidance for use*, AS/NZS ISO 14001.

Appendix B, *Environmental Management Plan Requirements*, is modified from CCC 2009. It describes the general requirements for EMPs, where those requirements are addressed in this information EMP, and where information should be included in project specific and operational EMPs.

1.7 General limitations to environmental information

The findings of this reporting are based on the objectives and scope of the services provided. Cavvanba Consulting performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental assessment profession. No warranties or guarantees, expressed or implied, are made.

Cavvanba's review/assessment is strictly limited to identifying the environmental conditions associated with the subject property in regard to site contamination, and does not seek to provide an opinion regarding other aspects of the environment not related to site contamination, or to the suitability of the site in regard to: landuse planning and legal use of the land; and/or regulatory responsibilities or obligations (for which a legal opinion should be sought); and/or the occupational health and safety legislation; and/or the suitability of any engineering design. Reviews of such information are only in relation to the contaminated land aspects of any project or site. If specialist technical review of such documents is required, these should be obtained by an appropriate specialist.

The reporting and conclusions are based on the information obtained at the time of the assessments. Changes to the subsurface conditions may occur subsequent to the investigation described, through natural processes or through the intentional or accidental addition of contaminants, and these conditions may change with space and time.

Field monitoring, sampling and chemical analysis of environmental media and structures are 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 regulatory requirements, site history, and the proposed landuse, not on sampling and analysis of all media, at all locations, for all potential contaminants.

Limited field monitoring, and environmental sampling and laboratory analyses, were undertaken as part of the investigations reviewed or conducted by Cavvanba, as described. Ground conditions, contaminants, and material types/composition can vary between sampling locations, and this should be considered when extrapolating between sampling locations. Except at each sampling location, the nature, extent and concentration of contamination is inferred only.

Furthermore, the test methods used to characterise the contamination at each sampling location are subject to limitations and provide only an approximation of the contaminant concentrations. Monitoring and chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

The absence of any identified hazardous or toxic materials at the site should not be interpreted as a warranty or guarantee that such materials do not exist at the site. Therefore, future work at the site which involves subsurface excavation or removal of structures or parts thereof, should be conducted based on appropriate management plans. These should include, *inter alia*, environmental management plans, including unexpected findings protocols, hazardous building materials management plans, and occupational health and safety plans.

If additional certainty is required, then additional site history information should be obtained, or additional exploration and sampling and analysis should be conducted. This decision should be made by the user of this information based on an appropriate risk management process, and the user should commission additional services if required.

Information within this EMP was developed in part based on environmental information and data from other consultants' reports. The limitations of these reports equally apply to this EMP.

2.0 Site identification

The site location is shown on Figure 1, and site identification and property descriptions are shown in Figure 2 and Table 2.1.

2.1 Site identification and landuse

The site is zoned Industrial 4A and is located within the City of Botany Bay.

Table 2.1: Site identification

Street address	Property description	Size (approx.)
25 - 49 Smith Street	Lots 1 to 6, and Lot A in DP24380. Lot B DP323369. Lots 1 to 4 DP373787. Lot 1 DP18290. Lot A DP345700.	2.58 ha
140 - 148 Denison Street	Lot B DP406437. Lot 7 DP24380.	0.153 ha

2.2 Surrounding landuse

The site is located in an area of mainly retail and commercial landuse, with the surrounding landuses identified as:

North: Smith Street, with commercial premises beyond;

South: Light industrial park with associated car parking, ancillary buildings and electrical transformers;

East: Residential properties and a small retail premises; and

West: Denison Street, with Botany Industrial Park beyond including several heavy industrial facilities (including Orica) with a well documented history of contamination.

2.3 Surrounding environment

Surrounding surface water bodies consist of the 'SW Channel', which is located approximately 900 metres south-southeast of the site. The SW Channel runs in a southwest direction parallel to Beauchamp Road towards the Patrick Container terminal and Botany Bay, and is not considered to be directly down gradient of the site.

Mill ponds associated with the Eastlake Golf Course are located approximately 1.7 km to the northwest of the site and are not considered to be down gradient of the site.

There are a number of underground services associated with the site and persons conducting work beneath the site are deemed as potential receptors of contamination. The surrounding commercial and residential properties are also considered to represent potential human health receptors through transfer by air if construction activities bring impacted soil or groundwater to the surface, such that odours, dust, asbestos and/or

vapours are potential exposures. Dermal contact to stockpiled soil and wastes, or following movement of these from the area of the work, represents another potential exposure.

2.4 Topography

The site is at an elevation of 20 metres relative to Australian height datum (AHD), and slopes steeply to the south-west.

2.5 Geology and soils

The geology at the site is mapped at 1:250,000 (Geological Survey of NSW 1966) as being underlain by quaternary sediments consisting of alluvium, gravel, sand, silt and clay.

The soil landscape at the site is mapped at 1:100,000 as Tuggerah (tg) (Morand 1994b). The soils of the Tuggerah soil landscape are described as deep (> 200 cm) podzols (acid sandy soil with strongly differentiated horizons, including a bleached horizon above a coffee coloured pan and coloured subsoil) (Uc2.31, Uc2.32, Uc2.34) on dunes and podzol/humus podzol intergrades (Uc2.23, Uc2.21, Uc 2.3, Uc 4.33) on swales (linear, level floored open depressions excavated by wind or formed by the build-up of two adjacent ridges, typically associated with the depression between two adjacent sand dunes).

Limitations include extreme wind erosion hazard, non-cohesive, highly permeable soil, very low soil fertility, localised flooding and permanently high water tables. The characteristics of the dominant soil materials for this soil landscape are summarised in Table 2.1.

Table 2.1: Tuggerah soil landscape, soil description and particle size analysis

Soil Material	% < 2 mm				USCS Class	Organic matter	CEC
	Clay	Silt	Fine Sand	Coarse Sand			
Loose speckled grey – brown loamy sand (tg1)	3	2	8	87	SP-SM	H	H
Bleached loose sand (tg2)	2	0	4	94	SP	VL	VL
Grey-brown mottled sand (tg3)	9	2	6	83	SM	L	L
Black soft sandy organic pan (tg4)	8	1	2	89	SP-SM	L	VL
Brown soft sandy iron pan (tg5)	6	1	7	86	SP-SM	L	VL
Yellow massive sand (tg6)	5	2	1	92	SP-SM	VL	VL
Average	6	1	5	89	-	-	-

Table notes:

- From Chapman G.A & Murphy C.L (1989)
- For soil classification based on the Northcote code (e.g. Dy2.41, Uf6.13, etc.), see Northcote K.H. (1984) *A Factual Key for the Recognition of Australian Soils*. Rellim, Adelaide.
- Organic matter refers to organic carbon (OC) content (% of soil), used as an indication of potential contaminant retention, i.e. > OC, > potential. VH = >5, H = 2.5-5, M = 1.5-2.5, L = 0.5-1.5, VL = 0-0.5.
- CEC (cation exchange capacity, me%) is the total amount of exchangeable cations that a soil can adsorb and is used as an indication of potential contaminant retention, i.e. > CEC > potential. VH = >40, H = 25-40, M = 12-25, L = 6-12, VL = 0-6.

2.6 Hydrogeology

Cavvanba conducted groundwater sampling at the site in 2010. Groundwater at the site is present at depths of approximately 8 m, and is estimated to flow towards the south-west. PSH was detected in MW220107-01 and MW220107-02, located up-gradient of the former UST area. The PSH was observed to be a black, viscous, oil-like product with a waste oil-like odour. The apparent thickness observed in MW012207-01 was greater than 80 cm, and less than 5 cm apparent thickness in MW012207-02. Dissolved phase TPH concentrations were also detected in monitoring wells in close proximity to the above mentioned PSH, but no volatile TPHs or BTEX were detected in any of the groundwater monitoring wells. TPH C_{10}-C_{36} was detected at concentrations ranging from 1,030µg/L (MW05) to 7,550µg/L (MW04).

The site is located within Zone 1 of the Botany Basin Groundwater Extraction Exclusion Area and is subject to an embargo order made under Section 113A of the Water Act 1912. An *Embargo on any further Applications for Sub Surface Water Licences* was issued by NSW Office of Water (NOW) in June 2007 in relation to the *Botany Sandbeds Water Shortage Zone GWMA 018* which restricts the use of groundwater to the following uses only:

- works for the dewatering of construction sites;
- monitoring and test bores for groundwater investigation and/or environmental management purposes; and
- works used for groundwater remediation purposes.

Woodward-Clyde (1996) developed a conceptual model of the Botany Sands aquifer, which described it as consisting of three systems, an upper unconfined shallow system and two deeper systems which vary from unconfined to fully confined conditions. The groundwater flow in each of these systems was described as being generally in a south-westerly direction towards Botany Bay. Extensive groundwater contamination by halogenated hydrocarbons has been reported for both the shallow and deep systems, as well as in the local drainage channels.

Contaminants detected in the shallow Botany aquifer include (Woodward-Clyde 1996) carbon tetrachloride, chloroform, 1,1,2,2-tetrachloroethane, 1,2-dichloroethane (EDC), tetrachloroethene (PCE), trichloroethene (TCE), cis1,2-dichloroethene, chloroethene, benzene, toluene, ethyl benzene, xylenes, hexachlorobenzene (HCB), hexachloroethane, hexachlorobutadiene and the metals chromium and mercury.

This embargo is not specifically related to the site, however it applies to the site and surrounding area, and precludes the installation of bores in the area, with the exception of dewatering, monitoring and remediation bores. Control of groundwater extraction is therefore beyond the scope or implementation of this EMP.

3.0 Regulatory requirements

Regulatory aspects considered to relate to the site and this EMP are summarised below.

3.1 CLM Act 1997

The *Contaminated Land Management Act* 1997, enables the EPA to respond to contamination that is significant enough to warrant regulation to protect human health or the environment. The EPA has not regulated the site directly, however the City of Botany Bay Council requested that an EPA accredited site auditor review the remedial action plan (RAP), and the site was subject of a site audit report undertaken to determine land suitability for industrial uses.

The duty to notify under Section 60 of the CLM Act is discussed in Section 1.4 of this EMP.

3.2 POEO Act 1997

Under the *Protection of the Environment Operations (POEO) Act* 1997, there is a duty to notify a pollution incident occurring in the course of an activity that causes or threatens material harm to the environment. The Act includes general provisions in regard to requirements not to pollute waters, to prevent or minimise air pollution, to maintain and operate plant in a proper and efficient condition/manner, and to deal with materials in a proper and efficient manner to minimise noise impacts. The Act defines 'waste' for regulatory purposes and establishes management and licensing requirements.

PCBUs should ensure their systems of work include appropriate procedures and controls to ensure compliance with the requirements of the POEO Act, including the appropriate classification and management of wastes.

3.3 WHS Act and Regulation 2011

The *Work Health and Safety (WHS) Act* 2011 No 10 is the overarching act in NSW relating to worker health and safety, and employer responsibilities. In addition, the *WHS Regulation* 2011 details the duties for employers, and sets regulations for employers to achieve required worker health and safety performance.

Of particular note, Section 49 of the *WHS Regulation* 2011, requires PCBUs to ensure that no person "is exposed to a substance or mixture in an airborne concentration that exceeds the exposure standard for that substance or mixture". Section 50 specifies requirements for air monitoring, recording keeping for 30 years, and making the air monitoring results available to persons at the workplace.

In addition to the requirements of the Act and Regulation, PCBUs should be familiar with, and incorporate the relevant information and requirements, from the relevant WorkCover and Safe Work Australia codes of practice and the like, including *How to Manage Work Health and Safety Risks, Code of Practice*; *Work Near Underground Assets, Guide*; *Excavation Work, Code of Practice*; and *Construction Work, Code of Practice*.

The code of practice issued by Safe Work Australia: *How to manage and control asbestos in the workplace* outlines procedures approved under Section 274 of the WHS Act. This document acts as a practical guide to achieving the standards of health, safety and welfare required under the WHS Act and Regulation 2011.

3.4 Development Control Plan No 34

The City of Botany Bay Development Control Plan (DCP) No 34 creates the framework to ensure that while carrying out its planning functions, Council considers the possibility that a previous or current land use has caused contamination of the site and the potential risk to health or the environment from that contamination.

Whereas the works proposed for the site are not considered to be substantial remediation works, site management plan requirements outlined in the DCP have been included in Section 8 of this EMP to ensure effective management of the associated concerns. In addition, further requirements of the DCP are included in Appendix D.

4.0 Project overview

4.1 Current site condition

Following remediation works, and at the time of writing this EMP, all structures and hardstand had been removed from the site, with the following exceptions:

- a large warehouse-style building located in the north eastern portion of the site;
- a concrete ramp in the central western portion of the site; and
- the 148 Denison Street site was operational at the time of writing this EMP, and contained the warehouse building located along the entire east section of site with an office and change-room.

The site layout is shown in Figure 3.

4.2 Proposed development

The proposed development is a Bunnings Warehouse and Building Supply Centre, primarily consisting of a concrete warehouse–style building, with undercroft parking. The proposed development and site layout is shown in Appendix A, with plans provided by John R Brogan & Associates on behalf of Bunnings.

It is understood that all current buildings and structures will be removed during demolition. To facilitate site development, it is expected that some excavation and movement of soil will be undertaken to re-contour the site. Some deeper excavations will also be required in regard to the establishment of foundations. The specific type, e.g. driven, drilled or specialty piles and the depth required are not known at this stage, but some material will likely be excavated associated with their placement. Also, additional excavation will be required from beneath features such as escalators and elevators.

The proposed development will provide a cap over the site, consisting of permanent hardstand of either concrete or a bitumen pavement, with a minimal area of landscaping on the southern boundary. The landscaping areas and areas over-excavated for services will have a geofabric marker layer to define the boundary between the existing site soils and the imported fill material, consisting of excavated natural material (ENM) or virgin excavated natural material (VENM) placed above at a minimum thickness of at least 0.5 m in line with ANZECC (1999) *Guidelines for the assessment of on-site containment of contaminated soil*.

The development will result in surplus land, as shown on the design plans in Appendix B, and further discussed in Section 8.2.4. It is understood that this surplus land will be land not included in this redevelopment, which may be divested at a later stage.

5.0 Nature of contamination requiring management

Extensive remediation and validation works have been conducted at the site, however there remains a potential to encounter contaminated soil during any works which intercept the current ground surface. The primary contamination management issues are in relation to:

- asbestos in soil and buildings;
- waste oil petroleum hydrocarbon impacts in groundwater at depth within a small portion of the site (refer to Figure 3); and
- uncontrolled fill beneath site buildings and other structures (refer to Figure 3 and Figure 4).

5.1 Asbestos across site

The building on 148 Denison Street is partly constructed with asbestos containing materials (ACMs). It is likely that the building to the north east of the site also contain ACMs, but these buildings are beyond the scope of the site audit conducted and a regulatory framework is already in place with respect to asbestos in buildings.

Asbestos was identified in various areas across the site during the previous assessment and remedial works. Asbestos impacted soil was reportedly placed in an 'entombment' area as shown on Figure 3. This area includes the screenings from the previous remedial works, which are described as "potentially asbestos impacted fill". The screening involved raking and "emu-bobing", and the potential asbestos in the resultant fill could include bonded asbestos-containing material (ACM), fibrous asbestos (FA), and asbestos fines (AF), (NEPM 2013). It is therefore likely that ACMs, and potentially free fibres are present however in soils across the site based on observations as well as in the entombment area.

Asbestos is classified as a hazardous material that poses a risk to human health by inhalation if the asbestos fibres become airborne and people are exposed to these airborne fibres (enHealth 2005). Asbestos is a known carcinogen and exposure over long periods of time to asbestos fibres is known to cause mesothelioma, asbestosis and lung cancer.

5.2 Analytical results summary

Soil and groundwater impacts remain at depth associated with the former storage of waste oil, in the area shown on Figure 3. These impacts are limited to depths beyond 5 m. Primary contaminants are polycyclic aromatic hydrocarbons (PAHs), and total petroleum hydrocarbons (TPHs) comprising of the following:

- TPHs C_{10}-C_{36};
- benzo(a)anthracene;
- benzo(a)pyrene;
- benzo(b)&(k)fluoroanthene;
- chrysene;
- naphthalene; and
- phenathrene.

A number of PAHs, particularly benzo(a)pyrene and naphthalene are either known or suspected carcinogens by inhalation, ingestion or direct contact.

Summary tables of the soil analytical results from the site audit report compiled by Environ in both 2006 and 2008 and groundwater from Cavvanba, 2010 are presented below in Tables 5.1 and 5.2.

Table 5.1: Soil assessment summary

Analyte	No. of samples analysed	Detections	Maximum
Asbestos	16	0	nd
Arsenic	136	46	3
Cadmium	136	49	8
Total Chromium	136	118	700
Copper	136	91	120
Lead	136	101	200
Nickel	136	99	780
Zinc	136	128	1,430
Mercury (inorganic)	136	53	0.39
PCBs	6	0	nd
OCPs	14	0	nd
OPPs	13	0	nd
TPH (C6-C9)	77	0	nd
TPH (C10-C36)	77	3	210
BTEX	77	0	nd
Total PAHs	92	9	10
Benzo(a)pyrene	92	2	1
SVOCs	15	0	nd

Table 5.2: Groundwater assessment summary – Cavvanba, 2010

Analyte	No. of samples analysed	Detections	Maximum
Benzene	6	0	nd
Toluene	6	0	nd
Ethyl benzene	6	0	nd
Meta-& para-Xylenes	6	0	nd
Ortho-Xylenes	6	0	nd
TPH (C6-C9)	6	0	nd
TPH (C10-C36)	6	6	7,550
Total PAHs	4	4	23.8
Benzo(a)pyrene	6	0	nd
VOCs	4	0	nd

5.3 Uncontrolled fill

There is potential for uncontrolled fill material to be present beneath built structures, particularly:

- within the identified vehicular ramps fronting 148 Denison Street; and
- beneath concrete slabs, buildings or behind retaining walls and the like.

Based on the conditions encountered across other areas of the site, it is also expected building wastes will be encountered, which may include ACMs along with other contaminants normally associated with fill material such as PAHs and heavy metals.

5.4 Unexpected finds

Along with the potential sources of contamination listed previously in this section, there remains the potential for unexpected finds to be encountered. Appendix C details an example of an unexpected finds protocol which should be incorporated into the environmental and WHS systems of work.

5.5 Human health exposure pathways

Potential human health exposure pathways related to the above mentioned contamination issues are:

- inhalation of asbestos fibres; and/or
- odours associated with the petroleum hydrocarbons; and/or
- dermal (skin) contact with impacted soil or groundwater; and/or
- ingestion of contaminants.

Table 5.3 below summarises the potential contaminants of concern specific to petroleum hydrocarbon sources.

Table 5.3: Contaminants of concern, petroleum sources

Chemical Name	Odour Threshold	TWA [1, 3]	STEL [2, 3]
Petrol (gasoline)	-	900 mg/m^3	-
Benzene	8.7 mg/m^3 [4]	1 ppm 3.2 mg/m^3	- -
Toluene	0.64 mg/m^3 [4]	50 ppm 191 mg/m^3	150 ppm 574 mg/m^3
Ethyl benzene	0.74 mg/m^3 [4]	100 ppm 434 mg/m^3	125 ppm 543 mg/m^3
Xylenes	0.18 mg/m^3 [4]	80 ppm 350 mg/m^3	150 ppm 655 mg/m^3
Hexane (n-hexane)	5.3 mg/m^3 [4]	20 ppm 72 mg/m^3	- -
Hexane (other isomers)		500 ppm 1,760 mg/m^3	1,000 ppm 3,500 mg/m^3
Naphthalene	0.44 mg/m^3 [4]	10 ppm 52 mg/m^3	15 ppm 79 mg/m^3

Notes:

1. TWA = 8 hour time weighted average. The average airborne concentration of a particular substance when calculated over an eight-hour working day, for a five-day working week.
2. STEL = short term exposure limit. This is the airborne concentration of a particular substance calculated as a time-weighted average over 15 minutes.
3. Safe Work Australia (December 2011) *Workplace Exposure Standards for Airborne Contaminants*.

4. Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) (September 2012) *Petroleum Vapour Intrusion (PVI) Guidance*, from various sources.

6.0 Integration and inductions

6.1 Integration of EMP

Any PCBU conducting works at the site and the site owner/occupier are responsible for ensuring the requirements of this EMP are integrated into the respective environmental and WHS systems of work. Where required, it should include:

- training of workers in the hazards posed by the contaminants;
- methods of work which minimise disturbance and exposure, including SOPs and SWMSs;
- use of contaminant control zones and decontamination procedures;
- suitable hygiene procedures, e.g. washing hands before eating, drinking, smoking, removing soil from clothes and skin as soon as possible, and the like; and
- development of an unexpected findings protocol (UFP), such that documented procedures and contingencies are established for subsurface finds which, although 'unexpected', can commonly occur during excavation and site works.

As asbestos in building and soils have been identified, the works must be conducted in accordance with the relevant WHS legislation and the Safe Work Australia code of practice and associated guidelines.

Appendix C contains contaminated land procedures, including copies of contaminant control zone, decontamination and unexpected findings protocols which should be integrated into the systems of work.

The owner/occupier of the site should also ensure that a system is in place to identify works which require management and integration of this EMP. The following list of typical personnel should be aware of and conduct their work in accordance with this EMP:

- all contractors working on the site during the demolition, construction and redevelopment works;
- principle contactor/site foreman/project manager;
- maintenance workers and any works associated with underground services;
- consultants conducting intrusive investigations;
- works which are to breach the concrete present on the site which acts as a cap; and
- any other person who may be directly or indirectly involved in works which may disturb or contact the soil or groundwater at the site, including designers.

It is not intended to require additional controls of day to day operation and maintenance such as retail activities, and garden maintenance such as mowing, trimming, and minor landscaping works.

6.2 Induction

Inducting individuals prior to their work ensures that they are aware of the contamination that remains on the site. An induction should provide the individual with information regarding the site's management systems, the site's conditions and their individual responsibilities, including how to enact their responsibilities.

7.0 Measurement, evaluation and review

This EMP is not intended to be a static document. It is a working document that requires review and amendment during the life of the project. Making changes to the EMP is an important aspect of improving the project's environmental management and is the responsibility of the site owner/occupier. This section details the audit and review process that should be undertaken.

External organisations relying on this EMP should keep records of their management and findings. It is recommended that they provide this information to the site owner, to allow effective updating of this EMP.

7.1 EMP review

This EMP should be reviewed:
- during future redevelopment (beyond the current proposed Bunnings warehouse development);
- when there is a change in the scope of the project;
- when roles or responsibilities are changed/require updating;
- following significant environmental incidents;
- where it is highlighted that a particular activity/action is not effective and requires review;
- when there is a need to improve performance in an area of environmental impact;
- where surplus land is divested; and
- at the completion of any environmental audits.

The review process should include looking at the environmental controls, monitoring and procedures in use to make sure they remain effective. Any changes to the EMP should be documented, and the original EMP, and subsequent versions should be kept for project records.

The EMP should be reviewed annually by the site owner as a minimum.

7.2 Record keeping

The site owner is to keep records associated with the distribution and use of this EMP, including;
- the details of the organisation that conducted the works which affect this EMP;
- the date and form of provision of the EMP; and
- any plans, reports and actions resulting from the works in relation to this EMP.

The site owner is ultimately responsible for assigning and documenting individual responsibilities for implementing the environmental controls as discussed in this EMP.

7.3 Modification of the EMP

Any proposed modifications to this EMP should be conducted to the satisfaction of the site owner.

8.0 Management of contaminants

8.1 Timeframe for EMP

The EMP will apply indefinitely, or until further information is available to demonstrate that the risks are no longer present.

8.2 Activities

8.2.1 Demolition activities

The demolition of buildings constructed of ACMs may give rise to the exposure pathways. The movement of plant and equipment, and removal of concrete slabs also has the potential to expose uncontrolled fill, and disturb asbestos contaminated soil.

8.2.2 Construction activities

The construction activities which may give rise to the exposure pathways are most likely to be:
- piling and excavation;
- earthworks, such as re-contouring; and
- general plant/equipment movements across the site.

8.2.3 Operational activities

The activities which may give rise to the exposure pathways are most likely to be maintenance work which breaks through either the concrete cap across the majority of the site, or through the marker layer and clean fill around underground services and garden areas. It is not intended to require additional controls of day to day operation and maintenance such as retail activities, and garden maintenance such as mowing, trimming, and minor landscaping works.

8.2.4 Works which breach the concrete cap

Works at the site following completion of construction works which breach the concrete cap will need to be controlled using the methods detailed in Tables 8.1 – 8.4.

8.2.5 Future redevelopment

In addition, future development applications or planning consents which are sought for the site will require review to ensure that the requirements of this EMP are reviewed and incorporated into any consent conditions, including any appropriate updates and modifications prior to submission to the relevant authorities.

8.3 Surplus land

The 0.25 ha area comprising Lot 1 DP18290 Lot A DP345700 and Lot 4 DP 373787 will not require ongoing environmental management controls if the following can be demonstrated during the demolition phase of the redevelopment:

- No changes to landuse have occurred, and/or no potentially contaminating activities have been undertaken on the land since the certification.

- No unexpected finds occur in during demolition works, or occur in adjacent areas which have the potential to impact the area.

- Any unexpected finds which do occur are appropriately addressed by the contaminated land management process.

Other areas of the site which become surplus will be subject to the provisions of this EMP, unless additional investigation, remediation and validation or management is conducted to demonstrate site suitability for the end land use.

8.4 Environmental management controls

The recommended environmental management controls for the above mentioned activities are described in Tables 8.1 to 8.4. These are provided only as a guide, as it is recognised that activities conducted during works can vary considerably. Therefore, it is the responsibility of each PCBU to determine the suitability of these controls in regard to their proposed works and systems of work.

Table 8.1: Demolition Stage - Environmental management controls

Control	Person Responsible
Information management	
Ensure PCBUs are aware of the EMP, and understand how the contamination issues impact their work, and incorporate into their systems of work.	Site owner/occupier
Asbestos management	
Ensure all demolition work associated with asbestos is undertaken by a licensed contractor, with development of documentation in accordance with *Work Health and Safety Regulation 2011*. This should include provisions for personal protective equipment (PPE), and air monitoring, which is expected to comprise part of the licence and conditions obtained from WorkCover for the removal of asbestos.	Demolition contractor
Soil and water management	
Develop a soil and water management plan in accordance with *Landcom*, The Blue Book (2004) to provide guidance during demolition and construction stages with respect to movement, stockpiling, classification and disposal of soils. This document will also assist with the management of uncontrolled fill, if found during demolition works. Consideration should be included in the plan of methods to minimise the potential for exacerbating exposure of asbestos in soils.	Designers and project managers of work and person conducting work (PCBU)

Table 8.2: Construction Stage – Environmental management controls

Control	Person Responsible
Information management	
Ensure PCBU are aware of the EMP, understand how the contamination issues impact their work, and incorporate into their systems of work.	Site owner/occupier
Asbestos management	
Develop an asbestos management plan in accordance with *Landcom*, The Blue Book (2004) by a suitably qualified person, that will provide for the following: – appropriate licensing and training for workers;	Designers and project managers of work and PCBU

Control	Person Responsible
Asbestos management	
– minimal disturbance of potentially contaminated soil; – soil tracking; – daily emu-bobs to remove all visible ACMs; – dust suppression to minimise wind borne asbestos fibres; – air monitoring at project boundaries at sufficient intervals to demonstrate effectiveness of dust controls, as determined by a competent person; – an appropriate level of PPE; – appropriate disposal of contaminated material, including PPE; and – management of overburden.	Designers and project managers of work and PCBU
Soil management	
Develop a construction environmental management plan in accordance with *Landcom*, The Blue Book (2004). Earthworks shall be carried out with all due care, to ensure that the following conditions are complied with, as far as practicable: – no stockpiles of soil or other materials shall be placed on footpaths or nature strips unless prior Council approval has been obtained; – all stockpiles of soil or other material shall be placed away from water bodies, drainage lines, gutters or stormwater pits or inlets, riparian land and native vegetation and appropriate erosion, sediment and leachate management controls installed; – if practical, all stockpiles of soil or other materials likely to generate dust or odours shall be covered and no wind-borne dust is to leave the confines of the site; – if practical, all stockpiles of contaminated soil shall be stored in a secure area and be covered if remaining more than 24 hours; – no water containing any suspended matter or contaminants is to be allowed to leave the confines of the site in such a matter that it could pollute any nearby waterway; and – material from known areas of contamination must not be tracked onto other areas of the site by personnel or equipment.	Designers and project managers of work and PCBU
Marker Layer Placement	
Ensure landscaped areas (i.e. areas not covered in concrete or permanent hardstand) have a geofabric marker layer between the underlying existing surface, and any imported material which will be a minimum thickness of 0.5 m and consist of VENM or ENM. Ensure an accurate plan of location and description of the marker layer is provided to the site owner and operator for inclusion in this EMP.	Site owner/occupier
Service Trenches	
Pre-excavate service trenches, installation of a geofabric marker layer to define the boundary between pre-existing soils and newly placed VENM. Ensure an accurate plan and description of service trenches and marker layer placement is provided to the site owner and operator for inclusion in this EMP.	Site owner/occupier
Waste oil management area	
Control works within the waste oil contamination area so that any material generated during excavations or piling from depths greater than 2 m is assessed for potential contamination, and managed appropriately. This should include provisions for assessment if the material is to be re-used on-site in line with *National Environment Protection (Assessment of Site Contamination) Measure (NEPM) 2013*, or classification if the material is to	Construction contractor

Control	Person Responsible
Waste oil management area	
be disposed off-site. Further information on soil disposal is included further Table 8.1 (Waste Management).	Construction contractor
Odour and vapour management	
Be aware that the potential exists for the build-up of hydrocarbon odours and/or vapours within service pits, service trenches and pipes, excavations, test-pits, and the like. These should be ventilated prior to accessing, and the need for atmospheric monitoring and personal protective equipment (PPE) should be assessed for hydrocarbon odours and/or vapours. Development of a hydrocarbon odour and vapour management plan, by a suitably qualified person, may be required and should include, amongst others, the following: – development of atmospheric monitoring program during works, including appropriate exposure limits, including measuring with a lower explosive limit (LEL) meter, multi-gas meter (O_2, CO_2, CH_4, etc.) and photo-ionisation detector (PID); – minimising open excavations as well as minimising extent of stockpiles of impacted soil; – covering stockpiles of soil with industrial plastic or clean soil to minimise the generation of odours and vapours, and consider the use of commercial odour suppressants; and – if odours and/or vapours exceed exposure limits, works should cease and control measures for emissions of odours and vapour should be reviewed and amended as necessary. No odours shall be detected at any boundary of the site during works by an authorised Council Officer relying solely on sense of smell. The following procedures may be employed to comply with this requirement: – use of appropriate covering techniques such as the use of plastic sheeting to cover excavation faces or stockpiles; – use of fine mist sprays and hydrocarbon mitigating agent on the impacted areas/materials; and – adequate maintenance of equipment and machinery to minimise exhaust emissions.	Designers and project managers of work and PCBU

Table 8.3: Operational Stage – Environmental management controls

Control	Person Responsible
Information management	
Ensure PCBU working within the following areas, understand how the contamination issues impact their work and develop systems of work to make provisions for asbestos in soil; – works beyond 0.5 m depth in the areas managed with the marker layer; – service trenches; and – excavation beneath the permanent hardstand.	Site owner/occupier
Service Trenches	
Ensure an accurate plan of location and description of marker layer is available, and incorporated into the operational management system of the site.	Site owner/occupier

Table 8.4: General – Environmental management controls

Control	Person Responsible
Personal protective equipment (PPE)	
As with all site works, PPE is recommended, potentially including long shirt sleeves, long pants, safety toe fully enclosed footwear, hard hats, high visibility clothing, safety glasses, hearing protection, gloves, sun protection, etc. Depending on the results of the atmospheric monitoring, respiratory protection may be required, including air purifying cartridges for volatile organic compounds (VOCs) and/or dust or asbestos. Air purifying respirators or higher levels of respiratory protection should not be used unless appropriate training has been conducted.	Designers and project managers of work PCBU
Establishment of contaminant control zones (CCZ)	
The objective of contaminant control zones (CCZs) is to minimise the potential for exposure of people outside of the work area to contaminants, and to prevent the off-site transport of contaminants. Security measures and physical barriers (marker tape and bollards, mesh fencing, security fencing, signs, control points, etc.) are to be installed to exclude unauthorised people and equipment from the controlled areas. Further procedural information regarding CCZs is included in Appendix D. Work zones to be established which consist of three continuous zones: *exclusion zone*, *contaminant reduction zone* and *support zone*. The *exclusion zone* is the area where the works are to be conducted, including stockpiling, truck loading and lay-down areas. The number of personnel and equipment in the exclusion zone should be kept to a minimum. *The contaminant reduction zone* is the area where personnel put on and take off PPE, and where personnel and plant and equipment are decontaminated when exiting the work area. This zone serves as a buffer to reduce the possibility of contaminants being transferred from the exclusion zone to the support zone or offsite. Truck washes if required are to be located within the contaminant reduction zone. The *support zone* includes all other parts of the site where contaminant controls are not required. Potentially contaminated clothing, tools, plant, equipment or vehicles are not to be permitted in this zone or offsite until appropriate decontamination has been conducted.	Designers and project managers of work and PCBU
Decontamination of personnel and plant and equipment	
Decontamination of personnel and plant and equipment is required to minimise workers' exposure to potential contaminants and to prevent the off-site transport of contaminants. Personnel decontamination should be conducted before breaks, at the end of the work day or before leaving the contaminant reduction zone for any reason. It is important to note that dermal contact, ingestion and inhalation are the main exposure pathways for contaminants, and decontamination should be conducted before any hand-to-mouth behaviour, e.g. eating, drinking, smoking, and the like.	Designers and project managers of work and PCBU

Control	Person Responsible
Decontamination of personnel and plant and equipment	
All plant or equipment which comes into contact with potentially contaminated soil or water is to be decontaminated prior to leaving the contaminant reduction zone. The decontamination area should be established before commencing works and should include plastic sheeting, grated boot wash, tubs of clean water with detergent, tubs of clean rinse water, soap, scrubbing brush, towels, etc. and lined garbage containers. For larger-scale work, a truck wash and stabilised access may need to be established.	Designers and project managers of work and PCBU
Waste management	
Any soil or groundwater to be removed should be appropriately managed, both through the establishment of appropriate erosion and sediment and water management controls (see Landcom (2004) *Managing Urban Stormwater: Soils and Construction*), and through the appropriate classification and disposal of any wastes generated (see Department of Environment, Climate Change and Water NSW (DECCW) (2009) *Waste Classification Guidelines Part 1: Classifying Waste*). The waste hierarchy of avoid, reduce, re-use, recycle, dispose should generally be adopted. Any material to be removed off-site is classified as a waste under the POEO Act, and needs to be appropriately classified and managed in accordance with the requirements of the POEO Act. Where works are proposed which may generate impacted soil and/or water, a management plan should be developed, including a sampling, analysis and quality plan (SAQP), which should specify the minimum technical requirements for persons conducting sampling. Depending on the material to be removed/disposed, appropriate approvals may be required from the EPA, Council or the water authority. Waste removed should be transported by a suitably licensed waste transporter to a suitably licensed waste facility, and waste tracking should be undertaken for all waste removed.	Designers and project managers of work and PCBU
Unexpected findings protocol	
For all site works, an unexpected findings protocol (UFP) should be developed, which includes the identification of potential contaminants and a process to manage each find. This should include such aspects as: – stop work in the immediate area; – notification of supervisors/site managers immediately; – establishing the required controls (these may include barricading, fencing, warning signs, covering odorous/volatile materials and asbestos, etc., avoiding leaving materials exposed on the surface, and including erosion and sediment controls as appropriate); – document the material's characteristics, e.g. location, extent, odours, appearance, etc., and details of the actions undertaken; – report the finding to the site owner, council, WorkCover, environment regulator (EPA) as required; – contact appropriately qualified environmental staff/consultant with a description of the material; and – UFP materials should not be removed or spread across the site without confirmation from the environmental consultant or emergency services as required. UFPs should be integrated with any site specific emergency response plan.	Designers and project managers of work and PCBU

Control	Person Responsible
Unexpected findings protocol	
If the unexpected findings present an imminent or immediate hazard, then the emergency response plan is to take precedence over the UFP. An example of a UFP is included in Appendix D.	

8.5 Reporting

Organisations conducting works on-site should keep records of soil excavated, reused or disposed, as well as waste classification certificates and waste disposal dockets, significant environmental incidents, and any environmental data collected as part of their work. This information should be conveyed to the site owner/operator for their records and for action, as well as for reviewing the effectiveness of the EMP.

The site owner/occupier should record any information provided, and along with environmental information, use this to determine any additional actions required, and as inputs to the EMP review discussed in Section 6.1.

Should additional requirements be necessary associated with the nature of the contamination, discussions should be held with the site owner/operator.

9.0 References

Consultant reports

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Figures

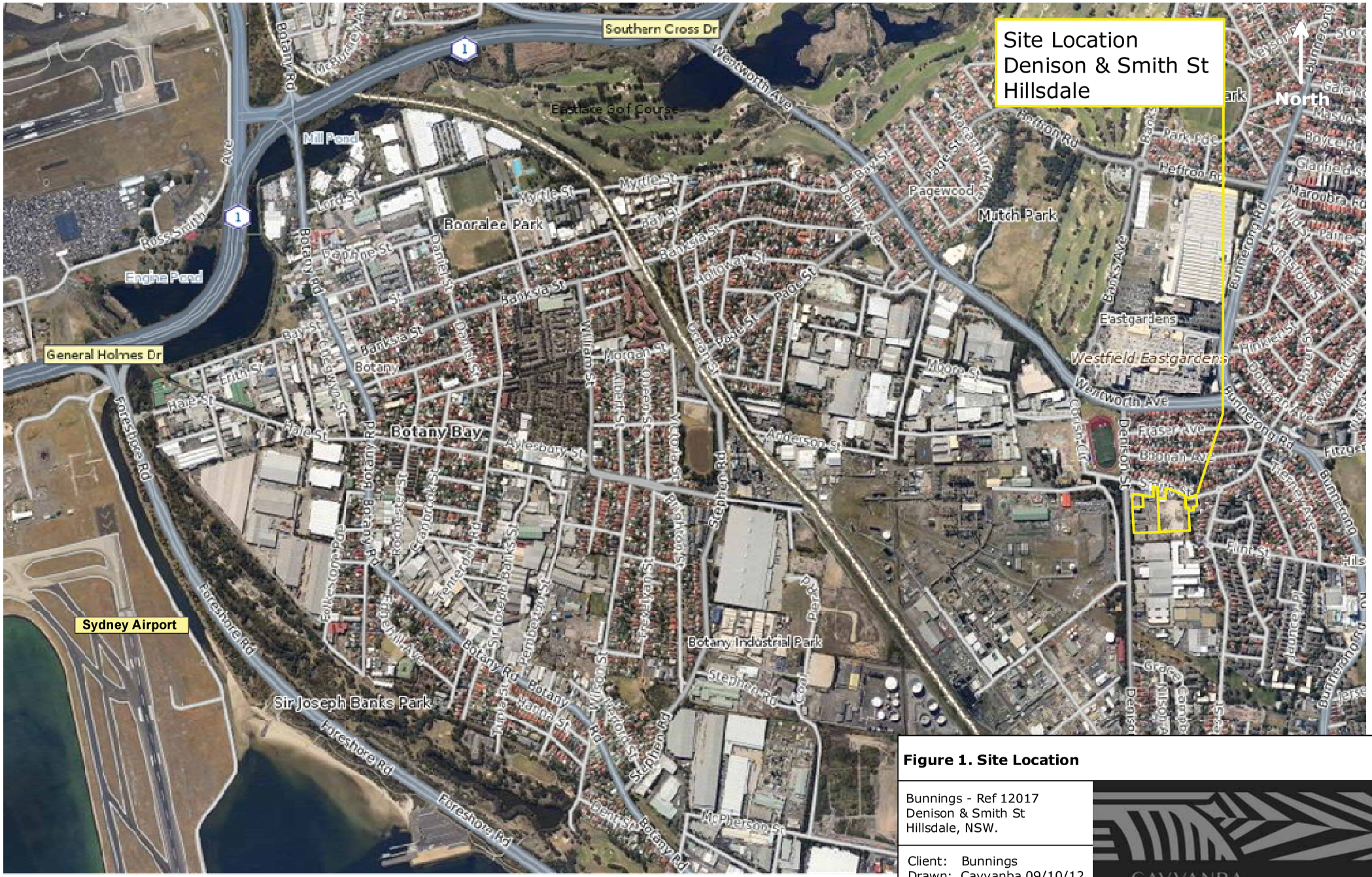


Figure 1. Site Location

Bunnings - Ref 12017
Denison & Smith St
Hillsdale, NSW.

Client: Bunnings
Drawn: Cavvanba 09/10/12
Source: SIX

CAVVANBA consulting

Figure 2. Site identification and property descriptions

Bunnings - Ref 12017
Denison & Smith St
Hillsdale, NSW.

Client: Bunnings
Drawn: Cavvanba 09/10/12
Source: Landpartners/SIX

CAVVANBA consulting

= Site boundary

Figure 3. Site layout and features

Bunnings - Ref 12017
Denison & Smith St
Hillsdale, NSW.

Client: Bunnings
Drawn: Cavvanba 1/02/13
Source: NSW Gov SIX

CAVVANBA consulting

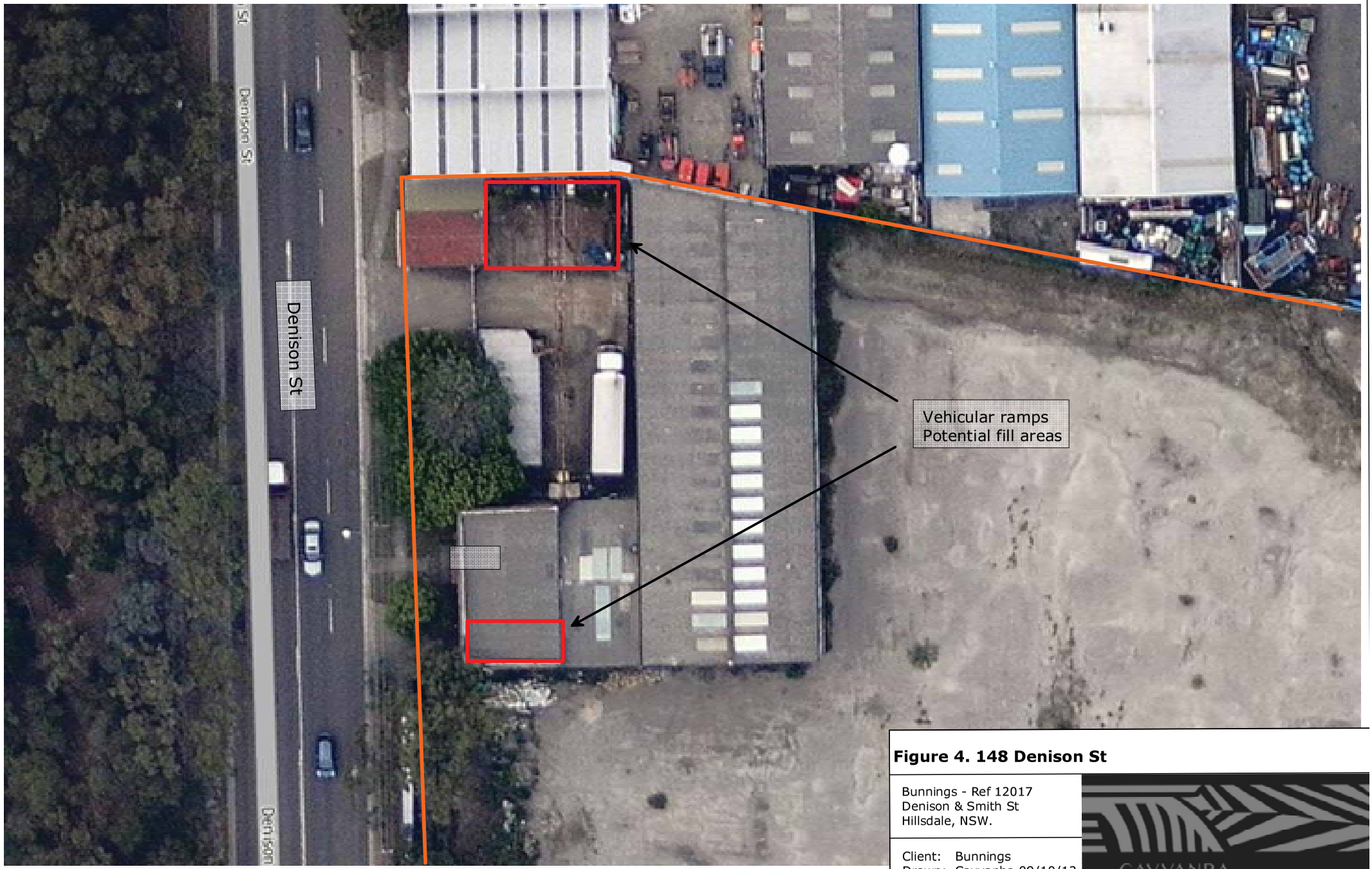


Figure 4. 148 Denison St

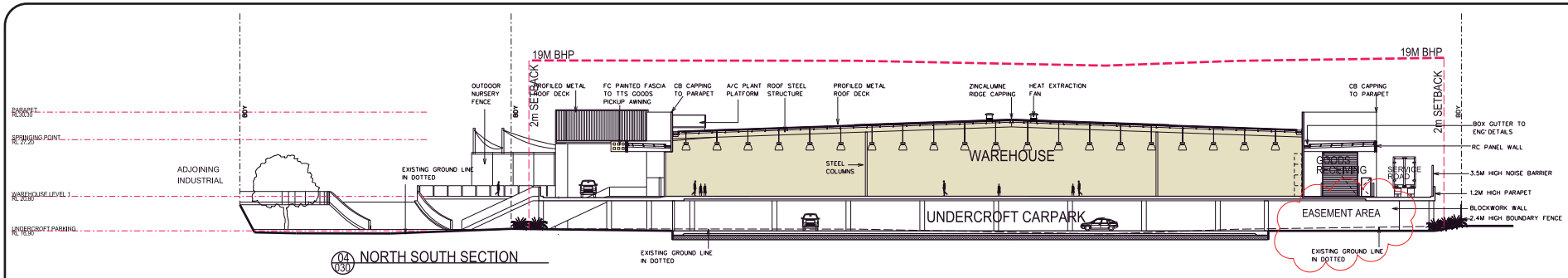
Bunnings - Ref 12017
Denison & Smith St
Hillsdale, NSW.

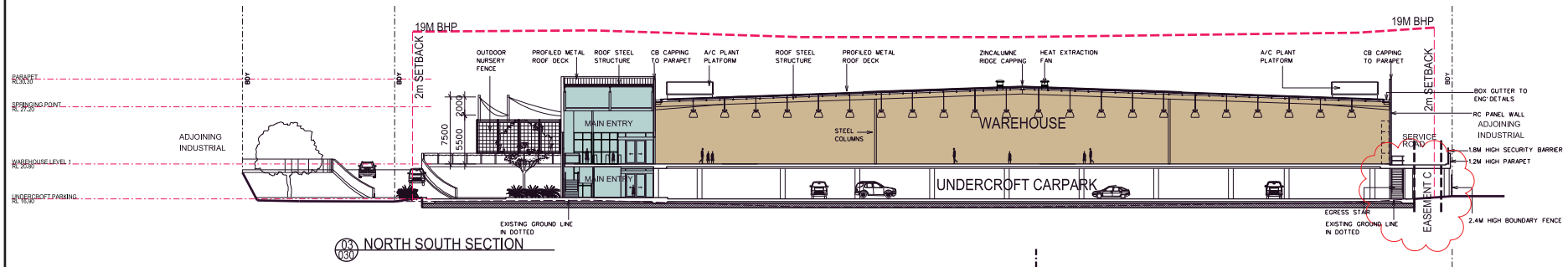
Client: Bunnings
Drawn: Cavvanba 09/10/12
Source: SIX/ERM

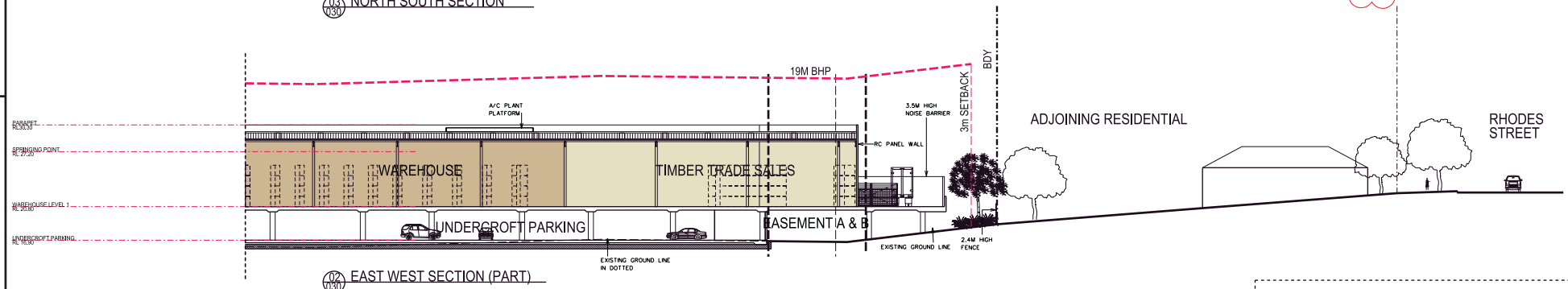
CAVVANBA consulting

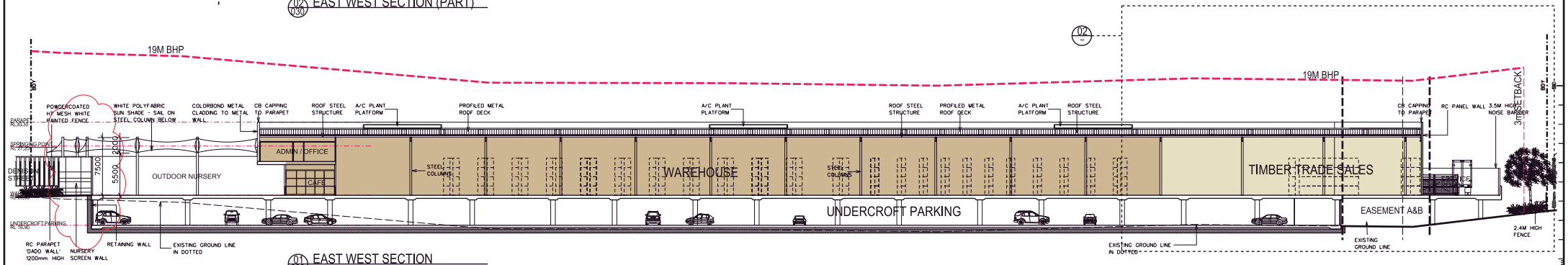
Appendix A

Draft site plans (John R Brogan & Associates) 16 October 2012









NOT FOR CONSTRUCTION

NO.	AMENDMENT	DATE	NO.	AMENDMENT	DATE
A	URBAN DESIGN PANEL ISSUE	23.09.11			
B	DA ISSUE	26.10.11			
C	DA AMENDMENT ISSUE	10.05.12			

CLIENT
BUNNINGS warehouse

JOHN R. BROGAN & ASSOCIATES
PTY. LIMITED
ARCHITECTS, PLANNERS & COMMERCIAL INTERIOR DESIGNERS
EST · 1927
37 PITT ST, SYDNEY NSW 2000
PH: (02) 9 221 2833 FAX: (02) 9 251 4741
EMAIL: jrb@brogans.com.au
A.B.N. 93 003 284 759

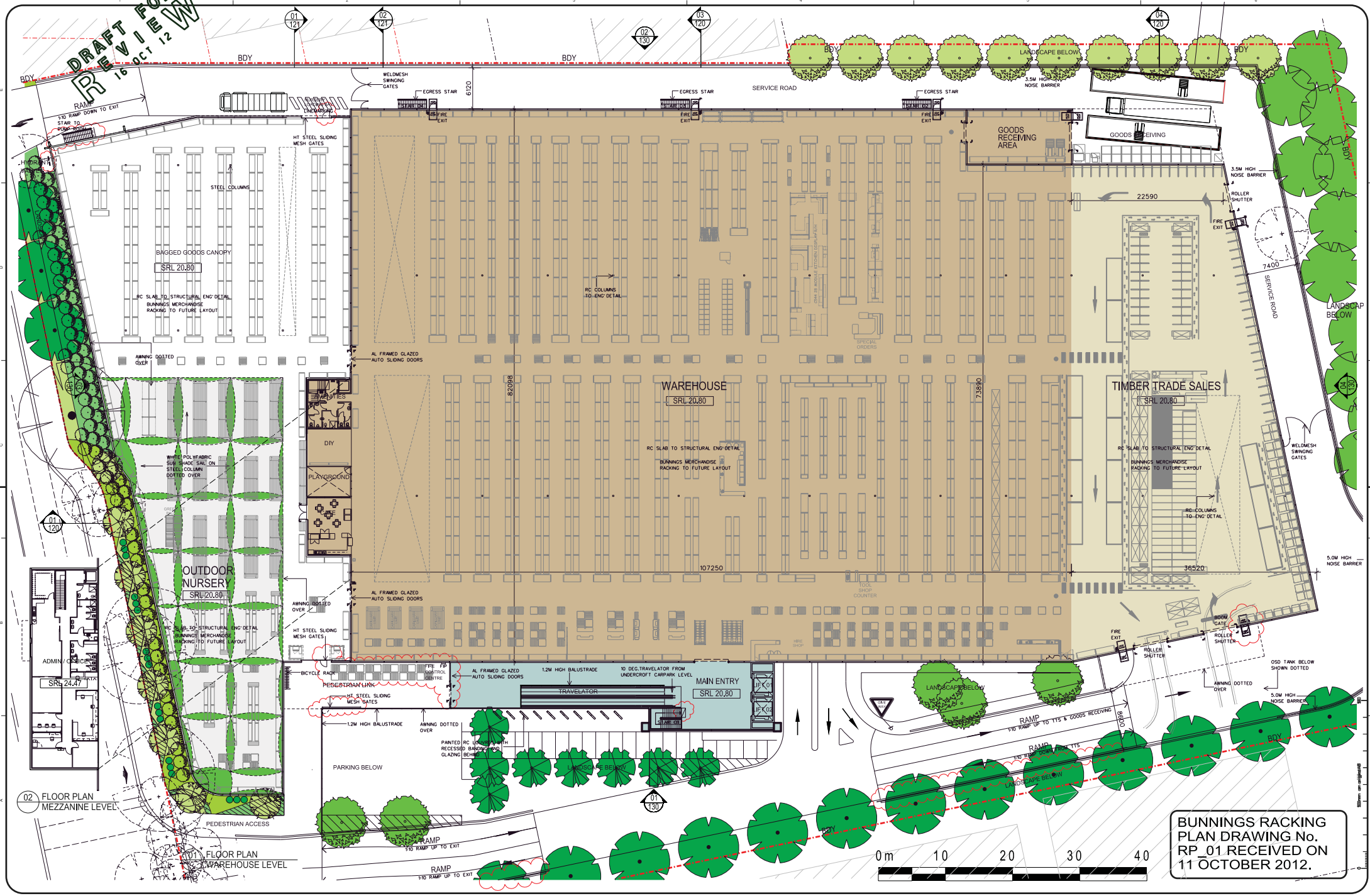
PROPOSED
BUNNINGS WAREHOUSE EAST GARDENS
DENISON ST & SMITH ST
HILLSDALE NSW 2036

SECTIONS 1/2

SCALE : 1:250
DATE : JAN 10

PROJ. NO. 1218
DRG. NO. 120
AMD NO. C

CAD REF : PROPOSED BUNNINGS WAREHOUSE HILLSDALE N.S.W. 1218 - PLOTTED 5/06/2012
Microstation V8i SS2



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A	DA DESIGN PANEL ISSUE	23.09.11
B	DA ISSUE	28.10.11
C	DA AMENDMENT ISSUE	22.11.11
D	DA AMENDMENT ISSUE	10.05.12
E	FIRE HYDRANTS/PUMPRM STAIR	09.10.12

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BUNNINGS warehouse

JOHN R. BROGAN & ASSOCIATES
PTY. LIMITED
ARCHITECTS, PLANNERS & COMMERCIAL INTERIOR DESIGNERS
EST · 1927
37 PITT ST. SYDNEY NSW 2000
PH: (02) 9 221 2833 FAX: (02) 9 251 4741
EMAIL: jrb@brogans.com.au
A.B.N. 93 003 284 759

PROPOSED
BUNNINGS WAREHOUSE EAST GARDENS
DENISON ST & SMITH ST
HILLSDALE NSW 2036

FLOOR PLAN
WAREHOUSE LEVEL

SCALE : 1:250
DATE : JAN 10

PROJ. NO. 1218
DRG. NO. 101
AMD NO. E

CAD REF : PROPOSED BUNNINGS WAREHOUSE HILLSDALE N.S.W. 1218 - PLOTTED 10/15/2012 Microstation V8i SS2

NO.	AMENDMENT	DATE
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B	DA ISSUE	28.10.11
C	DA AMENDMENT ISSUE	10.05.12
D	FIRE PUMP ROOM	09.10.12

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JOHN R. BROGAN & ASSOCIATES
PTY. LIMITED
ARCHITECTS, PLANNERS & COMMERCIAL INTERIOR DESIGNERS
EST · 1927
37 PITT ST, SYDNEY NSW 2000
PH: (02) 9 221 2833 FAX: (02) 9 251 4741
EMAIL: jrb@brogans.com.au
A.B.N. 93 003 284 759

PROPOSED
BUNNINGS WAREHOUSE EAST GARDENS
DENISON ST & SMITH ST
HILLSDALE NSW 2036

FLOOR PLAN
UNDERCROFT CARPARK LEVEL

SCALE : 1:250
DATE : JAN 10

PROJ. NO. 1218
DRG. NO. 100
AMD NO. D

CAD REF: Microstation V8i SS2 PROPOSED BUNNINGS WAREHOUSE HILLSDALE N.S.W. 1218 - PLOTTED 10/16/2012

NO.	AMENDMENT	DATE	NO.	AMENDMENT	DATE
A	URBAN DESIGN PANEL ISSUE	23.09.11			
B	DA ISSUE	26.10.11			
C	DA AMENDMENT ISSUE	10.05.12			

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BUNNINGS warehouse

JOHN R. BROGAN & ASSOCIATES
PTY. LIMITED
ARCHITECTS, PLANNERS & COMMERCIAL INTERIOR DESIGNERS
EST · 1927
37 PITT ST, SYDNEY NSW 2000
PH: (02) 9 221 2833 FAX: (02) 9 251 4741
EMAIL: jrb@brogans.com.au
A.B.N. 93 003 284 759

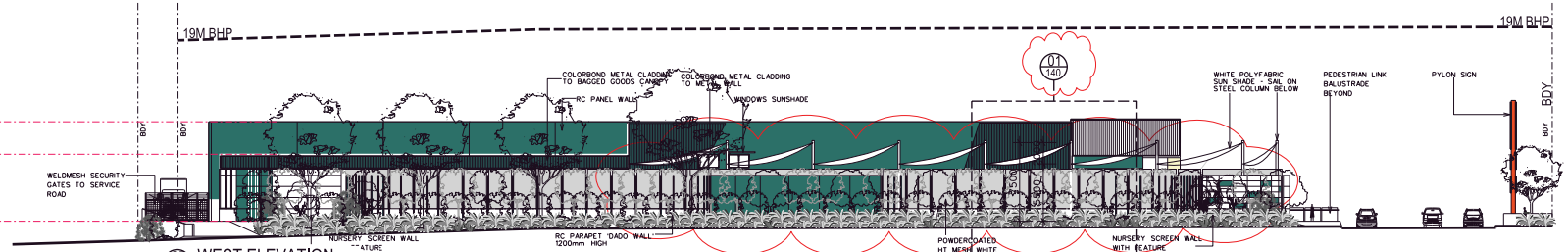
PROPOSED
BUNNINGS WAREHOUSE EAST GARDENS
DENISON ST & SMITH ST
HILLSDALE NSW 2036

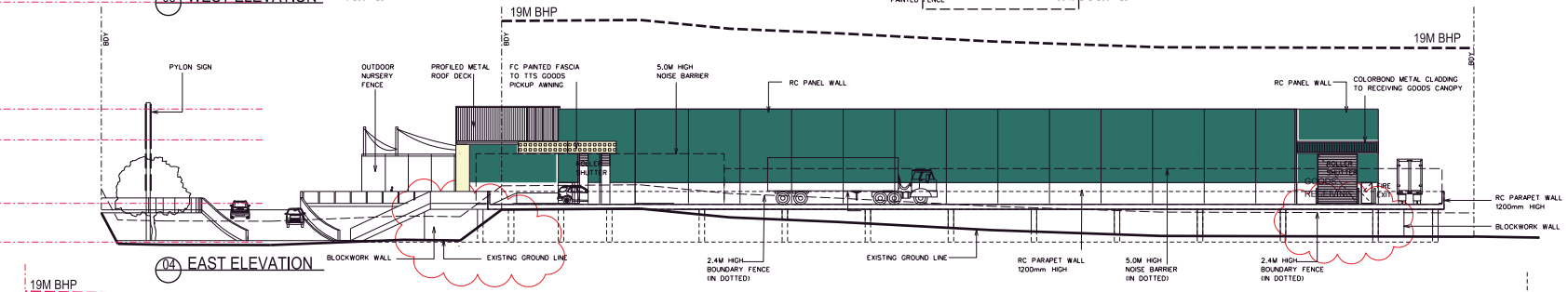
SITE PLAN / UNDERCROFT PARKING LEVEL

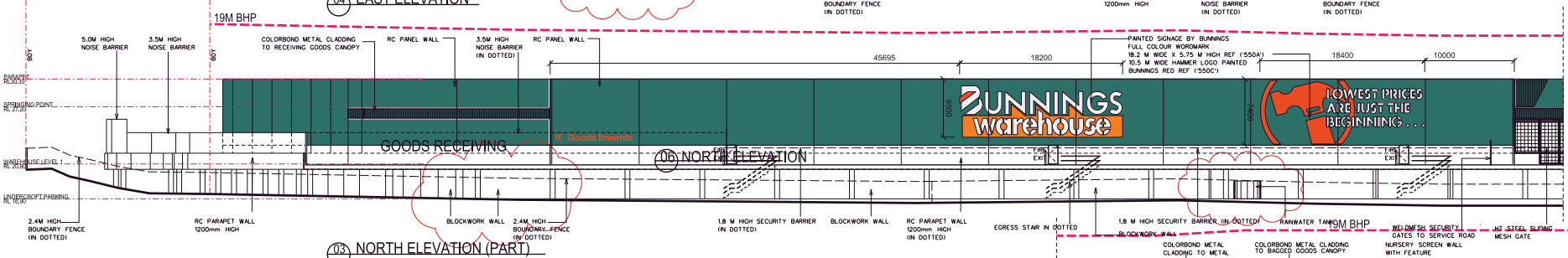
SCALE : 1:400
DATE : JAN 10

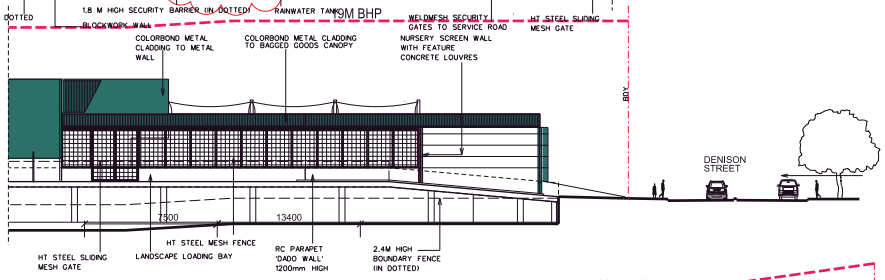
PROJ. NO. 1218
DRG. NO. 030
AMD NO. C

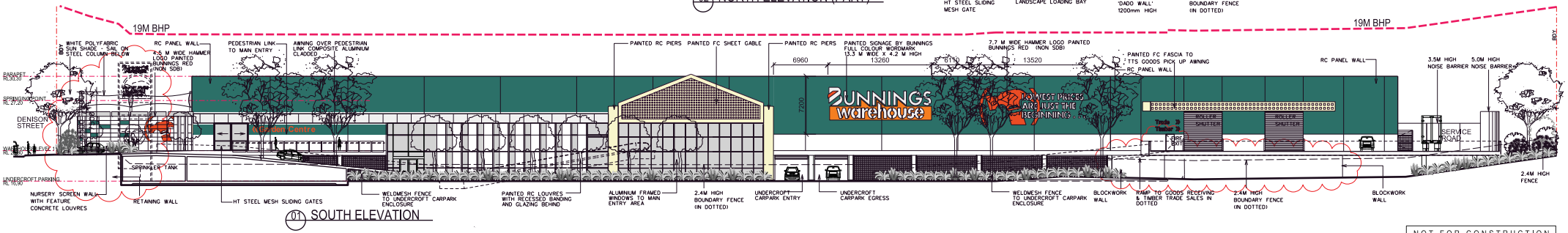
CAD REF : Workstation Vol1 SS2 PROPOSED BUNNINGS WAREHOUSE HILLSDALE N.S.W. 1218 - PLOTTED 5/06/2012











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B	DA ISSUE	26.10.11			
C	DA AMENDMENT ISSUE	10.05.12			

CLIENT
BUNNINGS warehouse

JOHN R. BROGAN & ASSOCIATES
PTY. LIMITED
ARCHITECTS, PLANNERS & COMMERCIAL INTERIOR DESIGNERS
EST · 1927
37 PITT ST. SYDNEY NSW 2000
PH: (02) 9 221 2833 FAX: (02) 9 251 4741
EMAIL: jrb@brogans.com.au
A.B.N. 93 003 284 759

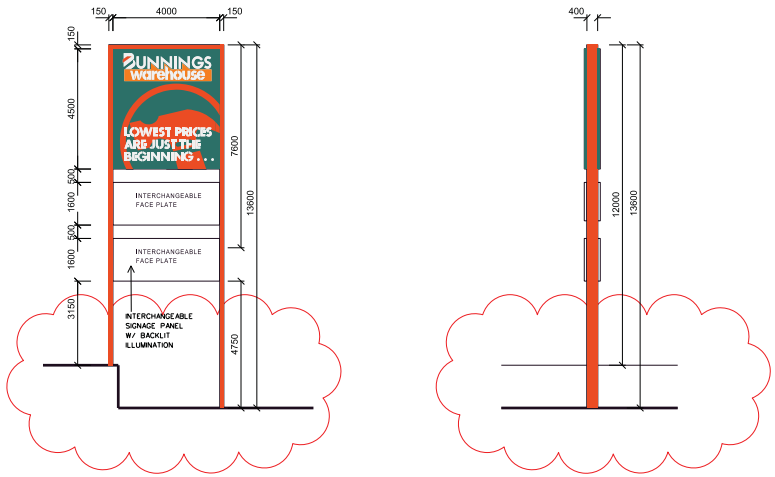
PROPOSED
BUNNINGS WAREHOUSE EAST GARDENS
DENISON ST & SMITH ST
HILLSDALE NSW 2036

ELEVATIONS

SCALE : 1:250
DATE : JAN 10

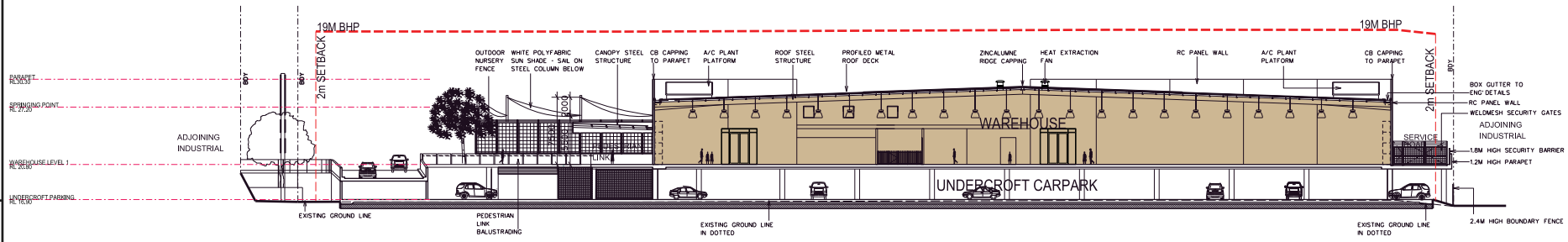
PROJ. NO. 1218
DRG. NO. 130
AMD NO. C

PROPOSED BUNNINGS WAREHOUSE HILLSDALE N.S.W. 1218 - PLOTTED 5/06/2012
CAD REF :
Microstation V8i SS2



03 PYLON SIGN FRONT ELEVATION
SCALE 1:100

04 PYLON SIGN SIDE ELEVATION
SCALE 1:100



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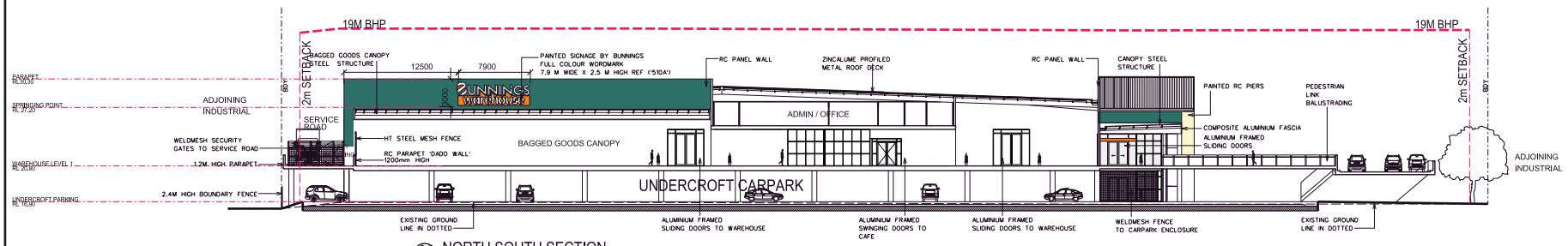

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B	DA ISSUE	28.10.11			
C	DA AMENDMENT ISSUE	10.05.12			

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JOHN R. BROGAN & ASSOCIATES
PTY. LIMITED
ARCHITECTS, PLANNERS & COMMERCIAL INTERIOR DESIGNERS
EST · 1927
37 PITT ST, SYDNEY NSW 2000
PH: (02) 9 221 2833 FAX: (02) 9 251 4741
EMAIL: jrb@brogans.com.au
A.B.N. 93 003 284 759

PROPOSED
BUNNINGS WAREHOUSE EAST GARDENS
DENISON ST & SMITH ST
HILLSDALE NSW 2036

SECTIONS 2/2

SCALE : 1:250
DATE : JAN 10

PROJ. NO. 1218
DRG. NO. 121
AMD NO. C

CAD REF : Microstation V8i SS2 PROPOSED BUNNINGS WAREHOUSE HILLSDALE N.S.W. 1218 - PLOTTED 5/06/2012

Appendix B

Environmental management plan requirements

Appendix B - Environmental Management Plan Requirements

Table 1 is modified from Appendix B, *Environmental Management Plan Review Checklist*, from CCC 2009. It includes a description of the requirement, where the requirement is included in this construction and operational EMP, and whether the requirement should be included in project specific EMPs developed by PCBUs conducting works on-site.

The information in Table 1 relates only to the objectives of this EMP, and the associated aspects and impacts. Users of this EMP should address all other aspects and impacts as they apply to their project.

Table 1: EMP requirements[1]

Requirement[2]	Included in this EMP	To be include in project specific EMPs
Does the EMP include:		
– a statement of objectives?	Included in Section 1. Provides the objectives in regard to the requirements of the aspects and impacts identified in this EMP only.	Yes. Organisations conducting works on-site should ensure that the objectives of this EMP are incorporated into their project specific EMP, along with other requirements as dictated by the environmental aspects and impacts relevant to their project.
– a listing of the environmental aspects, (with risks and opportunities) and significant related impacts with the activities involved?	Included in Section 5. Provides the environmental aspects and impacts relevant to the objectives of this EMP.	Yes. Organisations conducting works on-site should ensure that the environmental aspects and impacts of their project and activities are appropriately identified, including but not limited to the ones identified in this EMP.
Do the environmental aspects and impacts listed include:		
– specific undertakings and conditions arising from impact assessment, development consent, approvals, permits, licences, contractual obligations, etc.?	Included in Section 3. Identifies the relevant regulatory issues and approval conditions relevant to the objectives of this EMP and the identified aspects and impacts.	Yes. Organisations conducting works on-site should ensure that the relevant regulatory issues and approval conditions identified are included in their aspects and impacts list. In addition, other regulatory issues and approval conditions related to other aspects and impacts of the proposed works should also be included.

Requirement[2]	Included in this EMP	To be include in project specific EMPs
Do the environmental aspects and impacts listed include (continued):		
– environmental objectives, targets and measures (where practical) for the significant impacts, risk and opportunities?	Included in Section 8.	Yes. Organisations conducting works on-site should ensure that the environmental objectives, targets and measures of their project are appropriately identified, including but not limited to the ones identified in this EMP.
Does the EMP include:		
– documented procedures to be followed to manage the identified aspects and significant impacts, risks and opportunities identified?	Detailed in Section 8, Tables 8.1 – 8.4 and Appendix C.	Yes. Organisations conducting works on-site should integrate the procedures discussed in the EMP into their WHS plans.
– a clear indication of the respective environmental management roles and responsibilities of all parties?	Addressed in Section 1 in detail, including the responsibilities of City of Botany Bay Council, site owner and person conducting work on-site.	Yes. Organisations conducting works on-site should integrate their roles discussed in the EMP into their WHS plans (see Footnote 2 of this table regarding documentation of organisational and individual roles and responsibilities).
– emergency response procedures, covering the details required?	Not addressed in this EMP.	Yes. Organisations conducting works on-site should ensure that they develop appropriate emergency response procedures in their WHS plans.
Is it demonstrated that all personnel:		

Requirement[2]	Included in this EMP	To be include in project specific EMPs
– are or will be familiar with the EMP, and understand the EMP, including the following: o application of the EMP to them? o assessment of training needs? o communication, training and induction procedures? o training programs?	Addressed in Sections 1 and 6 in regard to need for development of plans and communication of information, including training and induction of organisations' contractors, subcontractors and workers.	Yes. Organisations conducting works on-site should ensure that they develop appropriate plans, e.g. job safety analyses (JSAs) and safe work method statements (SWMSs), and that they communicate the relevant information to the organisations' contractors, subcontractors and workers, including appropriate training and inductions.

Notes:

1. Modified from Appendix B, *Environmental Management Plan Review Checklist*, from NSW Government Construction Consultative Committee (CCC) (2009) *Environmental Management Systems Guidelines, 2nd Edition*.
2. The checklist in CCC 2009 includes enhancements for major contracts, in which the following additional aspects are addressed:
   - identification of organisational and individual roles, responsibilities and authorities for establishing, implementing and maintaining procedures, and monitoring activities and performance, to ensure conformity with each environmental management requirement (documenting all such responsibilities);
   - documented procedures, with roles, responsibilities and authorities, for controlling all activities/processes and performance to ensure conformity with each environmental management requirement (listing all such requirements);
   - cross-references to, or inclusion of, other environmental and other management related documents; and
   - monitoring, measurement, evaluation and review (including audit) procedures.

   Users of this information EMP should consult CCC 2009, *inter alia*, and determine the level of detail which is appropriate for their project and their systems of work.

Appendix C

Contaminated land procedures

1.0 Establishment of contamination control zones

1.1 Purpose & Scope

To detail the required establishment of contaminant control zones. The objective of this procedure is to minimise the potential for exposure of personnel to contaminants and to prevent the off-site transport of contaminants.

1.2 General

Security measures and physical barriers are to be installed to exclude unauthorised personnel and equipment from the controlled areas.

All personnel within these areas are to be briefed as to the potential risks and be provided with the appropriate level of personal protective equipment (PPE).

Work zones to be established on site consist of 3 continuous zones: *exclusion zone*, *contaminant reduction zone* and *support zone*. Appropriate barriers and signs are to be erected and control points are to be established between each zone to regulate access.

1.3 Exclusion zone

This is the area where the excavation works are to be conducted, including stockpiling, truck loading and lay-down areas. The number of personnel and equipment in the exclusion zone should be kept to a minimum.

The exclusion zone is to be fenced-off using orange marker mesh-fence and appropriate signage is to be erected.

1.4 Contaminant reduction zone

This is the area where personnel put on and take off PPE, and where personnel and plant and equipment are decontaminated when exiting the work area. This zone serves as a buffer to reduce the possibility of contaminants being transferred from the exclusion zone to the support zone.

Truck washes are to be located within the contaminant reduction zone.

The contaminant reduction zone is to be fenced-off using orange marker mesh-fence and appropriate signage erected.

1.5 Support zone

Includes all other parts of the site where contaminant controls are not required. Potentially contaminated clothing, tools, plant, equipment or vehicles are not to be permitted in this work zone until appropriate decontamination has been conducted.

2.0 Decontamination of personnel

2.1 Purpose and scope

Procedure for the safe decontamination of personnel. This procedure is required to minimise workers' exposure to potential contaminants and to prevent the off-site transport of contaminants.

2.2 General

Decontamination must be conducted before breaks, at the end of the work day or before leaving the contaminant reduction zone for any reason. It is important to note that dermal contact, ingestion and inhalation are the main exposure pathways for contaminants, and decontamination should be conducted before any hand-to-mouth behaviour, e.g. eating, drinking, smoking.

The decontamination area should be established before commencing works and is to include plastic sheeting, grated boot wash, tubs of clean water with detergent, tubs of clean rinse water, soap, scrubbing brush, towels, etc. and lined garbage containers.

2.3 Procedure

The following procedure is to be followed:

- remove disposable booties (if used) and place in plastic garbage bag for disposal;
- wash boots with detergent solution and rinse with clean water;
- wash outer gloves in detergent solution and rinse in clean water. Remove outer gloves and place into plastic garbage bag for disposal or retain for subsequent reuse;
- remove disposable coveralls, taking care to prevent the release and dispersion of dusts which may have accumulated on the coveralls during on-site operations and place coveralls into a plastic garbage bag;
- if non-disposable coveralls are used, place coveralls into laundry bag;
- remove respirator (if used) and place spent filters into a plastic garbage bag. Place the respirator into a separate plastic bag for later cleaning and disinfection. Respirators must be disinfected daily, if used;
- remove inner gloves and place in plastic garbage bag for disposal; and
- thoroughly wash hands and face.

Plastic sheeting and all disposable items placed in plastic garbage bags are to be removed at the end of each work day. Plastic sheeting should be rolled up and placed in plastic garbage bags. All potentially contaminated material must be disposed of in an appropriate manner.

3.0 Decontamination of plant and equipment

3.1 Purpose and scope

Procedure for the safe decontamination of plant and equipment. This procedure is required to minimise workers' exposure to potential contaminants, to prevent cross-contamination of sample locations, and to prevent the off-site transport of contaminants.

3.2 General

All plant or equipment which comes into contact with potentially contaminated soils or water is to be decontaminated prior to leaving the contaminant reduction zone.

To facilitate the decontamination of plant and equipment, cleaning should also be conducted before the plant or equipment is allowed within the exclusion zone. All plant and equipment used should be in good condition and free of oil or hydraulic leaks.

If a wheel wash has been established in the contaminant reduction zone, decontamination of plant and equipment is to be carried out on the wheel wash.

If a wheel wash has not been established, decontamination of plant and equipment is to be carried out on an area covered by plastic sheeting. After use, plastic sheeting is to be placed in plastic garbage bags.

3.3 Procedure

Decontamination of plant and equipment is to be carried out as follows:
- scrape and remove all earthen materials and dry wipe;
- hose down with high pressure, hot water wash, with a hydrocarbon surfactant;
- scrub with detergent solution;
- rinse with clean water; and
- collect scraped materials and place in to plastic garbage bags.

Rinsate from decontamination is not to be discharged to stormwater or sewer, but should be collected for appropriate testing and disposal to a licensed facility, if required. Plastic sheeting should be rolled up and placed in plastic garbage bags. All potentially contaminated material must be disposed of in an appropriate manner.

4.0 Unexpected Findings Protocol

4.1 Purpose and scope

The aim of this protocol is to provide information to any personnel conducting intrusive works at a site, and to inform them of the actions/procedures required should any unexpected/suspicious material be uncovered during their works.

4.2 Definitions

ACM	Asbestos containing material
ASS	Acid sulfate soils
DEHP	Department of Environment and Heritage Protection
EPA	Environment Protection Authority
UFP	Unexpected findings protocol
UST	Underground storage tank

4.3 References

N/A.

4.4 General

It is possible that during intrusive investigation works or when undertaking general excavation work or earthmoving, material may be encountered that is not the same as what is expected. Such unexpected materials should be reported directly to your supervisor and the site manager.

Typical unexpected findings may include:

- odorous material, like petrol, or ammonium (cleaning products), or solvents (can be sweet smelling), or tars, or mothballs (naphthalene), and the like;
- painted surfaces, which may be lead paint;
- buried building wastes;
- oily material;
- petrol-like sheen;
- drums, paint or oil containers, broken glass, rubbish, etc;
- artefacts, including building footings, old sumps or pits, burial pits, bones, etc;
- fibrous cement, including fibro cladding and pipes which could include asbestos-containing materials (ACMs); and/or
- Underground Storage Tanks (USTs) and associated pipe work.

Examples of these unexpected findings are illustrated in the attached figures.

4.5 Procedure

If an unexpected finding is suspected, or discovered, the following protocol should be adopted:

1. Stop work in the immediate area.

2. Notify your supervisor and site manager immediately.

3. Establish the required controls. These may include barricading, fencing, warning signs, covering odorous/volatile materials and asbestos, etc. Avoid leaving materials exposed on the surface. Include erosion and sediment controls as appropriate. Document all actions taken.

4. Document the material's characteristics, eg. location, extent, odours, appearance, etc.

5. Report the finding to the site owner, council, WorkCover, environment regulator (EPA or EHP) as required.

6. Contact appropriately qualified environmental consultant with a description of material.

7. No UF material is to be removed or spread across the site without confirmation from the environmental consultant or emergency services as required.

The UFP is to be integrated with the site specific emergency response plan. If the unexpected findings present an imminent or immediate hazard, then the emergency response plan is to take precedence over the UFP.

4.6 Contacts

The appropriate contacts should be included in the site safety, health and environment plan, for both day time and after hour's contacts, including:
- site manager,
- site environment officer,
- site safety officer,
- environmental consultant,
- site owner,
- remediation contractor,
- local council,
- environment regulator (EPA, EHP, etc.), and
- emergency services.

Appendix D

Checklist for incorporation of DCP requirements

Appendix D – DCP#34 Requirements

Table 1 is modified from *City of Botany Bay, Development Control Plan No. 34, Contaminated Land, 2003*. It includes a description of the requirement outlined in the DCP for management plans, and whether the requirement should be included in project specific environmental management plans (EMPs) developed by PCBUs conducting works on-site. The below requirements should be included in these EMPs in addition to those requirements already detailed in Tables 8.1 to 8.4.

The information in Table 1 relates only to the objectives of this EMP, and the associated aspects and impacts. Users of this EMP should address all other aspects and impacts as they apply to their project. It should be noted that additional consideration will be required for the conditions associated with the Development Consent.

Table 1: DCP requirements[1]

Requirement outlined in DCP	Source of requirement	To be include in project specific EMPs
The EMP should include:		
Hours of operation: All work shall be conducted within the following hours: – Monday to Friday, 7 am – 6 pm; – Saturdays, 8 am – 1 pm; and – Sundays or public holidays, no work is permitted	Outlined in DCP 34, or otherwise specified in conditions associated with the Development Consent.	Yes. Organisations conducting works on-site should ensure works are conducted in line with the outlined hours of operation.
Noise: Works shall comply with the Environment Protection Authority (EPA) Environmental Noise Manual for the control of construction site noise.	Outlined in DCP 34, or otherwise specified in conditions associated with the Development Consent.	Yes. Organisations conducting works on-site should ensure they are conducted in line with the Environmental Noise Manual.

Requirement outlined in DCP	Source of requirement	To be include in project specific EMPs
Soil and water management: Soil and water management should be conducted in line with LandCom *(2004) Managing Urban Stormwater: Soils and Construction*. Vehicle access to the site shall be stabilised to prevent the tracking of sediment onto the roads and footpath and the roadway should be kept clear of debris as required. All excavation pump-out water must be analysed for suspended solid concentrations, pH and any contaminants of concern identified during the preliminary or detailed site investigation, prior to discharge to the stormwater system and they should be checked to comply with relevant EPA and ANZECC standards for water quality. If contaminated, it must not be disposed of to stormwater. All landfarming areas for hydrocarbon contaminated soils shall be bunded on an imperious surface to contain surface water runoff from the landfarm areas and to prevent the leaching of hydrocarbons into the subsurface. All surface water discharges from the bunded areas to Council's stormwater system shall not breach Section 120 of the POEO Act, 1997.	Outlined in DCP 34, or otherwise specified in conditions associated with the Development Consent.	Yes. Organisations conducting works on-site should ensure that soil and water management is conducted in line with *LandCom, Managing Urban Stormwater: Soils and Construction*.
Vibration: The use of any plant and/or machinery shall not cause vibrations to be felt or capable of being measured at any adjacent premises.	Outlined in DCP 34, or otherwise specified in conditions associated with the Development Consent.	Yes. Organisations conducting works on-site should ensure works are conducted in line with the vibration restriction discussed.
Air Quality: Dust emissions shall be confined within the site boundary. The following dust control procedures may be employed to comply with this requirement: – erection of dust screens around the perimeter of the site; – securely covering all loads entering or exiting the site; – use of water sprays across the site to suppress dust; – covering of all stockpiles of contaminated soil remaining more than 24 hours; and – keeping excavation surfaces moist.	Outlined in DCP 34, or otherwise specified in conditions associated with the Development Consent.	Yes. Organisations conducting works on-site should ensure works are conducted in line with the air quality requirements discussed.

Requirement outlined in DCP	Source of requirement	To be include in project specific EMPs
Odour Control: All DCP requirements are included in Tables 8.1 – 8.4.	Outlined in DCP 34, or otherwise specified in conditions associated with the Development Consent.	Yes. Organisations conducting works on-site should ensure works are conducted in line with the odour control requirements in the DCP.
Groundwater: A licence shall be obtained from the Department of Land and Water Conservation (DLWC) for approval to extract groundwater under the provisions of Part V of the Water Act, 1912. A licence shall also be required from DLWC for any proposed bioremediation system. Groundwater shall be analysed for pH and any contaminants of concern identified during the preliminary or detailed site investigation, prior to discharge to the stormwater system. The analytical results must comply with relevant EPA and ANZECC standards for water quality. Any discharge to stormwater is not to breach Section 120 of the Protection of the Environment Operations Act 1997. Other options for the disposal of groundwater include disposal to sewer with prior approval from Sydney Water, or off-site disposal by a liquid waste transporter for treatment/disposal to an appropriate waste treatment/processing facility.	Outlined in DCP 34, or otherwise specified in conditions associated with the Development Consent.	Yes. Organisations conducting works on-site should ensure works are conducted in line with the groundwater advice.

Requirement outlined in DCP	Source of requirement	To be include in project specific EMPs
Transport: All haulage routes for trucks transporting soil, materials, equipment or machinery to and from the site shall be selected to meet the following objectives: – comply with all road traffic rules; – minimise noise, vibration and odour to adjacent premises; and – utilise State Roads and minimise use of local roads.	Outlined in DCP 34, or otherwise specified in conditions associated with the Development Consent.	Yes. Organisations conducting works on-site should ensure they are conducted in line with the transport policy discussed.
Hazardous Materials: Hazardous and/or intractable wastes arising from the work shall be removed and disposed of in accordance with the requirements of the NSW EPA and WorkCover Authority, together with the relevant regulations.	Outlined in DCP 34, or otherwise specified in conditions associated with the Development Consent.	Yes. Organisations conducting works on-site should ensure hazardous and/or intractable wastes are disposed of in accordance with NSW EPA and WorkCover requirements.
Disposal of Contaminated Soil: The disposal of contaminated soil shall have regard to the provision of both the Protection of the Environment Operations Act and Regulations and any relevant EPA guidelines such as Department of Environment, Climate Change and Water NSW (DECCW) (2009) *Waste Classification Guidelines Part 1: Classifying Waste*.	Outlined in DCP 34, or otherwise specified in conditions associated with the Development Consent.	Yes. Organisations conducting works on-site should ensure soil is disposed of considering the previous advice.
Containment/capping of contaminated material: For site specific information regarding on-site containment or capping of contaminated material, please refer to previous investigations conducted at the site, and the associated site audit report/statement.	Outlined in DCP 34, or otherwise specified in conditions associated with the Development Consent.	Yes. Organisations conducting works on-site should ensure works are conducted in line with the outlined hours of operation.

Requirement outlined in DCP	Source of requirement	To be include in project specific EMPs
Importation of fill: All fill imported on to the site shall be validated to ensure the imported fill is suitable for the proposed land use from a contamination perspective and comply with as Department of Environment, Climate Change and Water NSW (DECCW) publication (2009) *Waste Classification Guidelines Part 1: Classifying Waste*. Imported fill will consist of either excavated natural material (ENM) or virgin excavated natural material (VENM) only.	Outlined in DCP 34, or otherwise specified in conditions associated with the Development Consent.	Yes. Organisations conducting works on-site should ensure works are conducted in line with the outlined hours of operation.
Site Signage and Contact Numbers: A sign displaying the contact details of the works contractor (and site facilitator if different to works contractor) shall be displayed on the site adjacent to the site access. This sign shall be displayed throughout the duration of the remediation works.	Outlined in DCP 34, or otherwise specified in conditions associated with the Development Consent.	Yes. Organisations conducting works on-site should ensure works are conducted in line with the outlined hours of operation.
Community Consultation Owners and/or occupants of premises adjoining, and across the road, from the site shall be notified at least two days prior to the commencement of works classified as "category 2 remediation works".	Outlined in DCP 34, or otherwise specified in conditions associated with the Development Consent.	Yes. Organisations conducting works should ensure appropriate notification is given in the applicable situation.
Site Security The site shall be secured to ensure against unauthorised access by means of an appropriate fence.	Outlined in DCP 34, or otherwise specified in conditions associated with the Development Consent.	Yes. Organisations conducting works should ensure appropriate site security is put in place.

Requirement outlined in DCP	Source of requirement	To be include in project specific EMPs
Occupational Health & Safety It is the employer's responsibility to ensure that all site works shall comply with all relevant Occupational Health and Safety and Construction Safety Regulations of the NSW WorkCover Authority. Safety monitoring for hydrocarbon emissions is to be undertaken in accordance with Worksafe Time Weighted Averages Guidelines, 1991.	Outlined in DCP 34, or otherwise specified in conditions associated with the Development Consent.	Yes. Organisations conducting works should ensure compliance with applicable occupational health and safety guidance.
Removal of Underground Storage Tanks: The removal of underground storage tanks shall be undertaken in accordance with NSW WorkCover requirements. Underground storage tanks are present on-site, and Council requires their removal to be conducted in line with the Australian Institute of Petroleum's Code of Practice entitled "The Removal and Disposal of Underground Petroleum Storage Tanks". This document has been superseded by the NSW EPA UPSS Technical Note: Decommissioning, Abandonment and Removal of UPSS (2010), and so this should be referred to as guidance during the removal and disposal of the site UPSS. It should be noted in addition that if the UPSS are not in use, they are legally required to be removed within two years as detailed in Code of Practice: Storage and handling of dangerous goods NSW WorkCover Authority (2005). This should be done in accordance with AS1940-2004: Storage and handling of flammable and combustible liquids, and AS4976-2008: Removal and disposal of underground petroleum storage tanks.	Outlined in DCP 34, or otherwise specified in conditions associated with the Development Consent.	Yes. Organisations conducting works should ensure compliance with the applicable requirements with respect to removal of underground storage tanks.
Acid Sulfate Soils: The site is located within an area of "no known occurrence" of acid sulfate soils (Environmental Investigation Services, 2012). If acid sulfate soils are present it should be noted that there is potential for compounding effects through acid leachate mobilising heavy metals that may be present in the contaminated material and this should be addressed within a management plan.	Outlined in DCP 34, or otherwise specified in conditions associated with the Development Consent.	Yes. Organisations conducting works should ensure compliance with the applicable requirements with respect to acid sulfate soils.

Requirement outlined in DCP	Source of requirement	To be include in project specific EMPs
Demolition: Hazardous or intractable wastes arising from the demolition process being removed and disposed of in accordance with the requirements of WorkCover NSW and the Environment Protection Authority. Prior to demolition of any building constructed before 1970, the person acting on this consent shall submit a Work Plan prepared in accordance with Australian Standard AS260-2001, Demolition of Structure by a person with suitable expertise and experience. The Work Plan shall outline the identification of any hazardous materials, including surfaces coated with lead paint, method of demolition, the precautions to be employed to minimise any dust nuisance and the disposal methods for hazardous materials.	Outlined in DCP 34, or otherwise specified in conditions associated with the Development Consent.	Yes. Organisations conducting works should ensure compliance with the applicable requirements with respect to demolition.

Notes:
1. Modified from *City of Botany Bay, Development Control Plan No. 34, Contaminated Land, 2003*

   Users of this information EMP should consult the *City of Botany Bay, Development Control Plan*, *inter alia*, and determine the level of detail which is appropriate for their project and their systems of work.