Site Audit Report

0503-1112

Western Sydney Parklands Trust

Eastern Creek Business Hub
Rooty Hill Road South, Rooty Hill, NSW

April 2013
JBS42270-53571

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. **0503-1112**

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	**Andrew Lau**	Company	**JBS Environmental Pty Ltd**		
Address	**Level 1, 50 Margaret Street**				
	SYDNEY	**NSW**		Postcode	**2000**
Phone	**02 8245 0300**	Fax	**02 8245 0399**		

Site Details

Address	**Rooty Hill Road South**		
	ROOTY HILL	**NSW**	Postcode **2766**

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

- Part Lot 1 DP1103025
- Lot 100 DP882326
- Lot 2 and Lot 3 Section A DP8681
- Lot 3, Lot 4 and Lot 5 Section B DP8681
- Lot 1 DP135665
- Lot 1 and Lot 13 Section B DP 8681
- Lot 1, Lot 2, Lot 3, Lot 4, Lot 5, Lot 6, Lot 7, Lot 8 , Lot 9 and Lot 10 DP830836
- Lot 2 and Lot 3 DP1041487
- Lot A DP358346
- Lot 1, Lot 3, Lot 4, Lot 5, Lot 6, Lot 7 and Lot 8 DP31130
- Lot 11, Lot 12 and Lot 14 DP882325
- Lot 1 and Lot 2 DP1069269
- Lot 14 DP1051904
- Lot 11, Lot 12 and Lot 50 DP1041487
- Beggs Road (southern half) - Public Crown Subdivision Land
- Beggs Road (northern half) - Road being the residue of Land in Certificate of Title Volume 826 Folio 243

- Belmore Road from intersection with Beggs Road to its intersection with Great Western Hwy (western half)– Road being the residue of Land in Certificate of Title Volume 826 Folio 243
- Belmore Road from intersection with Beggs Road to its intersection with Great Western Hwy (eastern half)–Public Crown Subdivision Road
- Belmore Road from its intersection with Beggs Road to its extent to north-east (western half) –Road being the Residue of Land in Certificate of Title Volume 147 Folio 41
- Belmore Road from its intersection with Beggs Road to its extent to north-east (eastern half) – Public Crown Reserved Road
- Easement for Gas Pipeline – Easement for Pipeline (Vide Q916928)

Local Government Area **Blacktown City Council**

Area of Site (eg. hectares) **34 Ha** Current zoning **SEPP (WSP) 2009: UL-Western Parklands**

To the best of my knowledge, the site ~~is~~**/is not*** the subject of a declaration, order, agreement, proposal 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 **Eric Brodie** Company **Western Sydney Parklands Trust**

Address **Level 4, 10 Valentine Avenue Parramatta NSW**

Postcode **2150**

Phone **(02) 9895 7500** Fax **(02) 9895 7580**

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])~~

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]*)

Commercial, Open Space

Information sources for site audit

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

Douglas Partners Pty Ltd

CDM Smith Australia Pty Ltd

Consara Pty Ltd

Title(s) of report(s) reviewed

- *Report on Phase 1 Contamination Assessment, Proposed Redevelopment of Parcel 2.4, Western Sydney Parklands, Rooty Hill Road South, Doonside, Douglas Partners, November 2009 (DP 2009).*
- *Sampling, Analytical and Quality Plan, Eastern Creek Business Hub, Rooty Hill Road South, Rooty Hill NSW, CDM Smith, August 2012 (CDM 2012).*
- *Eastern Creek Business Hub Phase 2 Environmental Site Assessment, Rooty Hill Road South, Rooty Hill NSW, CDM Smith, February 2013, (CDM 2013).*
- *Concept Remediation Action Plan Eastern Creek Business Hub, Consara Pty Ltd, April 2013, (Consara 2013).*

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

Site audit report

Title **Site Audit Report, Eastern Creek Business Hub Rooty Hill Road South Rooty Hill NSW**

Report no. **JBS42270-53571** Date **12th April 2013**

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:**

OR

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

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~~*

Concept Remediation Action Plan Eastern Creek Business Hub, Consara Pty Ltd, April 2013, (Consara 2013).

subject to compliance with the following condition(s):

1. Any additional investigations conducted within each stage of the site must be reviewed and accepted by a Site Auditor.
2. Where required, the Specific Remediation Action Plans for each stage of the site development must be reviewed and accepted by a Site Auditor prior to commencement of remediation works within that stage.
3. Where required, the Asbestos Management Plan for each stage of the site must be reviewed and accepted by a Site Auditor prior to commencement of remediation works within that stage of the site.
4. Where required, the validation reports for each stage of the site must be reviewed and accepted by a Site Auditor prior to occupation of that stage of the site.
5. Where required, any Long Term Environmental Management Plans for each stage of the site plan must be reviewed and accepted by a Site Auditor prior to occupation of that stage of the site.

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

Overall comments

- The site assessment and proposed remedial/validation activities are considered to have met the requirements of the Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd Edition) (DEC 2006).
- The site assessment activities identified historically imported fill and waste materials within various areas of the site which contained reworked silty clay, demolition wastes, bitumen/road base and fragments of asbestos containing materials.
- The levels of some contaminants of potential concern (i.e., asbestos, lead and TPH) in fill/waste soils which are considered to require remediation or management under the proposed commercial and open space land uses.
- There were no levels of the identified contaminants of potential concern in groundwater which are considered not to require remediation or management under the proposed commercial and open space land uses.
- There was no evidence of potential or actual migration of contaminants from the site which may result in unacceptable risks to surrounding human or ecological receptors.
- The concept remediation and validation works detailed in the concept RAP prepared for the site (Consara 2013) are considered appropriate to render the site suitable for proposed commercial and open space land uses, subject to the conditions specified in this Site Audit Statement for each stage of the development.

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. **0503**).

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.

Andrew Lau
12th April 2013

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.

Site Audit Report

0503-1112

Western Sydney Parklands Trust

Eastern Creek Business Hub
Rooty Hill Road South, Rooty Hill, NSW

April 2013
JBS42270-53571

Table of Contents

List of Appendices

List of Abbreviations

A list of the common abbreviations used throughout this report is provided below.

As	Arsenic
AST	Aboveground Storage Tank
Cd	Cadmium
Cr	Chromium
Cu	Copper
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
B(a)P	Benzo (a) pyrene
EPA	NSW Environment Protection Authority
DO	Dissolved oxygen
DPI	NSW Department of Planning and Infrastructure
DQO	Data Quality Objectives
DP	Deposited Plan
EC	Electrical conductivity
EH	Redox potential
EPA	New South Wales Environment Protection Authority
Hg	Mercury
HIL	Health Based Investigation Level
LOR	Limit of Reporting
MAH	Monocyclic Aromatic Hydrocarbon
Ni	Nickel
OCP	Organochlorine Pesticide
SAR	Site Audit Report
SAS	Site Audit Statement
PAH	Polycyclic Aromatic Hydrocarbons
Pb	Lead
PIL	(Provisional) Phytotoxicity Based Investigation Level
PCB	Polychlorinated Biphenyls
QA/QC	Quality Assurance/Quality Control
RPD	Relative Percentage Difference
TPH	Total Petroleum Hydrocarbons (C_6-C_9 and C_{10}-C_{36})
UST	Underground Storage Tank
Zn	Zinc

1 Introduction

1.1 Introduction and Background

Andrew Lau, of JBS Environmental Pty Ltd (JBS), was engaged by the Western Sydney Parklands Trust (the client), care of Cadence Australia, on 15 October 2012 to conduct a site audit at the land proposed to be redeveloped into the Eastern Creek Business Hub, located at Rooty Hill Road South, Rooty Hill, NSW (the site, legally described in **Section 2.1**).

The site has an area of approximately 34 hectares (Ha) and the redevelopment is proposed to occur in a phased approach over a period of up to 20 years. Figures showing the site location, site layout, proposed subdivision and proposed landuses are provided in **Appendix D**.

The site audit has been undertaken to review the contamination investigations and Concept Remedial Action Plan (RAP), prepared as part of the supporting information for the staged development application for the site, in which approval is sought for the concept proposal for a development structure, including site layout activities, building envelopes and design guidelines and the Stage 1 Superlot Subdivision and Early Works. The contamination reports and the site audit were undertaken to address the requirements of State Environmental Planning Policy 55 (SEPP55), relating to the suitability of the site, from a contamination perspective, for the proposed commercial and parks/open space landuses.

Since further detailed RAPs will be required once detailed development plans are developed for various parts of the site, further site audits will be undertaken on the detailed RAP, remediation and validation phases. Such an approach is consistent and common-place with other large scale development works, where the site is developed in separate stages.

Andrew Lau is a Site Auditor accredited by the NSW Environment Protection Authority (EPA) under the *Contaminated Land Management Act 1997* (CLM Act 1997) (Accreditation Number 0503). The audit was completed with the assistance of Ken Henderson and Kellie Guenther, JBS Environmental's senior consultants trained and experienced in contaminated land assessment and auditing. The audit reference number is 0503-1112. No previous Site Audit Statements (SAS) or Site Audit Reports (SAR) are known to exist for the site.

1.2 Objectives of Audit

The objective of this site audit was to independently review two Environmental Site Assessment (ESA) reports, a Sampling, Analytical and Quality Plan (SAQP) and a Concept Remedial Action Plan (RAP) to determine if the land can be made suitable for the proposed uses by implementation of the processes outlined in the Concept RAP. In reviewing the investigation reports as part of this site audit, consideration was given to:

- The provisions of the CLM Act, Regulations and subsequent amendments;
- The provisions of any environmental planning instruments applying to the site; and
- Relevant guidelines made or approved by the NSW Environment Protection Authority (EPA) (**Appendix A**).

1.3 Type of Audit

Since the site audit is not being undertaken in response to a legal requirement imposed by a consent authority or the EPA, the site audit has been conducted as a non-statutory audit.

1.4 Documents Reviewed

The following documents were reviewed as part of this site audit:

- *Report on Phase 1 Contamination Assessment, Proposed Redevelopment of Parcel 2.4, Western Sydney Parklands, Rooty Hill Road South, Doonside*, Douglas Partners, November 2009 (DP 2009).
- *Sampling, Analytical and Quality Plan, Eastern Creek Business Hub, Rooty Hill Road South, Rooty Hill NSW*, CDM Smith, August 2012 (CDM 2012).
- *Eastern Creek Business Hub Phase 2 Environmental Site Assessment, Rooty Hill Road South, Rooty Hill NSW*, CDM Smith, February 2013, (CDM 2013).
- *Concept Remediation Action Plan Eastern Creek Business Hub*, Consara Pty Ltd, April 2013, (Consara 2013).

1.5 Site Inspections

The site was inspected on the date shown in **Table 1.1**.

Table 1.1 Summary of Audit Inspections

Date	Attendance	Purpose
3rd October 2012	Andrew Lau – JBS Rebecca Organo – CDM Smith (as at this date)	Detailed site inspection during the detailed investigations

1.6 Chronology of Site Assessment and Audit Works

The process of site assessment, Auditor review and preparation of final audit undertaken at the site has been summarised in **Table 1.2**.

Table 1.2 Summary of Assessment and Audits Works Undertaken at the Site

Date	Action
November 2009	Completion of a Phase 1 Environmental Site Assessment (ESA) report which included review of historical aerial photographs, regulatory searches and collection and analysis of a limited set of soil samples. The Phase 1 ESA concluded additional site assessment was recommended to assist in examining the extent of preliminary impacts identified and identifying any additional contamination issues.
August 2012	Commencement of Site Audit and review of Phase 1 ESA report (DP2009) and Sampling Analysis and Quality Plan (SAQP) (CDM 2012) and preparation of interim audit advice (0503-1112-01).
September 2012 to November 2012	Phase 2 ESA desktop and fieldworks conducted comprising relevant historical searches, detailed site inspection, soil test pitting and boring and soil and groundwater sampling and analysis.
October 2012	Site Auditor conducted a site inspection.
February 2013	Review of Phase 2 ESA report (CDM 2013) and preparation of interim audit advice (0503-1112-02). The Phase 2 ESA documented the results of the relevant historical searches, the methods and results of the soil and groundwater sampling conducted and the associated quality assurance and quality control (QA/QC) methods and results. The Phase 2 ESA concluded "*To manage risk associated with the identified waste, non-respirable ACM and a single sample location identified as a copper concentration hotspot associated with a waste stockpile, a Remediation Action Plan (RAP) is recommended to be developed for each proposed development area, with consideration given to materials that need to be transferred between each area for containment.*"
April 2013	Review of draft concept remediation action plan (RAP) (Consara 2013) and preparation of interim audit advice. The concept RAP documented the procedures required to remediate the site for the proposed residential, commercial and open space land uses.
April 2013	Preparation of Site Audit Statement 0503-1112 and Site Audit Report (JBS 2013)

2 Site Description

2.1 Site Identification

The site details as provided by the consultants have been summarised in **Table 2.1** and described in further detail in the following sections. Plans identifying the subject site have been presented in **Appendix C**. The site location and layout is shown in **Appendix D**.

Table 2.1 Summary Site Details

Street Address:	Rooty Hill Road South
Property Description:	Part Lot 1 DP1103025 Lot 100 DP882326 Lot 2 and Lot 3 Section A DP8681 Lot 3, Lot 4 and Lot 5 Section B DP8681 Lot 1 DP135665 Lot 1 and Lot 13 Section B DP 8681 Lot 1, Lot 2, Lot 3, Lot 4, Lot 5, Lot 6, Lot 7, Lot 8 , Lot 9 and Lot 10 DP830836 Lot 2 and Lot 3 DP1041487 Lot A DP358346 Lot 1, Lot 3, Lot 4, Lot 5, Lot 6, Lot 7 and Lot 8 DP31130 Lot 11, Lot 12 and Lot 14 DP882325 Lot 1 and Lot 2 DP1069269 Lot 14 DP1051904 Lot 11, Lot 12 and Lot 50 DP1041487 Beggs Road (southern half) - Public Crown Subdivision Land Beggs Road (northern half) - Road being the residue of Land in Certificate of Title Volume 826 Folio 243 Belmore Road from intersection with Beggs Road to its intersection with Great Western Hwy (western half)– Road being the residue of Land in Certificate of Title Volume 826 Folio 243 Belmore Road from intersection with Beggs Road to its intersection with Great Western Hwy (eastern half)–Public Crown Subdivision Road Belmore Road from its intersection with Beggs Road to its extent to north-east (western half) –Road being the Residue of Land in Certificate of Title Volume 147 Folio 41 Belmore Road from its intersection with Beggs Road to its extent to north-east (eastern half) – Public Crown Reserved Road Easement for Gas Pipeline – Easement for Pipeline (Vide Q916928)
Parish:	Rooty Hill and Melville
County:	Cumberland
Local Government Area:	Blacktown City Council
Property Size:	34 hectares
Zoning:	SEPP (WSP) 2009:UL-Western Parklands
Previous Use	Varied, see **Section 3**
Existing Use	Residential housing, paddocks, vegetation
Anticipated Future Uses	Large format and convenience retail, bulky goods, vegetation retention, playground, garden centre, and road easements.

The consultant (Consara 2013) provided the following description of the planned subdivisions on the site and the associated land uses, the layout is shown in **Appendix D**:

- Superlot 1 – comprises the south-western part of the Site which is confined on the east by the Jemena gas main buffer, to the south by the Great Western Highway, to the west by Rooty Hill Road South and to the north by a proposed access road referred to as Area A and then Superlot 2. Superlot 1 will primarily be developed bulky goods and large format retail use. However, the north-eastern corner is allocated for the retention of existing Cumberland Plain Woodland vegetation.
- Superlot 2 - comprises the central-western part of the Site, which is confined by a proposed road easement to the south and east, referred to as Area A. Further to the east is an area to be dedicated as open space referred to as Superlot 4 North (Area X2). Further to the south is Superlot 1 and to the west is Rooty Hill

Road South. To the north is an existing road easement known as Beggs Road and referred to as Area C and then Superlot 3. Superlot 2 will be developed for convenience retail and bulky goods and the south-eastern corner is proposed to be used for an activity/playground for children.

- Superlot 3 – comprises the north-western part of the Site, which is confined by Church Street to the north and Rooty Hill Road South to the west. To the east is an area to be dedicated as open space referred to as Superlot 4 North (Area X2). To the south is an existing road easement, known as Beggs Road, referred to as Area C and then Superlot 2. Superlot 3 will be developed bulky goods and self-storage.
- Superlot 4 (Areas X1) - comprises the area to the east of Superlot 1 bounded by Belmore Road (Area P) to the east and Beggs Road (Area C) to the north. Areas X1 will be revegetated as native Cumberland Plain Woodland and/or existing native Cumberland Plain Woodland will be retained. A small area in the south of Area X1 is dedicated for use as a detention basin.
- Superlot 4 North (Area X2) - comprises the area to the east of Superlot 3 and is bounded by the M7 to the east and Belmore Road (Area P) and Superlot 4 (Area X1) to the south. Areas X2 will be revegetated as native Cumberland Plain Woodland and/or existing native Cumberland Plain Woodland will be retained. An open drainage channel will also be established in a west-east direction through the central section of Area X2.
- Area Y – comprises the eastern half of the Site bounded by the M7 to the east. Area Y will be revegetated as native Cumberland Plain Woodland and/or existing native Cumberland Plain Woodland will be retained. A large area in the central part of Area Y is dedicated for use as a detention basin; Area A – roads to be completed by WSPT and then either maintained by WSPT or the local council.
- Area C – comprises an existing road easement known as Beggs Road and will be revegetated forming a vegetation corridor between Superlots 2 and 3. This area is not expected to be highly utilised by the public as it is planned to be densely vegetated.
- Area A and B - comprise proposed internal road easements to provide vehicular access to the Superlots 1, 2 and 3.
- Area P - comprises a buffer easement for a high pressure gas main and operated by Jemena that run through the central and western part of the Site. Area P will be revegetated as native Cumberland Plains Woodland and then full ownership to be transferred to the Trust and will be maintained by the Trust.
- Area Q - comprises an easement that runs parallel and immediately adjacent to the east of Belmore Road (Area P) underneath which runs the high pressure gas pipeline operated by Jemena. Area Q is currently grassed and is mowed and maintained by Jemena. Due to Jemena restrictions on use and access on Area Q, the Trust cannot demonstrate suitability of Area Q for ongoing use as an easement and as such it does not form part of the Site that is subject to this Concept RAP.

2.2 Site Condition

The site is bound by the M7 Motorway to the east, Church Street to the north, Rooty Hill Road South to the west and the Great Western Highway to the south. The site is irregular in shape, with the greatest length extending approximately northwest to southeast. The layout is shown in **Appendix D**.

At the time of the most recent site investigation, the consultant (CDM 2013) reported that the site was predominantly vacant cleared land and woodland, with several houses located at the northwest corner of the site. Additional observations as provided by the consultant are as follows:

- The site was secured by star picket fences at the northern and western site boundaries and a chain fence at the east site boundary. A portion of the western boundary and the southern boundary were not fenced and were accessible by the public.
- Various residences were located in the northeast portion of the site.
- The site surface was unsealed and was covered with grass and weeds, with many larger well established trees and small bush/shrubs distributed across the entire site.
- An open stormwater drain was located at the northern boundary of Superlot 1 (**Appendix D**) which connected to a stormwater ditch located in the central portion of the site (Area Y, **Appendix D**). The consultant noted the stormwater drain in Superlot 1 had been partially excavated, with residual soil material stockpiled on along the southern bank of the culvert.
- Demolition waste was observed by the consultant predominantly in the southern portion of the site at Superlot 1 (**Appendix D**), however, multiple stockpiles of demolition waste were present at other areas of the site, with a larger stockpile located in the southern portion of the site. Concentrated areas of debris were located within both the southern and northern vegetated portions of Area X. Multiple stockpiles were also located across Superlot 2, which were overgrown by grass and weeds.
- The consultant reported that the stockpiled waste material was mostly derived from historical on-site demolished building rubble and soil. Potential asbestos containing materials (ACM), concrete, bitumen, steel, varying soil materials and organic matter were observed within the stockpiles. Additionally, the consultant reported that contractors familiar with site have stated that it was common knowledge that illegal dumping occurs within the southern portion of Superlot 1.
- No evidence of stress to plants, unexplained odours, or areas of significant staining was noted at the site.
- No chemical storage was noted at the site. No air emissions were reported to be emanating from either the site or neighbouring properties.
- Two historical wells were observed by the consultant during investigation works at the site. One of the wells was a dug cement well of approximately 8 m in depth located in the central-southern portion of Superlot 1 (unknown use). The second well, referenced as BH6, was located at the western boundary of Superlot 1, and the consultant reported that this is likely an environmental monitoring well installed during a previous environmental investigation.

- Gated access roads were observed by the consultant from both Beggs Road to the west and from Great Western Highway to the south.

The information provided in the consultant's report (CDM 2013) was consistent with the observations made by the auditor during a site inspection conducted on 7 October 2012.

2.3 Topography

The consultant (CDM 2013) reported the site had an elevation between 38 and 53 metres Australian Height Datum (m AHD), based on data from Google Earth, and the surrounding area declined gently towards Eastern Creek.

2.4 Geology

The consultant (CDM 2013) reported review of the *Penrith 1:100 000 Geological Series Sheet 9030 Ed. 1* (Clark and Jones (Eds), 1991) indicated the site is underlain by the Triassic aged Wianamatta, Blue Mountains Bringelly Shale sub-group, which comprises alluvial and estuarine formed shale, carbonaceous claystone, claystone, laminite, fine to medium-grained lithic sandstone, and rare coal and tuff. This in turn is underlain by Ashfield Shale including dark-grey to black claystone-siltstone and fine sandstone-siltstone laminite. Additionally, the consultant (CDM 2013) reported, a thin layer of Mittagong Formation underlies the Ashfield Shale comprising interbedded shale, laminite and medium-grained quartz sandstone, which in turn is underlain at approximately sea level by medium to very course-grained quartz sandstone, minor laminated mudstone and siltstone lenses.

The consultant (CDM 2013) reported review of the *Soil Landscape of Penrith 1:100 000 Sheet 9030* (NSW DECCW 2010) indicated two landscape groupings were present at the site, with Blacktown Residual soils located on the west and South Creek soils on the east.

The consultant (CDM 2013) reported the west of the site comprised gently undulating rises on Wianamatta Group shales, with slopes > 5%. Topography includes broad rounded crests and ridges with gently inclined slopes, with cleared Eucalypt woodland and tall open-forest in the area.

The consultant (CDM 2013) reported based on the *Soil Landscape of Penrith* review, soil in the western half of the site was expected to be shallow to moderately deep hardsetting mottled texture soil with red and brown podzolic soils on crests grading to yellow podzolic soils on lower slopes and drainage areas. The western part of the sites soil landscape is indicated to be moderately reactive highly plastic subsoil, low soil fertility, with poor soil drainage.

The consultant (CDM 2013) reported the eastern part of the site includes floodplains, valley flats and drainage depressions associated with Eastern Creek. Soil on the eastern half was expected to contain very deep layered sediments over bedrock or relict soils. In some areas where pedogenesis has occurred, structured plastic clays or structured loams in and near drainage lines was expected. Red and tallow podzolic soils are most common on terraces with small areas of structured grey clays, leached clay and yellow solodic soils. The eastern part of the sites soil are associated with erosion hazard and frequent flooding.

2.5 Hydrology

The consultant (CDM 2013) reported Eastern Creek is the closest flowing surface water body, located approximately 300m to east of the site. Several localised draining surface

water drainage channels were observed including a slightly deeper channel running from west-east with no surface water observed at the time of sampling, located to the south of Area A and running eastward across Area X and Area Y. Proposed retention and development of a drainage channel is to be completed along the southern boundary of Area A and additional detention ponds in Area Y and a smaller proposed detention pond in Area X. The consultant (CDM 2013) made reference to the DP (2009) report stating that a man-made channel running below the M7 Motorway allowed drainage to Eastern Creek.

The consultant (CDM 2013) undertook a review of the Blacktown City Council flood risk data (http://maps.blacktown.nsw.gov.au/WebSpatial/) which indicated the majority of the site was outside the mapped flood risk zones, with the exception of the central east section of Area X north of Beggs Road which is situated within a Low Flood Risk zone.

2.6 Hydrogeology

The consultant (CDM 2013) reported the groundwater at the site is likely to be present within a shallow aquifer within the weathered shale, and that groundwater within the shallow aquifer would flow to the east toward Eastern Creek. Eastern Creek appears to be part of the drainage line from Prospect Reservoir (located approximately 4km to the south east of the site) and the Hawkesbury River (located approximately 20km to the north of the site).

The previous consultant (DP 2009) conducted a review of the NSW Natural Resource Atlas website (http://www.nratlas.nsw.gov.au) and identified one bore within the search area, located approximately 700 m to the west of the site. The works summary for the bore indicated that it was used for waste disposal and was drilled to a depth of about 218 m, with no groundwater details provided.

During the field investigation, the consultant (CDM 2013) concluded the following in relation to groundwater as measured in the site monitoring wells (which included 11 newly installed monitoring wells and one previously existing well):

- Groundwater was measured at depths between 1 m and 3.2 m bgs (or between 41.84 and 35.97 m AHD), with a groundwater flow direction inferred to the northeast across the site towards Eastern Creek.
- The temperature of the groundwater ranged between 14.8^{o}C and 18.4^{o}C.
- The average pH was measured at 6.73 pH units.
- The ORP (oxidation reduction potential) ranged between -58.8 mV and 130.7 mV.
- The average conductivity was measured at 26 108 micro Siemens/cm (uS/cm).
- Dissolved oxygen was measured at 0.83 ppm and 3.8 ppm.
- Based on the above measurements, the consultant concluded that the groundwater at the site is of poor quality and unsuitable for most uses.

2.7 Surrounding Environment

The consultant (CDM 2013) reported the site was surrounded by the following:

- North: Morreau Reserve, a recreational park, with residential housing to the northwest;

- East: Immediately to the east is the Westlink M7 motorway, followed by vacant lots, with Eastern Creek beyond, approximately 300 m to the east of the Site;
- South: The Great Western Highway is present to the south, with Eastern Creek Public School and sports fields to the southwest across Rooty Hill Road South; and
- West: Immediately to the west of the Site is Rooty Hill Road South, across which is residential housing.

2.8 Audit Findings

The information provided by the consultants (DP 2009 and CDM 2013) in regards to the site condition and surrounding environment has been checked against and generally meets the requirements of OEH 2011. The information provided was also consistent with the observations made during a site inspection as conducted by the site auditor during a site inspection conducted 3rd October 2012.

Overall, the information provided by the consultants (DP 2009 and CDM 2013), information supplemented by observations made during the site audit inspection and review of publicly available information in relation to the site condition and the surrounding environment is considered adequate for the purposes of the site audit, with the following exceptions:

Acid Sulfate Soils

The consultants (DP 2009, CDM 2013) did not report on the occurrence of acid sulfate soils within the soil profile at the site. For completeness, the auditor reviewed the NSW Natural Resource Atlas on 11 March 2013, which reported no High or Low probability of occurrence of acid sulfate soils within the soil profile located on the site (refer to **Appendix E** for a copy of the NSW Natural Resource Atlas findings).

Climate

The consultants (DP 2009 and CDM 2013) did not report on the climate of the site area. For completeness, the auditor conducted a review of Bureau of Meteorology (BOM) climate statistics for Seven Hills (Collin Street)[1] which indicates the following:

- Mean maximum temperatures ranging from 17.4° C in July to 28.4° C in December;
- Mean minimum temperatures ranging from 4.5° C in July to 17.0° C in February; and
- Mean monthly rainfall ranging from 43.8 mm in July to 117.3 mm in February, with an average annual rainfall of 917.2 mm.

In general, the climate of the site area is described as comprising warm summers and mild winters, rainfall was described as occurring throughout the year with wetter periods from January to June.

[1] Bureau of Meteorology Climate Statistics for Seven Hills (Collins Street), accessed 11/3/2013 http://www.bom.gov.au/climate/averages/tables/cw_067026.shtml

3 Site History

3.1 Site History Information Sources

The consultants (DP 2009 and CDM 2013) used a combination of sources to provide a site history, including the following:

- Aerial Photographs (1951, 1961, 1970, 1982, 1994 and 2005).
- Historical title search.
- Blacktown City Council information (including a review of s.149 certificates).
- NSW WorkCover dangerous goods licensing records.
- NSW EPA records.

3.2 Aerial Photographs

The initial consultant (DP 2009) undertook an aerial photograph review of the site, which was expanded on by the second consultant (CDM 2013), with the following information provided:

- **1951**: the Great Western Highway, Church Street, Beggs Road and Rooty Hill Road South were present, with Belmore Road running north-south through the eastern portion of the site. The northern portion of the site (i.e. north of Beggs Road) was primarily bush covered with minor scatterings of buildings presumed to be houses and/or sheds, potentially poultry sheds. Pockets of development exist in the southern and northwestern portions, however the majority of the site was undeveloped, relatively open and grassed, with minimal trees. Land cultivation was evident in the southern corner, and adjacent to Rooty Hill Road South. The site was surrounded by rural residential style properties.
- **1961**: The site was similar to the previous photograph, however some of the sheds have been removed, while new sheds were present in the north-western corner of the site. Some trees have been cleared. Land cultivation was evident in the north-eastern corner, while it appears to have ceased in the south. Increasing urban residential development was observed around the north-western portion.
- **1970**: The majority of trees in the northern portion have been removed, with increasing paddocks/fields for market gardens or other agriculture. Additional houses were present along Beggs Roads, extending to the corner with Rooty Hill Road South. A drainage channel had been built in the southern portion of the site, extending beyond Rooty Hill Road South and Belmore Road. Most structures in the far southern portion have been removed, with signs of disturbance present in the south-eastern corner. Urban residential development has expanded to the west of the site, whilst surrounding lands to the north, east and south remain rural.
- **1982:** The majority of the site had been cleared, with only pockets of development present remaining, largely in the north-western corner. Warehouses and sheds are present within paddocks, with some residential housing still present. The remainder of the site comprised undeveloped grassland with some trees. The southern portion of Belmore Road appeared less prominent and may be being abandoned. There were minor increases in urban development to the west.

- **1994:** The site appeared similar to the previous aerial photograph, with even fewer buildings remaining onsite in the northwestern corner. Horse feed troughs appeared to be present in the northern portion. The majority of the site was open space, containing some mature trees.
- **2005:** The site appeared similar to the 1994 photograph, with still fewer buildings present on site, consisting of residential housing in the northwest, and paddocks and buildings elsewhere. The gas trunk receiving station (Jemena) has been built in the south-eastern corner of the site. No other significant chances were noted. The M7 Motorway had been built adjacent to the eastern boundary of the site, while Belmore Road and Beggs Road no longer appeared to be in use.

The consultant (CDM 2013) provided based on the aerial photography review the buildings and warehouses that previously existed across the site would have been constructed between 1950 and 1980. Based on their age, the consultant (CDM 2013) considered there was the potential for ACM and other hazardous materials, such as lead-based paint and asbestos, to have been used in their construction. Additionally, given the potential for part or most of the site to have been used for agricultural purposes, it was likely pesticides may have been used.

3.3 Historical Title Search

A titles search was undertaken at the request of the consultant (CDM 2013) by Land Partners Limited. The results are presented below, by allotment.

Table 3.1: Lot 2 in DP1069269 (Superlot 1)

Date	Owner	Occupation / Landuse
1871	Council of Education / NSW Department of Education and Communities	Potential school
2001	*Environmental Planning and Assessment Act 1979* Minister	Unknown / none.
2008	Western Sydney Parklands Trust	Unknown / none.

Table 3.2: Lot 1 in DP 1069269 and Lot 14 in DP 882325 (Superlot 1)

Date	Owner	Occupation / Landuse
1914	Charles Vautravers Justin Nicholas Anthony Gabriel Vautravers	Cellarman Poultry farmer
1921	John Roset	Station Manager
1930	Daniel Mitchell Minnie Mitchell	Poultry farmer Married woman
1930	James Smith	Poultry farmer
1945	Cecilia Ann Bye	Married woman
1964	Commissioner for Main Roads	Unknown / none
1964?	*Environmental Planning and Assessment Act 1979* Minister	Unknown / none
1999	Western Sydney Parklands Trust	Unknown / none

Table 3.3: Lots 11 and 12 in DP 882325 (Superlot 1)

Date	Owner	Occupation / Landuse
1887	Harry Haydon Beggs	Blacksmith
1940	Hector Owen Beggs	Musician
1957	Sidney Samuel Luke	Carrier
1962, 1964?	Commissioner for Main Roads	Unknown / none
1999	*Environmental Planning and Assessment Act 1979* Minister	Unknown / none
2008	Western Sydney Parklands Trust	Unknown / none

Table 3.4: Lot 3 Section A in DP 8681 and Lots 9 and 10 in DP 830836 (Superlot 1, Superlot 2)

Date	Owner	Occupation / Landuse
1907	Ernest Victor Finckh	Agent
1922	Clarence Livingstone Beggs	Blacksmith
1934	Jonathon Haydon Beggs	Blacksmith

Date	Owner	Occupation / Landuse
1936	May Eileen Weston	Married woman
1977	NSW Planning and Environment Commission	Unknown / none
2008	Western Sydney Parklands Trust	Unknown / none

Table 3.5: Lot 2 Section A in DP 8681 and Lots 7 and 8 in DP 830836 (Superlot 2, Area A, Area X)

Date	Owner	Occupation / Landuse
1907	Ernest Victor Finckh	Agent
1930	John Ellul	Cook
1949	Vera Muriel Lynes	Married woman
1955	Ralph Alexander Crabb Magdalen Raie Crabb	Mill hand Married woman
1972	NSW Planning and Environment Commission	Unknown / none
2008	Western Sydney Parklands Trust	Unknown / none

Table 3.6: Lot 1 in DP 31130 (Superlot 2)

Date	Owner	Occupation / Landuse
1907	Ernest Victor Finckh	Agent
1921	Ellen Walker	Married woman
1934	John Walker	Farmer
1958	Caroline Louise Walker	Widow
1960	Geoffrey Arthur Walker Janet Ord	Farmer Married woman
1960	St Ives Development Pty Ltd	Unknown / none
1969	Joseph Henry Oblein Mary Teresa Oblein	Brick layer Married woman
1987	*Environmental Planning and Assessment Act 1979* Minister	Unknown / none
2008	Western Sydney Parklands Trust	Unknown / none

Table 3.7: Lot 2 in DP 31130 (Superlot 2)

Date	Owner	Occupation / Landuse
1907	Ernest Victor Finckh	Agent
1921	Ellen Walker	Married woman
1934	John Walker	Farmer
1958	Caroline Louise Walker	Widow
1960	Geoffrey Arthur Walker Janet Ord	Farmer Married woman
1960	St Ives Development Pty Ltd	Unknown / none
1961	John Roslyn Sewell	Salesman
1961	Albert Gates Margaret Allen Gates	Truck driver Married woman
2010	Albert Gates	Truck driver

Table 3.8: Lot 3 in DP 31130 (Superlot 2)

Date	Owner	Occupation / Landuse
1907	Ernest Victor Finckh	Agent
1921	Ellen Walker	Married woman
1934	John Walker	Farmer
1958	Caroline Louise Walker	Widow
1960	Geoffrey Arthur Walker Janet Ord	Farmer Married woman
1960	St Ives Development Pty Ltd	
1960?	James Brown Thomson Iris Ellen Thomson	Plumber
1972	Lindsay Woodward Valda May Woodward	Builder Married woman
1973	Guilio Legge Irene Yvonne Legge	Welder Married woman
1983-2009	Multiple owners	Unlisted
2009	*Environmental Planning and Assessment Act 1979* Minister	Unknown / none
2011	Western Sydney Parklands Trust	Unknown / none

Table 3.9: Lot 4 in DP 31130 (Superlot 2)

Date	Owner	Occupation / Landuse
1907	Ernest Victor Finckh	Agent
1921	Ellen Walker	Married woman
1934	John Walker	Farmer

Date	Owner	Occupation / Landuse
1958	Caroline Louise Walker	Widow
1960	Geoffrey Arthur Walker Janet Ord	Farmer Married woman
1960	St Ives Development Pty Ltd	
1960	Eugene Szandruk	Labourer
1975	Elizabeth Connellan	Married woman
1980-2011	Multiple owners	Unlisted
2011	*Environmental Planning and Assessment Act 1979* Minister	Unknown / none

Table 3.10: Lot 5 in DP 31130 (Superlot 2)

Date	Owner	Occupation / Landuse
1907	Ernest Victor Finckh	Agent
1921	Ellen Walker	Married woman
1934	John Walker	Farmer
1958	Caroline Louise Walker	Widow
1960	Geoffrey Arthur Walker Janet Ord	Farmer Married woman
1960	St Ives Development Pty Ltd	Unknown / none
	Nikolai Filtzoff	Labourer
1981	Peter Khoury Louhad Khoury	Panel beater Married woman
1998-2009	Multiple owners	Unlisted
2009	*Environmental Planning and Assessment Act 1979* Minister	Unknown / none
2011	Western Sydney Parklands Trust	Unknown / none

Table 3.11: Lot 6 in DP 31130 (Superlot 2)

Date	Owner	Occupation / Landuse
1907	Ernest Victor Finckh	Agent
1921	Ellen Walker	Married woman
1934	John Walker	Farmer
1958	Caroline Louise Walker	Widow
1960	Geoffrey Arthur Walker Janet Ord	Farmer Married woman
1960	St Ives Development Pty Ltd	Unknown / none
1960	Franciszek Komorowski Urszula Komorowski	Boiler attendant Married woman
1987-2002	Multiple owners	Unlisted
2002	*Environmental Planning and Assessment Act 1979* Minister	Unknown / none
2008	Western Sydney Parklands Trust	Unknown / none

Table 3.12: Lot 7 in DP 31130 (Superlot 2)

Date	Owner	Occupation / Landuse
1907	Ernest Victor Finckh	Agent
1921	Ellen Walker	Married woman
1934	John Walker	Farmer
1958	Caroline Louise Walker	Widow
1960	Geoffrey Arthur Walker Janet Ord	Farmer Married woman
1960	St Ives Development Pty Ltd	Unknown / none
1961	Ronald George McGannon	Painter
1963	Norman John Bumstead Mavis Doreen Marguerite Bumstead	Sheet metal worker Married woman
1968	Joseph Hanko Rosa Hanko	Labourer Labourer
1970	Alexander Micek Judy Micek	Labourer
1987	Malcolm Ernest George Katan Sandra Lee Katan	Unlisted / unknown
1995	*Environmental Planning and Assessment Act 1979* Minister	Unknown / none
2008	Western Sydney Parklands Trust	Unknown / none

Table 3.13: Lot 8 in DP 31130 (Superlot 2)

Date	Owner	Occupation / Landuse
1907	Ernest Victor Finckh	Agent
1921	Ellen Walker	Married woman

Date	Owner	Occupation / Landuse
1934	John Walker	Farmer
1958	Caroline Louise Walker	Widow
1960	Geoffrey Arthur Walker Janet Ord	Farmer Married woman
1960	St Ives Development Pty Ltd	Unknown / none
1967	Giovanni Cuda Silvana Cuda	Fitter mechanic Married woman
1979	*Environmental Planning and Assessment Act 1979* Minister	Unknown / none
2008	Western Sydney Parklands Trust	Unknown / none

Table 3.14: Lot A in DP 358346 (Superlot 2, Area A, Area X)

Date	Owner	Occupation / Landuse
1907	Ernest Victor Finckh	Agent
1921	Ellen Walker	Married woman
1934	Geoffrey Arthur Walker	Poultry farmer
1959	St Ives Development Pty Ltd	Unknown / none
1967	Giovanni Cuda Silvana Cuda	Fitter mechanic Married woman
1979	*Environmental Planning and Assessment Act 1979* Minister	Unknown / none
2008	Western Sydney Parklands Trust	Unknown / none

Table 3.15: Lots 5 and 6 in DP 830836 (Area X)

Date	Owner	Occupation / Landuse
	Ernest Victor Finckh	Agent
1921	Ellen Walker	Married woman
1934	Geoffrey Arthur Walker	Poultry farmer
1947	Frank Ellul	Carpenter
1949	Spiro Farrugia	Retiree
1961	Alexander Lawrence Farrugia Henry Samuel Farrugia	Driver Accounts clerk
1990	*Environmental Planning and Assessment Act 1979* Minister	Unknown / none
2008	Western Sydney Parklands Trust	Unknown / none

Table 3.16: Lots 3 and 4 in DP 830836 (Area X)

Date	Owner	Occupation / Landuse
1907	Ernest Victor Finckh	Agent
1934	James Smith Kelly	Farmer
1968	Italo Velardo Maria Lucia Veldaro	Poultry farmer Married woman
1980	*Environmental Planning and Assessment Act 1979* Minister	Unknown / none
2008	Western Sydney Parklands Trust	Unknown / none

Table 3.17: Lots 1 and 2 in DP 830836 (Area X)

Date	Owner	Occupation / Landuse
1907	Ernest Victor Finckh	Agent
1921	James Kelly	Labourer
1946	James Kelly Junior	Farmer
1954	Allen James Haley Elma May Haley	Farmer Married woman
1973	*Environmental Planning and Assessment Act 1979* Minister	Unknown / none
2008	Western Sydney Parklands Trust	Unknown / none

Table 3.18: Lot B in Section 8681 (Area X)

Date	Owner	Occupation / Landuse
1907	Ernest Victor Finckh	Agent
1922	George Thomas Griffin	Station manager
1954	Salvatore Vincenzo Belcastro	Market gardener
1997	*Environmental Planning and Assessment Act 1979* Minister	Unknown / none
2008	Western Sydney Parklands Trust	Unknown / none

Table 3.19: Lot 100 in DP 882326 and Lot 3 in DP 1041487 (Area X)

Date	Owner	Occupation / Landuse
1907	Ernest Victor Finckh	Agent
1950	James Kelly	Contractor

Date	Owner	Occupation / Landuse
1960	Edward Patrick Bartley Enid Dulcie Alice Bartley	Instructor of apprentices Married woman
1970	Ivan Ademovic Liljana Ademovic	Labourer Married woman
1995	Road and Traffic Authority of NSW	
1999	*Environmental Planning and Assessment Act 1979* Minister	Unknown / none
2008	Western Sydney Parklands Trust	Unknown / none

Table 3.20: Lot 2 in DP1041487 (Area X)

Date	Owner	Occupation / Landuse
1907	Ernest Victor Finckh	Agent
1946	James Gordon Jamieson	Poultry farmer
1951	Istvan Turoczy Margit Turoczy	Farmer Married woman
1952	Djuro Tramosljanin	Labourer
1956	Otto Boege Herta Boege	Machinist Married woman
1961	Stasys Narusevicius	Laboratory assistant
1974	State Planning Authority NSW / *Environmental Planning and Assessment Act 1979* Minister	Unknown / none
2008	Western Sydney Parklands Trust	Unknown / none

Table 3.21: Lot 1 in DP 1103025 (Area Y)

Date	Owner	Occupation / Landuse
Parcel 1		
1907	Ernest Victor Finckh	Agent
1922	Harry William Murkin Louisa Ann Murkin	Storeman
1946	Cecil Bernard Turner Gladys Turner	Dairy farmer
1948	Alfred Charles Crozier Leila Crozier	Farmer
1950	Commonwealth of Australia	Overseas communications purposes.
Parcel 2		
1907	Ernest Victor Finckh	Agent
1924	William Morrison	Labourer
1949	James Morrison	Farmer
1951	Commonwealth of Australia	Overseas communication purposes
Parcel 3		
1907	Ernest Victor Finckh	Agent
1918	Marion Beatrice Farrell	Married woman
1926	John Trigg	Labourer
1951	Commonwealth of Australia	Overseas communications purposes.
Parcel 4		
1907	Ernest Victor Finckh	Agent
1924	Louis James Kind	Book maker
1933	Herbert Hoare	Railway night officer
1937	Grace Caroline Olsson	Spinster
1951	Commonwealth of Australia	Overseas communications purposes.
Parcel 5		
1907	Ernest Victor Finckh	Agent
1926	Paul Healy	Farmer
1930	Gertrude Mary May Richardson	Spinster
1932	Grace Caroline Olsson	Spinster
1951	Commonwealth of Australia	Overseas communications purposes.
Parcel 6		
1907	Ernest Victor Finckh	Agent
1921	Camelo Francesco Zammit Giovanni Aquilina	Labourer Labourer
1924	Giovanni Farrugia Spiro Farrugia	 Poultry farmer
1927	Spiro Farrugia	Poultry farmer
1950	Commonwealth of Australia	Overseas communications purposes.
Parcel 7		
1907	Ernest Victor Finckh	Agent

Date	Owner	Occupation / Landuse
1937	James Abram	Labourer
1939	Janet Abram	Widow
1951	Commonwealth of Australia	Overseas communications purposes.
Parcel 8		
1899	Crown Parcel	Crown Reserve No. R 30199 for access to water
1953	Commonwealth of Australia	Presumed communication purposes.
Parcel 9		
?	Joseph Craven Bottomley	Poultry farmer
1924	Priscilla Jane Beers	Widow
1949	Commonwealth of Australia	Presumed communication purposes.

The consultant (CDM 2013) reported all parcels were transferred to the Minister for the *Environmental Planning and Assessment Act 1979* in 2001, before being transferred to the Western Sydney Parklands Trust in 2008.

3.4 Regulatory Searches

EPA Records

The consultant (DP 2009) conducted a search of the *Contaminated Land Management Act 1997* Register and found that the subject site was not registered. There also were no listed sites in close proximity to the site.

The consultant (DP 2009) also conducted a search of the public register provided under the *Protection of the Environment Operations Act 1997* and did not locate any listing for the subject site.

WorkCover Dangerous Goods Records

The consultant (CDM 2013) reported that a search of the Stored Chemical Information Data Base (SCID) and the micro-fiche records held by NSW WorkCover was conducted and did not identify any records regarding dangerous goods on the Site.

3.5 Previous Reports

The consultant (CDM 2013) included a report provided by E3 Consulting (now CDM Smith) as an appendix, consisting of a review of the initial Environmental Site Assessment conducted by Douglas Partners. The findings of the E3 report informed the writing of the SAQP (CDM 2012) for the follow up works conducted on the site.

The E3 (2012) report assessed the reliability and scope of the DP (2009) assessment. The findings included:

- The DP (2009) report was intended only as a preliminary investigation and further works would be required.
- Additional works should be undertaken to ascertain necessary remediation.
- E3 (2012) considered the DP (2009) report analytical quality to be poor, based on a poor QA/QC program and results. As such, E3 considered that the results could not be considered quantitatively reliable, particularly for VOCs.
- DP (2009) undertook no groundwater investigation and that NSW OEH guidelines required that a groundwater investigation be undertaken.
- The contents of stockpiles and fly-tipped material at the site might pose aesthetic issues and hence render it unsuitable for re-use on the site, requiring disposal offsite.

- DP (2009) did not complete review of Section 149 Certificates, NSW WorkCover Dangerous Goods records, or current and historical deeds for the site.
- Intrusive investigations of identified areas of environmental concern were conducted using very low sampling densities unable to be justified by reference to NSW Guidelines.
- Many samples were analysed only for asbestos, and did not adequately assess the chemical condition of soils.
- Several fly-tipped stockpiles were identified by DP (2009) but not sampled as part of the works.
- Test pits conducted in stockpiles on the southern part of the site were insufficient to assess chemical and physical contents of these stockpiles and hence were not able to assess whether these materials required offsite disposal or could be beneficially reused on site.

The consultant (E3 2012) recommended both further desktop and intrusive investigations be undertaken for the site.

3.6 Audit Findings

The site history information provided by the consultants (DP 2009 and CDM 2013) has been checked against, and generally meets the requirements of, OEH 2011.

Prior to ESA works as conducted by the consultant (CDM 2013), the auditor provided interim advice based on the review of the previous reports (DP 2009 and CDM 2012). The auditor generally considered DP 2009 can be used as part of the site audit, in conjunction with the results obtained from CDM 2013.

The consultants (DP 2009 and CDM 2013) did not undertake searches of relevant heritage databases. For the purposes of completeness, the auditor has undertaken these searches. For the NSW Heritage Database, several properties are listed as being located on Rooty Hill Road South, however none are located in the area of the site. For the Australian Heritage register, it is noted that the Rooty Hill park and recreation area has been nominated as an indicative place on the Australian heritage register. However, an application and/or data to support the nomination as a heritage area have not been submitted, nor has the heritage value been assessed. The nominated area appears to fall within the northern portion of the site. Records of the Heritage Register searches conducted are provided in **Appendix E**.

The extent of site history information presented by the consultant (CDM 2013) and the previous consultant (DP 2009) is considered adequately complete for the purposes of identifying a range of potential contamination issues at the site as part of the site investigation process.

4 Potential Contamination Issues

4.1 Potential Contamination Issues

Based on the site history review, the consultants (DP 2009 and CDM 2013) identified the following areas of potential contamination:

- Surface soils associated with agricultural use;
- Former market garden areas;
- Historic building locations;
- Asbestos piping used for drainage;
- Fly tipped stockpiles;
- Potential localised area of prior landfilling; and
- Fill materials of unknown origin.

Based on the identified potential contamination issues, the consultants (DP 2009 and CDM 2013) identified the following contaminants of potential concern (COPCs):

- Metals, including arsenic, cadmium, chromium, copper, manganese, mercury, nickel, zinc and/or lead.
- TPH/BTEX.
- PAHs.
- VOCs and sVOCs.
- OCPs.
- PCBs.
- Phenols.
- Asbestos.

4.2 Potentially Contaminated Media

The consultants (DP 2009 and CDM 2013) identified the COPCs may occur in natural soils, fill material, stockpiled materials and/or groundwater occurring at the site.

4.3 Audit Findings

The consultants (DP 2009 and CDM 2013) identified a number of potential contamination issues based on the findings of the site history review and the site inspection conducted as part of the investigations. The list of potential contaminants is considered to be suitable noting the site's history.

Overall, the auditor considers that the identified potential contamination issues and potentially contaminated media were appropriate for assessing the nature and extent of contamination present at the site.

5 Sampling Analytical and Quality Program

5.1 Sampling / Analytical Regime

The sampling/analytical regimes adopted as part of the intrusive soil and groundwater works (DP 2009 and CDM 2013) are summarised in **Table 5.1.**

The sample locations are shown on the consultants' sample location diagrams provided in **Appendix D**.

Table 5.1 Summary of Soil and Groundwater Sampling / Analytical Schedule (DP 2009 and CDM 2013)

Media	Area	No. Sampling Locations	General Depth Intervals (m)	Sampling Regime	No. Analyses (not incl. QA/QC)
DP 2009					
Soil	Site-Wide	19 Stockpiles 41 Surface	0.1-0.3 0.1-0.4 0.9-1.0 1.5-1.7 1.6-1.8	Judgmental	Asbestos - 37 Heavy Metals (HM) – 29 PAHs - 11 TPH - 6 BTEX – 6 PCBs – 6 OCPs - 28 Phenols - 6
Materials	Site-wide	14	Surface	Judgmental	Asbestos - 14
CDM 2013					
Soil	Site-Wide	Superlot 1 – 4 boreholes, 30 test pits and 9 stockpiles Area A – 3 test pits Area C – 4 test pits Superlot 2 – 27 test pits and 2 boreholes Area X – 47 test pits, 3 boreholes and 2 stockpiles Area Y – 15 test pits and 2 boreholes	0-0.05 0.1-0.15 0.2-0.25 0.2-0.3 0.3-0.4 0.45-0.55 0.5-0.6 0.55-0.65 0.9-1.0 0.95-1.05 1.2-1.3 1.4-1.5 1.5-1.6 1.8-1.9 2.4-2.5 2.5-2.6 3.0-3.1 3.5-3.6 4.0-4.1 4.5-4.6 5.0-5.1 5.5-5.6 6.0-6.1 6.5-6.6 7.0-7.1 7.5-7.6 8.0-8.1 8.5-8.6 9.0-9.1 9.5-9.6 10.0-10.1 10.5-10.6 10.9-11.0	Systematic	Heavy metals - 323 TPH - 278 BTEX - 278 OCPs - 323 PCBs - 174 VOCs – 174 sVOCs - 323 Asbestos - 173
Materials	Site-wide	33	Surface	--	Asbestos - 31
Groundwater	Site-wide	12	NA	--	Heavy metals - 12 TPH - 12 BTEX - 12 VOCs - 12 sVOCs - 12

5.2 Sampling Methodology

5.2.1 Soil Investigation

DP 2009

The consultant (DP 2009) reported soil sampling was undertaken as follows:

- Soil samples were collected directly from the backhoe or hand auger using disposable sampling equipment.
- Samples were then transferred into laboratory prepared glass jars, completely filled to ensure the headspace within the sample jar is minimised, and immediately capped jars with Teflon lined lids to minimise the loss of volatiles.
- Sample containers were labelled with unique identifiers, including the project number, sample location and sample depth. Sample jars were stored immediately within a cooled, insulated and sealed container for transport to the laboratory. In addition, replicate samples were collected at a rate of one-in-ten samples.

CDM 2013

The consultant (CDM 2013) reported soil sampling was undertaken as follows:

- Service location was undertaken prior to the start of investigation works on the site, using both a dial-before-you-dig search and an accredited service locator on site. Where services were identified within areas which required sampling proceed, boreholes were initially hand augered to 1 m depth to prevent damage to services, or moved to nearby areas which would not intercept services.
- Testpits were completed using a 6 or 8 tonne track mounted excavator operated by CMS Group. Testpits were advanced through fill materials and into natural soils. Following the completion of sampling works, testpits were reinstated prior to being flagged for subsequent surveying of the testpit locations. Samples were collected from the undisturbed materials in the centre of the excavator bucket or directly from the walls of the test pit using a hand protected by a nitrile glove.
- Boreholes were completed by a GeoProbe rig operated by TerraTest, using a direct push method. They were completed into natural soils below where groundwater occurred. Where refusal was met through direct push methods, solid flight augurs were used to advance the borehole to the desired depth. All boreholes were subsequently converted to groundwater monitoring wells and hence were widened using solid flight auger drilling methods. Samples were collected from each location directly from the centre of the push tube liner using a hand protected by a nitrile glove. In boreholes first advanced using a hand auger, soil was collected from the undisturbed materials at the centre of the hand auger using a hand protected by a nitrile glove. Samples were collected from each borehole from the surface between 0.0-0.05 m bgs, between 0.1-0.15 m bgs, at 0.5 m bgs, at 1.0 m bgs, and then at 0.5 m intervals or at changes in lithology until the completion depth was reached.
- Field logs were completed during all sampling and recorded soil/rock type, colour, grain size, sorting, inclusions, moisture conditions, staining and observation of any anthropogenic material (i.e. odours, waste materials).

- Additional soil from each sample depth range was placed in a sealed plastic bag for field screening purposes. After waiting approximately 5 minutes for the sample and the headspace to equilibrate the headspace in the bagged samples was assessed by a calibrated (100 ± 3 parts per million (ppm) isobutylene) photoionisation detector (PID) with a 10.6 eV lamp to measure the presence of total VOCs.
- The soil samples were collected in 125 mL of 250 mL jars supplied by the laboratory. All samples were clearly labelled with unique sample identification numbers consisting of the date, sample location, depth of sample and sampler's initials. In the case of field intra-laboratory and inter-laboratory duplicates, sample containers were labelled so as to not reveal their purpose or sample location to the laboratory.
- All samples were kept chilled in an ice-filled ice box prior to dispatch and during transport to the NATA registered laboratory under chain-of-custody procedures.

Asbestos Field Screening

The consultant (CDM 2013) reported samples collected for asbestos analysis from testpits were collected from undisturbed materials in the centre of the excavator bucket or directly from the walls of the test pit using a hand protected by a nitrile glove. Samples were placed immediately into a 0.5 L sealed bag.

The consultant (CDM 2013) reported additional bulk soil samples (10L) were collected from each sample location during testpitting works, and placed into a bucket for field screening for fibrous asbestos and/or asbestos containing materials. Field screening was reportedly undertaken in line with the WA DoH 2009 guidelines, where the bulk sample was passed through a <7mm sieve or spread out on a contrasting colour tarpaulin.

Additionally, the consultant (CDM 2013) reported where suspected asbestos containing materials >7x7 mm were identified these were collected into sealed plastic bags for analysis. No asbestos sampling was undertaken in boreholes due to insufficient material being recovered from the boreholes. Testpits were conducted in proximity to all boreholes to address asbestos concerns.

CDM (2013) reported reusable equipment was decontaminated during soil sampling and included the push-tube cutting shoe, solid flight augers and the excavator bucket. The push-tube cutting shoe was scrubbed clean using a wire brush between sample locations. The solid flight augur was not generally used to collect samples from, but was cleaned by dropping and scraping. The excavator bucket was cleaned by shaking free loose materials, and decontamination assured by collecting samples only from the centre of the bucket.

5.2.2 Groundwater Investigation

The consultant (CDM 2013) reported following the completion of boreholes, and the widening of the holes using solid flight augers, the wells were immediately installed as follows:

- The groundwater monitoring wells were constructed using Class 18 uPVC 50 mm inside diameter machine threaded casing and 0.4 mm slotted screen and casing.
- Once the well was in the ground, a filtered sand of 2 mm in diameter was introduced as a filter pack to reduce sediment infiltrating the well annulus. The filter pack was placed around the screened section of the well to approximately

0.5m above the top of the screen. Fine-grained bentonite pellets were placed above the sand filter pack around the well for 0.5 m and was slightly wetted to ensure an adequate seal was formed to prevent surface infiltration into the well. The remainder of the well was then backfilled using clean materials removed during drilling to approximately 0.2 m from the surface. A lockable well cap was then inserted and a steel well monument was installed and secured with concrete at the top to prevent tampering and damage.

- The wells were developed using a high powered submersible Monsoon Pump. The pump was used to disturb the water column within the well annulus to remove any groundwater and well debris that may have been introduced during the installation process. Development volumes were variable depending on the hydraulic conductivity; however, approximately 20 L was removed from each well or until the well was purged dry. Wells were then left to recharge and stabilise for approximately 7 days prior to purging and sampling.
- Measurement of the standing water level in each groundwater monitoring well was undertaken prior to purging, using an electronic interface probe. Both the standing water level and the depth to the base of the well were measured.
- All newly installed wells were purged using dedicated 'medical grade' bonded tubing and a low flow bladder pump. Purging was continued with frequent measurements of the water quality until the water quality parameters stabilised or until the well went dry.
- Water quality parameters including, temperature, electrical conductivity, dissolved oxygen, redox potential and pH were measured during purging using a calibrated water quality meter.
- Sampling of the monitoring wells was completed using the same methods as for purging and was only completed following the stabilisation of the water quality parameters. Samples were collected using the bladder pump directly into laboratory prepared bottles. Samples for heavy metals analysis were first filtered through 0.45 micron filters prior to being poured into a bottle. All bottles were then sealed immediately using a Teflon lined cap, labelled and placed on ice.
- All samples were clearly labelled with unique sample identification numbers consisting of the date, sample location and sampler's initials. All samples were kept chilled in an ice-filled ice box prior to dispatch and during transport to the NATA registered laboratory under chain-of-custody procedures.
- During the gauging of groundwater monitoring wells, the bladder pump, water quality meter and interface probe were reused. All three instruments were decontaminated between each well location by scrubbing with a solution of Decon 90 (a phosphate-free detergent) followed by a rinse in potable water.
- The groundwater purged from the wells during development and purging that did not contain odour, discolouration or sheen was discharged to ground at a distance of at least 10 m from the groundwater well to prevent infiltration back into the well annulus.

5.3 Laboratory Methods

The consultants (DP 2009 and CDM 2013) used laboratories which were NATA accredited for the chemical analyses undertaken. Envirolab Pty Ltd in Chatswood, NSW was the

primary analytical laboratory, and ALS Pty Ltd in Smithfield, NSW, was the secondary analytical laboratory during CDM (2013) soil analysis only.

The methods used by the laboratories as part of the site investigation programs are shown in **Table 5.2**.

Table 5.2 Laboratory Methods Used in Site Investigations

	Limit of Reporting			Laboratory Method
	ALS Soil (mg/kg)	Envirolab Soil (mg/kg)	Envirolab Groundwater (µg/L)	
METALS				
Arsenic	5	4	1	ICP-AES, ICP-OES, AAS
Cadmium	1	0.5	0.1	ICP-AES, ICP-OES, AAS
Chromium (Total)	2	1	1	ICP-AES, ICP-OES, AAS
Copper	5	1	1	ICP-AES, ICP-OES, AAS
Lead	5	1	1	ICP-AES, ICP-OES, AAS
Manganese		1	5	ICP-AES, ICP-OES, AAS
Mercury	0.1	0.1	0.05	CV-ICP-MS, FIMS
Nickel	2	1	1	ICP-AES, ICP-OES, AAS
Zinc	5	1	1	ICP-AES, ICP-OES, AAS
TOTAL PETROLEUM HYDROCARBONS				
C_6 – C_9 Fraction	n/a	25	10	Purge Trap-GC/MS, PT/GC/FID/MSD
C_{10} – C_{36} Fraction	200	250	250	GC/FID
MONOCYCLIC AROMATIC HYDROCARBONS (MAHs)				
Benzene	0.5	0.2-0.5	1	Purge Trap-GC/MS, PT/GC/FID/MSD
Toluene	0.5	0.5	1	Purge Trap-GC/MS, PT/GC/FID/MSD
Ethylbenzene	0.5	1	1	Purge Trap-GC/MS, PT/GC/FID/MSD
Xylenes	1.5	3	3	Purge Trap-GC/MS, PT/GC/FID/MSD
PAHs				
Benzo(a)pyrene	0.5	0.05	n/a	GC/MS
Naphthalene	0.5	0.1	n/a	GC/MS
Total PAHs	n/a	1.55	n/a	GC/MS
OCPs				
Aldrin	0.05	0.1	n/a	GC with dual ECDs
Dieldrin	0.05	0.1	n/a	GC with dual ECDs
Chlordane	0.05	0.1	n/a	GC with dual ECDs
DDT + DDD + DDE	0.3	0.3	n/a	GC with dual ECDs
Heptachlor	0.05	0.1	n/a	GC with dual ECDs
Semi-Volatile Organic Compounds (sVOCs)				
sVOCs (Individual)	0.05-1	0.1-10	10-100	GC/MS
Volatile Organic Compounds (VOCs)				
VOCs (Individual)	0.2-5	1	0.001-10	Purge Trap-GC/MS
Phenols				
Total Phenolics	n/a	5	n/a	Colorimetrically following distillation
PCBs				
Total PCBs	n/a	0.6-0.7	n/a	GC-ECDs, GC with dual ECDs
OTHER				
Asbestos	n/a	0.1 g/kg	n/a	PLM / Dispersion Staining

5.4 Quality Assurance / Quality Control (QA/QC)

The consultants (DP 2009 and CDM 2013) broadly developed pre-determined data quality indicators broadly based on the seven step process referred to in DEC 2006. Both a field and laboratory quality assurance/quality control (QA/QC) program was conducted during the site investigation works. Field QA/QC consisted of the following procedures:

- New (disposable) sampling equipment was used where possible for each sampling location.
- Equipment decontamination was conducted between sampling locations using phosphate free detergent and water.
- Collection and analysis of 'blind duplicate' soil and groundwater samples for a suite of potential chemicals of concern (intra or 'within' laboratory duplicates).
- Collection and analysis of 'split duplicate' (inter-laboratory) soil samples for a suite of potential chemicals of concern.
- Inclusion of trip spike and trip blank samples collected during a portion of the soil and groundwater sampling programs.
- Collection of rinsate samples to determine the potential for cross-contamination between samples occurring due to sampling equipment during groundwater sampling program.
- Transporting samples in ice-cooled chests, under chain of custody conditions, to laboratories that were NATA accredited for the analysis performed.

Laboratory QA/QC consisted of the following procedures:

- Analysis and reporting of laboratory duplicate samples.
- Analysis and reporting of laboratory method blank samples.
- Analysis and reporting of laboratory control samples.
- Analysis and reporting of laboratory control spikes, matrix and surrogate spikes.

The QA/QC undertaken by the consultant(s) has been reviewed and summarised in **Tables 5.3 and 5.4** against the PARCC parameters (precision, accuracy, representativeness, comparability and completeness).

Table 5.3 Investigation QA/QC summary (DP 2009)

Quality Indicator	Reported results	Meets the requirements of Site Audit?
Precision		
Intra-laboratory (blind) duplicates	Soil Frequency = 3/37 primary samples RPDs = 0% – 54%	Yes[1]
Inter-laboratory (split) duplicates	No triplicates collected	Partial[1]
Laboratory Duplicates	Soil Frequency = 5/37 primary samples RPDs = 0% - 29%	Yes
Accuracy		
Laboratory Control Samples	81% - 121%	Yes
Matrix Spike	80% - 128%	Yes
Surrogate Spikes	95% - 122%	Yes
Representativeness		
Sampling appropriate for media and analytes	Samples were generally collected using appropriate methods	Yes[1]
Rinsate blanks	No rinsates collected and analysed	Partial[1]
Trip spike	No trip spikes collected and analysed	Partial[1]
Trip blank	No trip blanks collected and analysed	Partial[1]
Laboratory blanks	<LOR for all reported sample batches	Yes
Samples extracted and analysed within holding times.	All samples extracted and analysed within holding times.	Yes
Comparability		
Standard operating procedures used for sample collection and handling	Suitable description of sampling procedures provided.	Yes
Standard analytical methods used for all analyses	Analytical methods were referenced and NATA Accredited	Yes
Consistent field conditions, sampling staff and laboratory analysis	Project team were identified and single primary laboratory used during each assessment	Yes
Limits of reporting appropriate and consistent	Reporting limits were less than the site criteria.	Yes
Completeness		
Soil logs completed and appropriate	No soil logs included in the report	Partial[1]
Appropriate & complete COC documentation	Complete & appropriate COCs in report	Yes
Satisfactory frequency and result for QC samples	The frequency and results reported as acceptable	Yes[1]
Data from critical samples valid	Critical sample data are considered valid	Partial[1]

[1] See discussion in **Section 5.5**.

Table 5.5 Investigation QA/QC summary (CDM 2013)

Quality Indicator	Reported results	Meets the requirements of Site Audit?
Precision		
Intra-laboratory (blind) duplicates	Soil Frequency = 34/323 primary samples RPDs = 0% – 158% Groundwater Frequency = 2/12 primary samples RPDs = 0% - 26%	Yes[1] Yes
Inter-laboratory (split) duplicates	Soil Frequency = 17/323 primary samples RPDs = 0% - 176% Groundwater None collected and analysed	Yes[1] Partial[1]
Laboratory Duplicates	Soil Frequency = 44/323 primary samples RPDs = 0% - 128% Groundwater Frequency = 2/12 primary samples RPDs = 0-7%	Partial[1] Yes
Accuracy		
Laboratory Control Samples	11% - 140%	Yes[1]
Matrix Spike	0, 62% - 140%	Yes[1]
Surrogate Spikes	19% - 140%	Yes[1]
Representativeness		
Sampling appropriate for media and	Samples were generally collected using	Yes

Quality Indicator	Reported results	Meets the requirements of Site Audit?
analytes	appropriate methods	
Rinsate blanks	No rinsate blanks collected for the soil sampling.	Partial[1]
	Two rinsate blanks collected for the groundwater investigation, all results <LOR.	Yes
Trip spike	Eight completed during soil works only results were within range; One trip spikes completed during groundwater sampling results were within range	Yes
Trip blank	Seven completed during soil works only results <LOR; no trip blanks completed during groundwater sampling	Partial[1]
Laboratory blanks	<LOR for all reported sample batches	Yes
Samples extracted and analysed within holding times.	All samples extracted and analysed within holding times.	Yes
Comparability		
Standard operating procedures used for sample collection and handling	Suitable description of sampling procedures provided.	Yes
Standard analytical methods used for all analyses	Analytical methods were referenced and NATA Accredited	Yes
Consistent field conditions, sampling staff and laboratory analysis	Project team were identified and single primary laboratory used during each assessment	Yes
Limits of reporting appropriate and consistent	Reporting limits were less than the site criteria. Except for the following groundwater analytes: • Pentachlorophenol LOR 100 µg/L and groundwater criteria of 10 µg/L and 22 µg/L. • DDT LOT 10 µg/L and groundwater criteria of 0.01 µg/L. • Endrin LOR of 10 µg/L and a groundwater criteria of 0.02 µg/L and 0.008 µg/L. • Lindane LOR of 10 µg/L and a groundwater criteria of 0.2 µg/L. • Heptachlor LOR of 10 µg/L and a groundwater criteria of 0.09 µg/L. • 2,4-dinitrophenol 100 µg/L and a groundwater criteria of 45 µg/L. • BaP LOR of 10 µg/L and a groundwater criteria of 0.1 µg/L.	Yes[1]
Completeness		
Soil logs completed and appropriate	Complete & appropriate soil logs in report	Yes
Appropriate & complete COC documentation	Complete & appropriate COCs in report	Yes
Satisfactory frequency and result for QC samples	The frequency and results reported as acceptable	Yes[1]
Data from critical samples valid	Critical sample data are considered valid	Yes

[1] See discussion in **Section 5.5**.

5.5 Audit Findings

DP 2009

The number of soil sampling locations adopted by the consultant (DP 2009) during the initial Phase 1 investigation provided limited coverage of the site noting the potential areas of concern and associated COPCs identified as part of the site history review, whilst taking into consideration the gaps in such information. The Phase 1 was designed as a preliminary assessment and sampling was conducted judgementally across the site. The auditor notes that the report (DP 2009) recommended further investigation across the site prior to assessing site suitability. The consultant (CDM 2012) prepared the SAQP after reviewing the previous report (DP 2009).

The sample intervals at each of the sampling locations were appropriate given the identified potential contamination sources at the site and the site geology. The sample depths were also appropriate to assess the vertical extent of contamination at the site.

The auditor notes that an additional groundwater assessment was recommended at the site (CDM 2012) as a groundwater assessment was not conducted by DP (2009).

The consultant (DP 2009) did not provide soil logs in the report. While this is considered a non-conformance, given the preliminary nature of this assessment and a Phase 2 ESA (CDM 2013) has since been conducted at the site this omission is considered unlikely to materially affect the outcome of the site audit.

The primary laboratory (Envirolab) employed for the chemical analyses used analytical methods which were considered appropriate for the identified COPCs at the site and were NATA accredited.

Sufficient soil intra-laboratory duplicates were collected and analysed as part of the ESA investigation (DP 2009). The relative percentage difference (RPDs) calculated for the intra-laboratory soil duplicates ranged between 0% - 54% with one RPD exceeding the DQI for zinc. Given that the samples were obtained from fill materials, the auditor considers that the higher than expected RPDs are attributable to sample heterogeneity, and is of the opinion that the isolated elevated RPD results do not affect the overall reliability of the analytical data.

The consultant (DP 2009) did not collect or analyse any inter-laboratory duplicates during the soil sampling program. While this is considered a non-conformance, given the preliminary nature of this assessment and a Phase 2 ESA (CDM 2013) has since been conducted at the site this exclusion is considered not to affect the overall reliability of the analytical data.

All internal laboratory duplicates and laboratory control samples reported by the primary laboratories were within the laboratory control limits. All matrix spike recoveries and surrogate spike recoveries reported by the primary laboratories were also within the control limits.

Holding time compliance reports provided by both laboratories confirmed that all samples were analysed within their holding times for all analyses undertaken.

Rinsate blank samples were not collected and analysed by the consultant (DP 2009). The consultant (DP 2009) provided soil samples were recovered directly from the auger by the Environmental Scientist using disposable latex gloves and no additional sampling equipment was utilised therefore negating the need for decontamination. The auditor considers this a non-conformance and does not accept the consultants (DP 2009) explanation. The auditor notes a rinsate blank should have been collected from the auger. However given this assessment was a Phase 1 with some preliminary sampling and subsequent investigations have occurred across the site (CDM 2013) this oversight is considered unlikely to materially affect the outcome of the site audit.

Laboratory prepared trip spikes and trip blanks were not submitted by the consultant (DP 2009), with no explanation provided. The auditor considers this a minor non-conformance unlikely to affect the representativeness of the data as the TPH and BTEX results of all soil sampling activities do not show a pattern of sustained elevated impact. As such, the BTEX/TPH concentrations in soil are considered representative of site conditions.

The consultant (DP 2009) did not report measure or record PID measurements. The auditor considers this a minor non-conformance unlikely to affect the representativeness of the data as soil samples were analysed by a NATA accredited laboratory.

The quality assurance/quality control measures employed by the consultant (DP 2009) were checked and found, overall, to adequately comply with the requirements outlined in OEH 2011, DEC 2006 and NEPC 1999. The laboratory QA/QC results have been reviewed and the results indicate that the analytical laboratories were achieving adequate levels of precision and accuracy during the time when samples from the site were being analysed. As such, the sampling, analytical and quality protocols undertaken by the consultant (DP 2009) were considered satisfactory. However, given the preliminary nature of the assessment these data should not be used in isolation for the purpose of assessing the contamination status of the site. The auditor notes an additional, more robust soil and groundwater investigation was conducted at the site by CDM Smith (CDM 2013). Both data sets should be used for the purpose of assessing the contamination status of the site.

CDM 2013

The number of soil sampling locations adopted by the consultant (CDM 2013) during the ESA investigation provided sufficient coverage of the site noting the potential areas of concern and associated COPCs identified as part of the site history review, whilst taking into consideration the gaps in such information.

The whole development area measures approximately 34 ha, however the development areas subject to this site audit are Superlot 1 and 2 and Areas A, C, X and Y. The consultant (CDM 2012 and 2013) provided the areas as follows:

- Superlot 1 – 4.76 ha;
- Superlot 2 – 4.29 ha;
- Area C, X and Y – 15.5 ha; and
- Area A – 0.78 ha.

Superlot 1 and 2 required a minimum of 50 sampling locations, Areas C, X and Y required additional sub-division and Area A required a minimum of 5, as outlined in Table A of EPA 1995. The previous consultant (DP 2009) conducted a total of 41 targeted surface sampling locations at the site, which did not meet the recommended minimum number of locations as outlined in EPA 1995. Additional sampling was recommended by the consultant (DP 2009) and documented in the SAQP (CDM 2012).

In general, the auditor considers the sampling density and strategy as adopted by the consultant (CDM 2012 and 2013) acceptable for the purposes of the Phase 2 ESA.

The sample intervals at each of the sampling locations were appropriate given the identified potential contamination sources at the site and the site geology.

The screen interval in all monitoring wells was installed targeting the natural materials (shale). The bentonite 'plug' at the monitoring well locations was generally installed approximately 0.5-1.0 m in thickness above the sand filter pack, thereby limiting the potential for surface water infiltration. Overall, the auditor considers that the monitoring wells were suitably constructed and developed to enable an assessment of groundwater quality at the site.

The groundwater sampling methods are considered appropriate given the geology encountered on-site. The majority of field parameters were within the 10% of each other upon sampling.

The analytical schedule is considered appropriately complete given the site history and the identified COPCs.

The primary laboratory (Envirolab) and the secondary laboratory (ALS) employed for the chemical analyses used analytical methods which were considered appropriate for the identified COPCs at the site and for which the laboratories were NATA accredited. Some of the LORs for SVOCs were higher than the adopted groundwater criteria however given no soil sources or impacts were identified this is considered a minor no-conformance and unlikely to affect the comparability of the data.

Sufficient soil intra-laboratory and soil inter-laboratory (split) duplicates were collected and analysed as part of the supplementary ESA investigation (CDM 2013). The RPDs calculated for the intra-laboratory soil duplicates ranged between 0% - 158% with a number of RPDs exceeding the DQI for metals. The RPDs calculated for the inter-laboratory duplicates ranged between 0% and 176% with a number of RPDs exceeding the DQI for metals. The consultant (CDM 2013) attributed the elevated RPD to sample heterogeneity. Given that the samples were obtained from fill materials, the auditor accepts the consultant's explanation of the higher than expected RPDs and is of the opinion that the isolated elevated RPD results do not affect the overall reliability of the analytical data.

However, the consultant (CDM 2013) did not include the ALS analytical certificates for the soil inter-laboratory duplicates and therefore the auditor cannot verify the results reported in the summary tables. While this is considered a non-conformance, given the sufficient intra-laboratory duplicates were collected and the results of all soil sampling activities do not show a pattern of sustained elevated impact (with the exception of some variable metals results, which is attributable to the natural background levels). As such, the concentrations in soil are considered representative of site conditions.

Sufficient groundwater intra-laboratory duplicates were collected and analysed as part of the ESA investigation (CDM 2013). The RPDs calculated for the intra-laboratory groundwater duplicates ranged between 0% - 26%, with no exceedances of the DQI.

While the consultant (CDM 2013) provided in the report that a groundwater inter-laboratory duplicate was collected no results were tabulated nor were any analytical certificates included. Therefore, the auditor is of the opinion that no groundwater inter-laboratory duplicates were collected and analysed. While this is considered a non-conformance, given the sufficient intra-laboratory duplicates were collected and the results of all groundwater sampling activities do not show a pattern of sustained elevated impact. As such, the concentrations in groundwater are considered representative of site conditions.

The internal laboratory duplicates analysed by the primary laboratory were generally within the control limits and do not indicate a sustained pattern of reduced precision by the testing laboratory, and are considered to confirm the overall reliability of the analytical data.

All laboratory control samples reported by the primary laboratory were within the laboratory control limits. All matrix spike recoveries and surrogate spike recoveries reported by the primary laboratory were within the control limits. Overall, the RPDs of laboratory control samples, matrix spike recoveries and surrogate spike recoveries do not indicate a sustained pattern of reduced precision by the testing laboratory and the accuracy of the results are acceptable for assessing the suitability of the environmental condition of the site.

Holding time compliance reports provided by the primary laboratory confirmed that all samples were analysed within their holding times for all analyses undertaken.

Chain of custody documentation was provided and generally complete.

Rinsate blank samples were collected during the groundwater investigation works conducted by the consultant (CDM 2013), with no COPCs reported above laboratory LORs.

No rinsate blank samples were collected during the soil sampling works as conducted by the consultant (CDM 2013). The consultant (CDM 2013) reported no rinsate samples were necessary as samples were collected using disposable nitrile gloves and taking the sample from the centre of the disposable push-tube liner or from undisturbed materials from the centre of the excavator bucket. The auditor notes that the analytical data presented by the consultant does not show a pattern of sustained elevated impact (with the exception of some variable metals results, which is attributable to the natural background levels). As such, the auditor does not believe these data have been compromised, and the lack of rinsate blank sample data across all soil sampling field works does not affect the overall reliability of the analytical data.

Eight laboratory prepared trip spikes were submitted by the consultant (CDM 2013) for the soil sampling works and one laboratory prepared trip spike was submitted by the consultant (CDM 2013) for the groundwater sampling works. All reported acceptable results.

Seven laboratory prepared trip blanks were submitted for the soil sampling works, all results were less than the LOR. Trip blanks were not submitted for the groundwater sampling works. The consultant (CDM 2013) did not discuss why no trip blanks were collected during groundwater sampling. The auditor considers this a minor non-conformance unlikely to affect the representativeness of the data as rinsate samples and trip spike samples were prepared and analysed for the groundwater sampling activities, with both sets of samples reporting favourable results. As such, the BTEX/TPH concentrations in groundwater are considered representative of site conditions.

The consultant (CDM 2013) provided calibration records for the PID and water quality meter for the respective sample dates.

The quality assurance/quality control measures employed by the consultant (CDM 2013) were checked and found, overall, to adequately comply with the requirements outlined in OEH 2011, DEC 2006 and NEPC 1999. The laboratory QA/QC results have been reviewed and the results indicate that the analytical laboratories were achieving adequate levels of precision and accuracy during the time when samples from the site were being analysed. As such, the sampling, analytical and quality protocols undertaken by the consultant (CDM 2013) were considered satisfactory and the data are considered to be adequately reliable for the purpose of assessing the contamination status of the site.

6 Assessment Criteria

6.1 Soil Criteria

At the time the ESA fieldworks were conducted, the consultant (CDM 2013) stated that the planned future use of the site will consist of mixed commercial and open space uses. Accordingly, the most stringent assessment criteria were used to consider these potential uses. The soils criteria used by the consultant (CDM 2013) for the investigation works at the site include Health-based Investigation Levels (HILs) for 'parks, recreational open space, playing fields including secondary schools' (Column 3, DEC 2006), 'commercial or industrial' (Column 4, DEC 2006), Provisional phytotoxicity based criteria (PILs) (Column 5, DEC 2006) and the Service Station Guidelines (EPA 1994), as presented in **Table 6.1**.

Table 6.1 Soil Criteria (CDM 2013)

Substance	Health-Based Investigation Criteria (Parks/open space) (HIL – E)[1]	Health-Based Investigation Criteria (Commercial/industrial) (HIL – F)[2]	NSW EPA 1994	Provisional Phytotoxicity Based Criteria (PIL)[3] (mg/kg)
Metals				
Arsenic	200	500	-	20
Cadmium	40	100	-	3
Chromium (III)	24%	60%	-	400
Chromium (VI)	200	500	-	1
Copper	2000	5000	-	100
Lead	600	1500	-	600
Manganese	3000	7500		
Mercury (inorganic)	30	75	-	1
Nickel	600	3000	-	60
Zinc	14000	35000	-	200
TPH				
TPH C_6 – C_9	-	-	65[4]	-
TPH C_{10} – C_{36}	-	-	1,000[4]	-
BTEX				
Benzene	-	-	1[4]	-
Toluene	-	-	1.4[4]	-
Ethyl benzene	-	-	3.1[4]	-
Total Xylene	-	-	14[4]	-
PAHs				
Benzo (a) pyrene	2	5	-	-
Total PAHs	40	100	-	-
PCBs				
Total PCBs	20	50	-	-
OCPs				
Aldrin+Dieldrin	20	50	-	-
Chlordane	100	250	-	-
DDT+DDD+DDE	400	1000	-	-
Heptachlor	20	50	-	-
Other				
Asbestos	-	-	-	-

Note 1: Health Based Investigation Levels for parks / open space, (Column 3, DEC 2006)
Note 2: Health Based Investigation Levels for commercial / industrial, (Column 5, DEC 2006)
Note 3: Provisional Phytotoxicity Based Investigation Levels (Column 5, DEC 2006)

In relation to asbestos in soil, the consultant (CDM 2013) adopted the criteria presented in WA DoH 2009[2]:

[2] *Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia,* WA Department of Health, May 2009 (WA DoH 2009)

- All uses: 0.001% w/w for friable asbestos (FA) and asbestos fines (AF) and no visible asbestos in surface soils (0 - 0.1 m bgs);
- Parks/Open Space – 0.02% w/w asbestos containing materials (ACM); and
- Commercial/Industrial – 0.05% w/w ACM.

6.2 Groundwater Criteria

The consultant (CDM 2013) reported the site and offsite areas are located in an urbanised area with ready access to reticulated, potable water. Therefore the potential for groundwater to be used for drinking water was considered negligible and the drinking water guidelines do not apply.

Similarly, the consultant (CDM 2013) reported the receiving water of Eastern Creek is not known to be used for recreational purposes and therefore the recreational water quality guidelines do not apply.

The groundwater criteria adopted by the consultant (CDM 2013) adopted during the investigation were based on trigger values relating to the protection of *"slightly to moderately disturbed ecosystems"* (fresh water) based on 95% protection levels (ANZECC/ARMCANZ 2000) as presented in **Table 6.2**.

Table 6.2 Groundwater Criteria (CDM 2013)

Substance	Trigger Values for protection of 95% of fresh water species (μg/L)[1]
Metals/metalloids	
Arsenic III	24
Cadmium	0.2
Chromium (VI)	1
Total Chromium	10
Copper	1.4
Lead	3.4
Manganese	1700
Mercury	0.6
Nickel	11
Zinc	8
Petroleum Hydrocarbons	
Benzene	950
Toluene	180[2]
Ethylbenzene	80[2]
m & p - Xylene	275[2]
PAHs	
Naphthalene	16
Benzo(a)pyrene	0.2[2]
Phenanthrene	2[2]
Anthracene	0.4[2]
Fluoranthene	1.4[2]
PCBs	
Arochlor 1016	0.001[2]
Arochlor 1232	0.3[2]
Arochlor 1242	0.3[2]
Arochlor 1248	0.03[2]
Arochlor 1254	0.01[4]
Arochlor 1260	25[2]
OCPs	
Aldrin	0.001[2]
Aldrin and Dieldrin	-
Heptachlor	0.01[4]
Endosulfan I	0.03[4]
Dieldrin	0.01[2]
Endrin	0.01[4]

Substance	Trigger Values for protection of 95% of fresh water species (μg/L)[1]
4,4-DDE	0.03[2]
4,4-DDT	0.0006[4]
Cis-Chlordane	0.03[4]
Endosulfan II	0.007[2]
Methoxychlor	0.005[2]
OPPs	
Fenitrothion	0.2
Dichlorvos	-
Demeton-S-methyl	0.04[2]
Monocroptophos	-
Malathion	0.05
Dimethoate	0.15
Diazinon	0.01
Parathion	0.004
Parathion-methyl	-
Chlorpyrifos	0.01
Primphos-ethyl	-
Chlorfenvinphos	-
Bromophos-ethyl	-
Ethion	-
Carbophenothion	-
Azinphos Methyl	0.01[2]

Note: 1. ANZECC/AMRCANZ (2000) 'Australian and New Zealand Guidelines for Fresh and Marine Water' – Protection of Freshwater Species, 95% Protection Level
2. ANZECC/AMRCANZ (2000) 'Australian and New Zealand Guidelines for Fresh and Marine Water' – Protection of Freshwater Species, Low Reliability Trigger Values
3. ANZECC/AMRCANZ (2000) 'Australian and New Zealand Guidelines for Fresh and Marine Water' – Protection of Freshwater Species, Moderate Reliability Trigger Values
4. ANZECC/AMRCANZ (2000) Trigger Value for 99% level protection (recommended for slightly to moderately disturbed ecosystems where chemicals may bioaccumulate or 95% provides inadequate protection for test species).

6.3 Audit Findings

The soil criteria adopted by the consultant (CDM 2013) have been checked against, and were consistent with, criteria endorsed by the EPA. Specifically, the consultant appropriately adopted the most conservative set of criteria relating to the mix of proposed future uses, consistent with guidance provided in DEC 2006.

The consultant (CDM 2013) adopted WA DoH 2009 for the asbestos criteria. In the absence of any NSW or national endorsed criteria for asbestos in soil, the auditor has exercised professional judgement in accordance with the requirements of DEC 2006 and is satisfied that the asbestos criteria in WA DoH 2009 are appropriately protective of human health and represent some, if not the most, conservative criteria for asbestos in soil in the world, as at the time of the audit. On this basis, the asbestos criteria adopted by the consultant are considered appropriate and accepted by the auditor for use in the assessment and validation of asbestos in soil at the site.

The consultant (CDM 2013) also took into consideration aesthetic issues (i.e., odours and discolouration) as part of the site assessment.

The groundwater investigation criteria adopted by the consultant have been checked against, and were sourced from relevant DECCW endorsed guidelines, namely ANZECC/ARMCANZ 2000. The adopted criteria are considered appropriate for assessing the potential impacts to ecological receptors relevant to the site setting (i.e., fresh water in a semi-urban environment).

Reference to each specific PAH, OCP, OPP, PCB etc groundwater criterion was not provided by the consultant in the report. For completeness, the auditor has provided these details in **Table 6.2**. Additionally, the criterion quoted for manganese by the

consultant was 1.9 mg/L, however the Auditor notes in ANZECC/ARMCANZ 2000 it is 1.7 mg/L, this has been provided in **Table 6.2**.

The consultant's exclusion of drinking water and recreational criteria in the groundwater assessment was based on site being located in an urbanised area and Eastern Creek is not known to be used for recreational purposes. The auditor does not accept this justification as appropriate, however, notes the estimated concentrations of total dissolved solids (TDS) provided by the consultant were sufficiently high to indicate groundwater would be unsuitable for drinking or recreational purposes. As such, the auditor considers the omission of drinking water guidelines as part of the groundwater assessment did not have any material impact on the conclusions drawn regarding groundwater quality or the potential migration of contamination from the site.

Overall, the auditor considers that the soil and groundwater criteria adopted by the consultant (CDM 2013) were appropriate for the nature of the investigation and for assessing the suitability of the site for the proposed uses.

7 Site Investigation Results

7.1 Field Observations

DP 2009

Field observations were summarised by the consultant (DP 2009) as follows:

- The stockpiles sampled in the southern portion of the site generally comprised a clayey matrix with various proportions of building rubble (concrete, brick, metals rods), rootlets, sandstone, plastics, cans, bottles, road base, pipes and scrap metal. Potential asbestos containing materials were noted in a few stockpiles.
- Building rubble was encountered within area of concern (AEC) 2 to AEC 17.
- Surface or near surface fragments of potential ACM were noted within AEC 2, 3, 5, 6, 7, 8, 10, 11 and 16.
- Ash was encountered in the surface profile at A2S1.
- Although the majority of the surface samples were logged as filling it is possible the ground surface had been disturbed through past demolition works giving the impression of non-natural soils.

CDM 2013

The consultant (CDM 2013) did not provide a summary of the field observations. The following has been summarised by the Auditor from the borelogs provided by CDM (2013):

- Superlot 1
    - Fill materials were encountered between approximately 0-1.1 m bgs and comprised dark brown silts and clays with inclusions of demolition waste, bricks, concrete, rusted metal, titles, roots, bitumen, rope, plastic, ceramic pipes, nails, cables, Steel, plastic bags at TP05L1, TP12L1, TP19L1, TP27L1, TP28L1, TP29L1, TP31L1, TP32L1 and TP33L1.
    - Natural materials were encountered between approximately 0-5.6 m bgs and comprised brown clayey silt to brown/orange silty clay with brown/grey mottles and rootlets trace gravels.
    - Shale was encountered from 3.4 m bgs to greater than 11 m bgs.
    - Nine stockpiles were identified – fill plastic, bricks, concrete, steel, brown silt, roots, demolition waste, bitumen, cement, gravels, steel pipes, wood, corrugated iron, rocks, tyres, underlain by brown silty clay with grey mottles
    - Tar odour was noted at TP27L1, TP29L1, TP31L1, TP32L1 and SP2L1a-b-c within fill.
- Superlot 2
    - Fill materials were encountered between approximately 0-0.5 m bgs and within four stockpiles and comprised brown silts, sands, clays, with inclusions of concrete and potential ACM, cement fragments, bricks, concrete, roots, plastic, steel, gravels, organics at TP5L2, TP11L2, TP18L2, TP22L2, TP23L2, TP28L2, TP29L2, TP33L2.

- Natural materials were encountered between approximately 0-2.4 m bgs and comprised brown clayey silt to brown/orange silty/gravelly clay with brown/grey/red mottles and rootlets trace gravels and weathered shale.
- Shale was encountered from 0.8 m bgs to greater than 10 m bgs.
- Black ash material noted at 0.4 mbgl in TP23L2.

- Area A
  - Natural materials were encountered between approximately 0-1 m bgs and comprised brown clayey silt to brown/orange silty/gravelly clay with brown/grey/red mottles and rootlets trace gravels and weathered shale.
- Area C
  - Fill materials were encountered between approximately 0-0.1 m bgs and comprised dark brown and grey road base silts, gravels and roots with bitumen.
  - Natural materials were encountered between approximately 0-1 m bgs and comprised brown clayey silt to brown/orange silty/gravelly clay with brown/grey/red mottles and rootlets trace gravels and weathered shale.
  - Shale was encountered from 0.6 m bgs to greater than 1 m bgs.
- Area X
  - Fill materials were encountered between 0-0.8 mbgs and comprised brown/black silt, demolition waste, gravels, bricks, metal pipe, roots, asphalt, plastic, charcoal, rubbish, wood, tiles, bottles, concrete (TP11X, TP15X, TP18X, TP28X, TP29X, TP36X, TP38X, TP42X and TP47X).
  - Natural materials were encountered between approximately 0-4.5 m bgs and comprised brown clayey silt to brown/orange silty/gravelly clay with brown/grey/red mottles and rootlets trace gravels and weathered shale.
  - Shale was encountered from 3.3 m bgs to greater than 6 m bgs.
  - A sulphur odour was noted at TP47X at 0.5 m bgs.
- Area Y
  - Fill materials were encountered between 0-0.05 mbgs and comprised brown silts with demolition waste, tiles, bricks, concrete and roots (TP6Y).
  - Natural materials were encountered between approximately 0-5.4 m bgs and comprised brown clayey silt to brown/orange silty/gravelly clay with brown/grey/red mottles and rootlets trace gravels and weathered shale.
  - Shale was encountered from 1.4 m bgs to greater than 8 m bgs
- A PID was used to screen any volatile hydrocarbons during the investigation; no significant volatile hydrocarbons were detected during the investigation during screening.
- No oily substances or petroleum hydrocarbon odour were observed in the groundwater during monitoring well development, purging and groundwater sampling. A slight sulphur odour was noted during purging of BH7L1 and BH30L1.

- The inferred groundwater flow direction for groundwater present in the natural materials underlying the site was calculated in a north-easterly direction.
- Groundwater quality parameters during groundwater sampling were reported as follows:
    - pH ranged from 6.01 to 6.81.
    - Electrical conductivity ranged from 17.95 mS/cm to 31.778 mS/cm.
    - Dissolved oxygen ranged from 0.83 mg/L to 3.8 ppm.
    - Redox potential ranged from -58.8 mV to 130.7 mV.

7.2 Soil Investigation Results

The consultant (DP 2009 and CDM 2013) provided summary results tables (**Appendix F**) in addition to detailed laboratory reports and chain of custody documentation. In comparison to the adopted soil criteria (**Section 6.1**), the following results for the site were reported.

7.2.1 Metals

DP 2009

The reported concentrations of arsenic in the soils samples ranged from 4 mg/kg to 19 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of cadmium in the soil samples ranged from less than the LOR to 2.9 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of chromium in the soil samples ranged from 15 mg/kg to 46 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of copper in the soil samples ranged from 8 mg/kg to 40 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of lead in the soil samples ranged from 23 mg/kg to 1400 mg/kg at sample Ax4S1, with one reported concentration (Ax4S1) exceeding the adopted PIL and HIL-E and none exceeding the adopted HIL-F.

The reported concentrations of mercury in the soil samples ranged from less than the LOR to 1 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of nickel in the soil samples ranged from 5 mg/kg to 32 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of zinc in the soil samples ranged from 11 mg/kg to 1600 mg/kg, with seven reported concentrations exceeding the adopted PIL and no reported concentrations exceeding the adopted HIL-E and HIL-F.

CDM 2013

Superlot 1

The reported concentrations of arsenic in the soils samples ranged from <4 mg/kg to 20 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of cadmium in the soil samples ranged from less than the LOR (0.5 mg/kg) to 4.5 mg/kg, with two reported concentrations exceeding the adopted PIL and no reported concentrations exceeding the adopted HIL-E and HIL-F.

The reported concentrations of chromium in the soil samples ranged from 3 mg/kg to 36 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of copper in the soil samples ranged from 4 mg/kg to 120 mg/kg, with two reported concentrations exceeding the adopted PIL and no reported concentrations exceeding the adopted HIL-E and HIL-F.

The reported concentrations of manganese in the soil samples ranged from 5 mg/kg to 2300 mg/kg, with 38 reported concentrations exceeding the adopted PIL and no reported concentrations exceeding the adopted HIL-E and HIL-F.

The reported concentrations of mercury in the soil samples ranged from less than the LOR (0.1 mg/kg) to 2.2 mg/kg, with one reported concentrations exceeding the adopted PIL and no reported concentrations exceeding the adopted HIL-E and HIL-F.

The reported concentrations of nickel in the soil samples ranged from 2 mg/kg to 47 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of lead in the soil samples ranged from 6 mg/kg to 610 mg/kg, with one reported concentration (SP6L1-0-0.05) exceeding the adopted PIL and HIL-E and none exceeding the adopted HIL-F.

The reported concentrations of zinc in the soil samples ranged from 4 mg/kg to 3400 mg/kg, with 14 reported concentrations exceeding the adopted PIL and no reported concentrations exceeding the adopted HIL-E and HIL-F.

Superlot 2 and Area A

The reported concentrations of arsenic in the soils samples ranged from <4 mg/kg to 24 mg/kg, with one reported concentrations exceeding the adopted PIL and no reported concentrations exceeding the adopted HIL-E and HIL-F.

The reported concentrations of cadmium in the soil samples ranged from less than the LOR (0.5 mg/kg) to 1 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of chromium in the soil samples ranged from 10 mg/kg to 38 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of copper in the soil samples ranged from 7 mg/kg to 192 mg/kg, with one reported concentration exceeding the adopted PIL and no reported concentrations exceeding the adopted HIL-E and HIL-F.

The reported concentrations of manganese in the soil samples ranged from 9 mg/kg to 3700 mg/kg, with 44 reported concentrations exceeding the adopted PIL and two reported concentrations (TP9L2-0-0.05, 3700 mg/kg and TP7L2-0-0.05, 3300 mg/kg) exceeding HIL-E and none exceeding the HIL-F.

The reported concentrations of mercury in the soil samples ranged from less than the LOR (0.1 mg/kg) to 1.6 mg/kg, with one reported concentrations exceeding the adopted PIL and no reported concentrations exceeding the adopted HIL-E and HIL-F.

The reported concentrations of nickel in the soil samples ranged from 2 mg/kg to 25 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of lead in the soil samples ranged from 6 mg/kg to 300 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of zinc in the soil samples ranged from 6 mg/kg to 451 mg/kg, with nine reported concentrations exceeding the adopted PIL and no reported concentrations exceeding the adopted HIL-E and HIL-F.

Area Y

The reported concentrations of arsenic in the soils samples ranged from <4 mg/kg to 8 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of cadmium in the soil samples were less than the LOR (0.5 mg/kg), with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of chromium in the soil samples ranged from 7 mg/kg to 24 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of copper in the soil samples ranged from 4 mg/kg to 29 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of manganese in the soil samples ranged from 6 mg/kg to 2300 mg/kg, with 15 reported concentrations exceeding the adopted PIL and no reported concentrations exceeding the adopted HIL-E and HIL-F.

The reported concentrations of mercury in the soil samples ranged from less than the LOR (0.1 mg/kg) to 0.1 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of nickel in the soil samples ranged from 2 mg/kg to 16 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of lead in the soil samples ranged from 6 mg/kg to 78 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of zinc in the soil samples ranged from 3 mg/kg to 140 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

Area X

The reported concentrations of arsenic in the soils samples ranged from <4 mg/kg to 29 mg/kg, with one reported concentrations exceeding the adopted PIL and no reported concentrations exceeding the adopted HIL-E and HIL-F.

The reported concentrations of cadmium in the soil samples ranged from less than the LOR (0.5 mg/kg) to 22 mg/kg, with one reported concentrations exceeding the adopted PIL and no reported concentrations exceeding the adopted HIL-E and HIL-F.

The reported concentrations of chromium in the soil samples ranged from 7 mg/kg to 110 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of copper in the soil samples ranged from 4 mg/kg to 11 000 mg/kg, with two reported concentrations exceeding the adopted PIL and one concentration TP47x-0.1-0.15 exceeding both the HIL-E and HIL-F. All remaining concentrations were below adopted HIL-E and HIL-F.

The reported concentrations of manganese in the soil samples ranged from 4 mg/kg to 4600 mg/kg, with 61 reported concentrations exceeding the adopted PIL and the following seven concentrations exceeded HIL-E, none exceeded HIL-F:

- BH20X-1.5-1.6 – 3100 mg/kg.
- TP21X-0-0.05 – 3800 mg/kg.
- BH22X-0-0.05 – 3900 mg/kg.
- TP23X-0-0.05 – 3200 mg/kg.
- TP24X-0.1-0.15 – 3400 mg/kg.
- TP28X-0.1-0.15 and its duplicate QAQC29 – 3900 mg/kg and 4600 mg/kg, respectively.

The reported concentrations of mercury in the soil samples ranged from less than the LOR (0.1 mg/kg) to 0.4 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of nickel in the soil samples ranged from 2 mg/kg to 98 mg/kg, with two reported concentrations exceeding the adopted PIL and no reported concentrations exceeding the adopted HIL-E and HIL-F.

The reported concentrations of lead in the soil samples ranged from 4 mg/kg to 1100 mg/kg, with two reported concentrations (TP47x-0.1-0.5, 1100 mg/kg and TP47x-0.-0.4, 770 mg/kg) exceeding the adopted PIL and HIL-E and none exceeding the adopted HIL-F.

The reported concentrations of zinc in the soil samples ranged from 7 mg/kg to 6800 mg/kg, with six reported concentrations exceeding the adopted PIL and no reported concentrations exceeding the adopted HIL-E and HIL-F.

Area C

The reported concentrations of arsenic in the soils samples ranged from <4 mg/kg to 13 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of cadmium in the soil samples ranged from less than the LOR (0.5 mg/kg) to 0.6 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of chromium in the soil samples ranged from 3 mg/kg to 36 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of copper in the soil samples ranged from 7 mg/kg to 90 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of manganese in the soil samples ranged from 18 mg/kg to 770 mg/kg, with three reported concentrations exceeding the adopted PIL and no reported concentrations exceeding the adopted HIL-E and HIL-F.

The reported concentrations of mercury in the soil samples ranged from less than the LOR (0.1 mg/kg) to 0.1 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of nickel in the soil samples ranged from 3 mg/kg to 34 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of lead in the soil samples ranged from 7 mg/kg to 23 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

The reported concentrations of zinc in the soil samples ranged from 8 mg/kg to 57 mg/kg, with no reported concentrations exceeding the adopted PIL or the adopted HIL-E and HIL-F.

7.2.2 TPH / BTEX

The reported concentrations of BTEX compounds and TPH C_6-C_9 were all below the laboratory LORs reported in both DP (2009) and CDM (2013).

The reported concentrations of TPH C_{10}-C_{36} in the analysed soil samples from both DP (2009) and CDM (2013) ranged from less than the LOR to 2560 mg/kg at TP27L1B 0.1-0.15 within Superlot 1 (CDM 2013). This sample and surface sample TP05L1 exceeded the adopted soil criterion (1000 mg/kg). All remaining analysed samples were below the adopted soil criterion.

7.2.3 VOCs

The reported concentrations of VOCs in the analysed soil samples from CDM (2013) were all below the laboratory LORs.

7.2.4 OCPs / PCBs

The reported concentrations of PCBs in the analysed soil samples were all below the laboratory LORs during both investigations (DP 2009 and CDM 2013).

The reported concentrations of OCPs in the analysed soil samples from both investigations (DP 2009 and CDM 2013) ranged from less than the laboratory LORs to 2.9 mg/kg of DDD/DDE/DDT detected in SP6L1-0-0.05 within Superlot 1 (CDM 2013). Additionally, Aldrin/Dieldrin was detected within one sample (SP4L1-0.5-0.6) at 0.55 mg/kg also within Superlot 1 (CDM 2013). No reported concentrations within DP (2009) and CDM (2013) exceeded adopted HIL-E and HIL-F.

7.2.5 SVOCs and PAHs

The reported concentrations of SVOCs in the analysed soil samples from CDM (2013) were below the laboratory LORs, with the exception of the following:

- Bis-2-ethylhexyl phthalate detected at TP05L1 (5 mg/kg).
- Diethyl phthalate detected at TP31L1-0.5-0.6 (3 mg/kg).
- Di-n-butyl phthalate detected at TP32L12-0-0.05 (3 mg/kg).

The reported concentrations of benzo(a)pyrene in the analysed soil samples from both investigations (DP 2009 and CDM 2013) ranged from less than the LOR to 2 mg/kg at sample TP48x-0-0.05 located within Area X. No reported concentrations within DP (2009) and CDM (2013) exceeded adopted HIL-E and HIL-F.

The reported concentrations of total PAHs in the analysed soil samples from both investigations (DP 2009 and CDM 2013) ranged from less than the LOR to 16 mg/kg at sample TP48x-0-0.05 located within Area X. No reported concentrations within DP (2009) and CDM (2013) exceeded adopted HIL-E and HIL-F.

7.2.6 Asbestos

During the DP (2009) investigation 16 fragments were reported to contain asbestos collected from locations across the site.

During the CDM (2013) investigation the consultant reported the following:

- Superlot 1 - one fragment was analysed from TP16L1 and reported to contain asbestos. Additionally, two soil samples were reported to contain ACM (SP8L1-0-0.05 and SP9L1-0-0.05) above the laboratory LOR. One of these samples was also reported to contain asbestos fines (SP9L1-0-0.05). The remaining soil samples analysed were reported as non-detect for asbestos.
- Superlot 2 and Area A – 12 fragments were analysed and all were found to contain asbestos. Additionally, two soil samples were reported to contain ACM (TP24L2 and QA55) above the laboratory LOR. No soil samples analysed were reported to contain asbestos fines. The remaining soil samples analysed were reported as non-detect for asbestos.
- Area X – six fragments were analysed and five were reported to contain asbestos. Additionally, one soil sample was reported to contain ACM (TP47x-0-0.5) above the laboratory LOR and one soil sample was reported to contain asbestos fines (TP21x-0-0.05) above the laboratory LOR. The remaining soil samples analysed were reported as non-detect for asbestos.
- Area C and Y – all soil samples analysed for asbestos were reported as non-detect.

7.3 Groundwater Investigation Results

The consultant (CDM 2013) provided summary results tables (**Appendix F**) in addition to detailed laboratory reports and chain of custody documentation. In comparison to the adopted groundwater criteria (**Section 6.2**), the following results were reported.

7.3.1 Metals

- The reported concentrations of arsenic in the groundwater samples were all <1 µg/L, with no reported concentrations exceeding the adopted groundwater criteria.
- Concentrations of cadmium in the groundwater samples ranged from <0.1 µg/L to 1 µg/L, with five reported concentrations exceeding the adopted groundwater criteria.
- Concentrations of chromium in the groundwater samples ranged from <1 µg/L to 1 µg/L, with no reported concentrations exceeding the adopted groundwater criteria.
- Concentrations of copper in the groundwater samples ranged from <1 µg/L to 2 µg/L, with one reported concentrations exceeding the adopted groundwater criteria.
- Concentrations of manganese in the groundwater samples ranged from 420 µg/L to 19 000 µg/L, with eight reported concentrations exceeding the adopted groundwater criteria.
- Concentrations of mercury in the groundwater samples were all reported at levels less than the LOR (< 0.05 µg/L).
- Concentrations of nickel in the groundwater samples ranged from <1 µg/L to 20 µg/L, with one reported concentration exceeding the adopted groundwater criteria.
- Concentrations of lead in the groundwater samples were all reported at levels less than the LOR (< 1 µg/L).
- Concentrations of zinc in the groundwater samples ranged from 26 µg/L to 990 µg/L, with all reported concentrations exceeding the adopted groundwater criteria.

7.3.2 TPH/BTEX

TPHs and BTEX in the analysed groundwater samples were reported at concentrations less than the laboratory LORs in all analysed samples.

7.3.3 VOCs and SVOCs

VOCs and SVOCs in the analysed groundwater samples were reported at concentrations less than the laboratory LORs in all analysed samples.

7.4 Consultants Interpretation and Conclusions

7.4.1 Soil

The consultant (DP 2009) concluded the following in in relation to soil contamination at the site:

- Is not environmentally suitable for redevelopment, due primarily to the presence of asbestos on the ground surface in a number of areas and to a lesser extent the presence of dumped stockpiles / fly tipping of soils and building rubble. The site can be made suitable for redevelopment following the remediation and/or management of the identified contamination.

The consultant (CDM 2013) reported the following in in relation to soil contamination:

- Superlot 1
    - All metals concentrations were below the industrial health criteria.
    - Mean concentrations of manganese and zinc in soil within the proposed shale woodlands area in the northeast were above ecotoxicity criteria but within published background soil metals concentrations (NEPC 1999).
    - No management of heavy metals impacted soil was considered necessary.
    - The TPH C_{10}-C_{36} concentration in TP27L1 and TP05L1 contain some bitumen waste and should be managed for aesthetics. No evidence of hydrocarbons was detected in surrounding soil.
    - ACM present in the surface soils in locations TP16L1, SP8L1, and SP9L1 will require management.
    - Waste material was identified in several locations in the southern portion of the lot. No waste materials were identified in the woodland areas.
- Superlot 2 and Area A
    - All metals concentrations were below the industrial health criteria. Locations with exceedances of metals concentrations in soil above the ecological criteria did not show signs of stress to vegetation.
    - No actions or management of heavy metals impacted soil was considered necessary.
    - No significant organic compound concentrations were detected in soil within the lots.
    - ACM present at locations TP5L2, TP6L2, TP22L2, TP6L2, TP24L2, TP27L2, TP28L2, TP29L2, TP31L2, and TP32L2 will require management.
    - Waste materials were identified in several locations in the southwest, west, northwest and northeast which will require management.
    - Wastes identified in woodland areas will require control under a Long term Environmental Management Plan (LEMP).
- Area C
    - Mean metal concentrations in soil were below the ecotoxicity and all health related criteria. Locations with exceedances of metals concentrations in soil above ecological criteria did not show signs of stress to vegetation.
    - No actions or management of heavy metals impacted soil was considered necessary.
    - Samples collected from bituminous material on Beggs Road contained TPH. No other significant organic compound concentrations were detected in soil within Area C. No management actions required.
    - ACM was not detected in Area C.
    - Waste material identified in Area C comprised bitumen road base which will require management.
- Area X

- Mean metals concentrations in soil were below the ecotoxicity and all health related criteria, with exception of manganese and zinc which were above background ranges. There was no evidence of effect on the abundant grasses, shrubs and trees at the Site.
- No actions or management of heavy metals impacted soil was considered necessary, with exception of location TP47X to approximately 0.4 mbgs or until no waste is visually identified.
- No significant organic compound concentrations were detected in soil.
- ACM contained in the surface soils in locations TP11X, TP21X, TP38X2, TP43X, and TP47X will require management.
- Waste material was identified in several locations across the area that will require management.

- Area Y
  - Mean metals concentrations in soil were below the ecotoxicity and all health related criteria. Locations with exceedances of metals concentrations in soil above ecological criteria did not show signs of stress to vegetation.
  - No actions or management of heavy metals impacted soil was considered necessary.
  - No significant organic compound concentrations were detected in soil.
  - ACM was not detected in Area Y.
  - Waste materials were detected at TP06Y on the western edge of the proposed detention basin and will require management.

The site may be developed for the proposed uses through the implementation of a remediation strategy and Remediation Action Plan (RAP) for each proposed development area.

An excavation program can be optimised to allow the placement of impacted soils, waste and ACM below hard standing areas and minimise the need for off-site disposal.

7.4.2 Groundwater

The consultant (CDM 2013) reported the following in in relation to groundwater contamination:

- Concentrations of TPH, BTEX, VOCs, and SVOCs were not detected in any groundwater samples in any locations across the Site.
- For SVOCs pentachlorophenol, DDT, endrin, g-BHC (lindane), heptachlor, and 2,4-dinitrophenol laboratory limits of reporting for water analysis were greater than the ANZECC/ARMCANZ 2000 trigger value concentrations. Since these contaminants were not detected in soil, and no concentrations of SVOCs were detected in groundwater at the Site, analyses at lower detection limits was not considered necessary, and the analyses performed are satisfactory.
- ANZECC/ARMCANZ 2000 low reliability trigger values can be incorporated for analytes that do not have high reliability trigger values (i.e. some metals, SVOCs (OCPs, PAHs), however given that metals were detected and are considered

indicative of background ranges, and SVOC concentrations were not detected in any concentrations the trigger values included in the laboratory report are considered suitable.

- Heavy metals in filtered samples collected from several monitoring wells at the Site indicated heavy metals above the ANZECC 2000 freshwater guidelines for protection of aquatic ecosystems, including cadmium, copper (BH17Y location only), manganese, nickel (in BH20X location only), and zinc. Zinc was detected at a mean value of 0.47 µg/L, and present in all groundwater samples above the ANZECC 2000 freshwater criteria.

The consultant (CDM 2013) concluded groundwater at the site contained heavy metal concentrations above freshwater ecosystem criteria, but the source of heavy metals is likely off-site, and any risk to identified potential receptors is considered low. The consultant noted that manganese concentrations in groundwater in the region of the site are known to be elevated. No management/remediation of groundwater is required.

7.5 Audit Findings

The consultant (DP 2009) provided tables that were generally accurate and complete.

The consultant (CDM 2013) provided tables that were generally accurate and complete, with the following exceptions:

- TPH, BTEX and metals results for a number of soil samples were not presented in the summary tables (specifically, Table 1A as provided in CDM 2013), however, these sample results were provided in a draft version of the report (dated 12 December 2012). It is unclear as to why these sample results were not summarised in the final report. These samples include the following:
    - TP21L1 0.0-0.05 and TP21L1 0.3-0.4;
    - TP22L1 0.0-0.05 and TP22L1 0.1-0.15;
    - TP23L1 0.0-0.05 and TP23L1 0.45-0.55;
    - TP24L1 0.0-0.05 and TP24L1 0.95-1.05;
    - TP25L1 0.0-0.05 and TP25L1 0.1-0.15;
    - TP26L1 0.0-0.05 and TP26L1 0.1-0.15;
    - TP27L1 0.0-0.05, TP27L1B 0.1-0.15 and TP27L1 0.9-1.0;
    - TP28L1 0.0-0.05, TP28L1 0.45-0.55 and TP28L1 1.2-1.3;
    - TP29L1 0.0-0.05 and TP29L1 0.1-0.15;
    - BH30L1 0.0-0.05, BH30L1 0.1-0.15, BH30L1 4.0-4.1, and BH30L1 8.0-8.1; and
    - TP31L1 0.0-0.05 and TP31L1 0.5-0.6;
- It is noted the above listed sample results were generally consistent with no results reported at concentrations exceeding the laboratory LORs and/or adopted SAC with the following exceptions:
    - Manganese was reported at concentrations exceeding the adopted SAC in the majority of the above referenced samples;

- Zinc was reported at concentrations exceeding the adopted SAC in samples TP21L1 0.0-0.05, TP28L1 0.0-0.05, TP28L1 0.45-0.55 and BH30L1 0.1-0.15; and
- TPH C_{10}-C_{36} was reported at a concentration exceeding the adopted SAC in sample TP27L1B 0.1-0.15.

- Samples TP9L1 0.0-0.05 and TP9L1 0.1-0.15 (collected 26/09/2012) were incorrectly referenced as TP19L1 0.0-0.05 and TP19L1 0.1-0.15, respectively, on Tables 1A, 1B, 1C and 1D.
- A number of manganese sample results on Table 1A were bolded to indicate a guideline exceedance, however, some of these results were reported below the adopted SAC and as such did not require bolding.
- Sample TP29L1 0.0-0.05 on Table 1B indicates VOCs were not analysed, however, a full VOC analysis was conducted on this sample with all results reported at levels <LOR.
- Low levels of SVOCs were reported for sample TP29L1 0.0-0.0.5, however, these results were incorrectly reported as <LOR on Table 1C. All results reported at levels exceeding the laboratory LOR for this sample were below the adopted SAC (where applicable).
- Asbestos analysis corresponding to sample TP29L1 0.0-0.05 was not summarised on Table 1D (no asbestos was detected in this sample).
- Sample SP28L2 as collected from a stockpile on 3 October 2012 is mislabeled as SP29L2 on Table 2D.
- Samples BH22X 0.0-0.05 and BH22X 0.5-0.6 as provided in Envirolab report #79126 are incorrectly labeled on Table 3D as samples BH22Y 0.0-0.05 and BH22Y 0.5-0.6. In addition, sample BH17Y 0.0-0.05 is incorrectly labeled on Table 3D as sampled on 12 September 2012 (this sample was collected on 19 September 2012).
- Asbestos analysis corresponding to samples TP9X and TP46X were not summarised on Table 4D (no asbestos was detected in these samples). In addition, material sample TP47X was note summarised on Table 4D (this material was confirmed as containing asbestos).
- Sample TP1X 0.0-0.05 as collected on 3 October 2012 is mislabeled as TP2X 0.0-0.05 on Table 4D.

Groundwater was present at the site within the natural clay/shale formation, with no indication of significant groundwater contamination by the contaminants identified in the fill and waste material.

The laboratory procedures were generally appropriate for the identified potential contaminants of concern and the adopted site assessment criteria against which the results were compared.

The site plans provided by the consultants (DP 2009 and CDM 2013) were to scale and adequately identified the sampling locations relevant to the main site features such as boundaries and street frontages.

The consultant (CDM 2013) provided an assessment of aesthetic conditions of fill materials at the site. The assessment of these materials revealed ACM, bitumen/road

base fill and demolition wastes. These observations were incorporated into consideration of the proposed remedial strategy (**Section 8**) and are considered appropriate for the purposes of this site audit.

The consultant (DP 2009 and CDM 2013) reported the analysed fill/waste and topsoil contained asbestos and concentrations of lead (three locations) and TPH C_{10}-C_{36} (two locations) above the adopted soil criteria. These results were incorporated into consideration of the proposed remedial strategy (**Section 8**) and are considered appropriate for the purposes of this site audit.

Soil waste classifications were conducted by the consultant (CDM 2013) on soils across the site, however the auditor considers these waste classifications preliminary in nature and additional sampling and analyses will be required during the proposed remediation works at the site.

Superlot 3, Area B, Area P and Area Q were not intrusively investigated by CDM Smith (2013) and therefore site suitability has not been assessed. The auditor requires prior to any redevelopment works detailed assessments be conducted within these areas.

The conclusions reached by the consultant in relation to the soil and groundwater contamination issues are considered appropriate and meet the requirements of the site audit. However, additional sampling is required to adequately conduct a waste classification for materials requiring off-site disposal. Overall, the consultant (CDM 2013) is considered to have obtained and reported results in a manner which enables conclusions to be drawn regarding the need for remediation and therefore meets the requirements of the site audit.

8 Concept Remedial Action Plan

8.1 Remediation Objective

The consultant (Consara 2013) reported the site is to be redeveloped for commercial retail space, recreational and tourism facilities and the maintenance of large areas of the Site as Cumberland Woodland Plain, and a Concept RAP was prepared for the remedial works required at the site.

The consultant (Consara 2013) noted the remediation strategy provides for demonstration of suitability to be achieved as part of the redevelopment works on the site. This strategy requires the remediation works are conducted in conjunction with the phasing of the redevelopment, which may take over 20 years.

The consultant (Consara 2013) provided given the timeframes for the phasing of the redevelopment, the Concept RAP sets out the requirement for RAPs specific to each area of the Site requiring remediation to be prepared at the time development is proposed to be undertaken. This will allow for the remediation strategy set out in this Concept RAP to be tailored to the specific building and infrastructure designs for each area of the Site that will only be prepared at the time at which development of each area is to go ahead.

The defined objectives of the RAP (Consara 2013) are:

- Provide the framework for the remediation of the Site that is consistent with the conceptual nature of the Staged Development Application for the Site;
- Ensure a consistent decision making process and approach is applied to the remediation and management to all areas of the Site regardless of the redevelopment phasing plan for the Site;
- Define the remedial goals;
- Define the remediation strategy;
- Identify any regulatory approvals or licences required by the proposed works;
- Document the remediation and validation strategy and provide an outline of the remediation works required;
- Document the requirement for RAPs for specific areas of the Site; and
- Document the outline of the contingency, environmental management and occupational health and safety procedures to be implemented during the remedial works.

8.2 Remediation Options and Preferred Approach

The consultant (Consara 2013) reported, in accordance with DEC 2006, the preferred options for remediation and/or management of contaminated land are summarised as follows, in order of preference:

1. Remediation should not proceed in the event it is likely to cause greater adverse effect than leaving the site undisturbed.
2. On-site treatment of the soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level.
3. Off-site treatment of excavated soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level.

4. Removal of contaminated soil to an appropriate site or facility, followed where necessary by replacement with clean fill.
5. Consolidation and isolation of the soil on-site by containment within a properly designed barrier.

The consultant (Consara 2013) identified the following most viable options for remediation of the site:

- For areas of the site which contain significant volumes of asbestos contaminated materials, excavation or removal by other means (such as emu picking) of contaminated materials, and their transfer and placement to designated containment areas for consolidation and containment and long-term management.
- For areas of the site in which only small or minor volumes of asbestos contaminated materials are present or where chemical contamination of soils is identified to be present, these materials will be removed for disposal off-site to a landfill appropriately licenced to accept these materials.
- For large areas of the site to be used for parks/open space/recreational uses that will be fenced, and not accessible for use by the public and in which no asbestos contamination has been identified but where there may be a likelihood of contamination being identified in the future, no remediation will be undertaken but as a precautionary measure to protect future users and to ensure suitability of these areas for the proposed use, a long-term management plan will be required.
- For areas of the Site in which no contamination has been identified and for which an appropriate sampling and analytical density has been demonstrated to have been conducted no remediation or long-term management will be required in order for these areas to be suitable.

8.3 Summary of Remediation Works

The consultant (Consara 2013) reported the Concept RAP for the site has been prepared as an overarching strategy that can be applied to each area of the site and can be tailored to the development footprint at the time it is subject to redevelopment. In order for this to be appropriately implemented, at the time of redevelopment of an area that requires remediation, a Specific Remediation Action Plan (SRAP) will be prepared. The SRAP for a particular area will be consistent with the requirements of the Conceptual RAP but will provide a detailed description of the remediation works required for the specific area of the site.

The consultant (Consara 2013) noted that in determining the remedial strategy for the asbestos materials identified, the volume and extent within an area will determine the approach to be adopted. The adoption of specific strategies based on the nature, volume and extent of asbestos present in or on soils is consistent with the approach for the remediation and management of asbestos contaminated soils set out in WA DoH 2009. The remediation strategy has also been developed to address the potential presence of asbestos and/or chemical contamination that requires remediation.

Additionally, the consultant (Consara 2013) reported areas of the site not previously subject to detailed assessment are required, prior to the commencement of any redevelopment works, to be assessed. The detailed assessment must include assessment

of concentrations of TPH, BTEX, PAHs, OCPs, PCBs, metals and asbestos and must be conducted to meet the requirements set out in the Conceptual RAP.

8.3.1 Preparation for Remediation Works

The consultant (Consara 2013) reported the following procedures will be carried out prior to conducting remedial works on-site:

- Requirement for intrusive investigations where limited or no intrusive investigations have been conducted. In order to determine the requirement for remediation and/or long-term management on areas which only limited or no intrusive investigations have been conducted, a program of intrusive investigation is required to be conducted. Prior to undertaking these investigations, a Sampling, Analytical and Quality Plan (SAQP) must be prepared to describe the sampling and analytical program. The results of the implementation of the SAQP on each area of the site subject to investigations are required to be presented in a Report that is to be prepared in accordance with the relevant requirements set out in NSW OEH (2011). Each report will be reviewed by the Site Auditor. The implementation of the remediation strategy for these areas of the site, as required, must be conducted in accordance with this Concept RAP.
- The SRAP is required to detail any preparatory works and in general may include the following:
    - Protection of services;
    - Site access and temporary roads:
    - Decommissioning of monitoring wells that are likely to be damaged or removed as part of the remediation works;
    - Establishment and preparation of containment/placement area (where required) in accordance with the concept RAP and SRAP; and
    - Establishment of all relevant health and safety measures.

8.3.2 Remediation Works

The consultant (Consara 2013) detailed the proposed concept remediation works in the concept RAP, summarised as follows:

- Containment area minimum design parameters and construction - the areas of the site which contaminated materials will be placed for containment are anticipated to be either within above-ground surface structures or in the sub-surface beneath building footprints. In determining the minimum design parameters for the Containment Areas the following factors were considered:
    - The estimated volume of materials to be placed;
    - The nature of the natural clays present on site;
    - The depth to groundwater being at least 7-10 m or greater below the current ground surface;
    - The absence of a groundwater aquifer beneath the site as whole, that is utilised for beneficial purposes;
    - Future development will be restricted to commercial/industrial activities that will not require the sub-surface to be disturbed;

- Construction of a hardstand across the surface and surface water drainage diversions around the proposed Containment Area; and
- The integrity of the Containment Area needs to be retained in perpetuity and the development and implementation of a long-term environmental management plan (LTEMP).

Based on the above considerations the consultant (Consara 2013) specified the following design and construct parameters:

- In accordance with the requirements of *Guidelines for the Assessment of On-site Containment of Contaminated Soil* (ANZECC 1999) and the WA DoH 2009 guidelines;
- The ground surface is not significantly disturbed with the exception of minor earthworks required to establish the surface onto which the materials will be placed;
- At a minimum the capping of a Containment Area must comprise 0.5 m of clean fill materials;
- Underground service trenches or other sub-surface systems such as irrigation that are required to be present within the footprint of a Containment Area must be able to be located within the top 0.25 m of the cap or above the cap. No trenches or sub-surface systems are permitted to be installed within the contaminated soils;
- The surface area of a Containment Area which is proposed to remain unsealed for vegetation to be established must be constructed so as to allow for an overlying growing medium of sufficient depth to allow for grasses to medium sized shrubs to establish over the cap without the root zones affecting the integrity of the cap. If clay or similar soil/fill materials are used, these materials must be assessed to be VENM and must have a minimum thickness of 150 mm;
- A marker layer, comprised of geofabric or geotextile or similar, must be placed between the capping layer and the growing medium layer and the top of the contaminated materials; and
- Requirement for survey , by a Registered Surveyor, of the lateral extent and relative levels of the following:
  - Surface prior to placement of materials within the Containment Area;
  - Final surface of the placed materials;
  - Final surface of the marker layer;
  - Final surface of the capping layer; and
  - Final surface of the Containment Area.

- Excavation of Contaminated Stockpiled Materials - must be excavated and/or handpicked for transfer and placement within a Containment Area or for off-site disposal. Detailed excavation methods are to be applied to limit the volumes of soils excavated during the remediation works. This may include coarse screening etc. All materials are to be tracked and inspections conducted following

implementation of environmental control measures, prior to excavation and at the completion of excavation. Validation sampling and analysis of the excavated area will be required in accordance with the SRAP.

The consultant (Consara 2013) noted where large loose sheets or large length of pipes containing asbestos are encountered (i.e. sheets greater than 1 m x 1 m in surface area and pipes greater than 1 m in length) or where ACM is encountered considered by the Remediation Contractor to be geotechincally unsuitable, must be disposed off-site.

- Stockpiling of Materials – where materials requires stockpiling prior to placement or offsite disposal a designated area is to be established. All stockpiles are to be managed under the remediation environmental management plan and tracked. Where feasible stockpiles will be established on unremediated areas, if stockpiles are placed on remediated and validated areas HDPE plastic or similar will need to be placed prior to stockpile formation. The stockpiling area will be inspected prior to and after placement of the stockpiles and following the implementation of environmental controls and after any storm or rainfall events.
- Placement of Materials within a Containment area – prior to the commencement of placement activities, the Remediation Contractor must ensure that the surface and lateral extent of the Containment Area is surveyed by a Registered Surveyor. Tracking of the volume and source location of the material as it is placed into a Containment Area is also required to be undertaken by the Remediation Contractor and records kept in the Materials Tracking Plan. The materials must be placed and compacted to 95% level.
- Capping of a containment area - the Remediation Contractor is responsible for the construction and installation of the marker layer, capping layer and final surface finishing across the Containment Area. These works are to be undertaken in accordance with the detailed specifications and design drawings that are required to be prepared by the Remediation Contractor and approved by the Project Manager, Remediation Consultant and the Site Auditor, in accordance with the detail to be presented in the SRAPs.

8.4 Remediation Works Environmental Management Plan

The consultant (Consara 2013) reported the remediation works are to be carried out under a Remediation Works Environmental Management Plan (RWEMP) which must be detailed in the SRAP and must meet the following minimum requirements:

- Hours of operation;
- Soil and Water Management;
- Asbestos Management;
- Excess/Accumulated Waters;
- Site Access;
- Noise and Vibration;
- Ambient Air Monitoring;
- Odour;
- Material Transporting and Tracking; and

- Complaint Reporting and Resolution.

Asbestos Management

The consultant (Consara 2013) reported due to the known presence of asbestos, both bonded and fibres, on site control measures will be required during remedial works to prevent release of asbestos fibres. The remediation contractor will be required to prepare and implement an asbestos management plan (AMP) in accordance with all current Work Health and Safety (WHS) legislation and regulations. In general, control measures will include at a minimum materials tracking, dust suppression, control and monitoring.

Excess/Accumulated Waters

The consultant (Consara 2013) reported large volumes of excess waters are not to be disposed onto unsealed areas and must be disposed offsite after appropriate sampling and analysis.

Noise and Vibration

The consultant (Consara 2013) reported the site is located adjacent residential dwellings and works will needs to be controlled as follows:

- Ensure works are undertaken within the hours of operation;
- Restricting the activities that generate the highest levels of noise to within the restricted hours of operation (where required);
- Ensuring no vehicles, machinery or equipment generate noise levels beyond applicable guidelines; and
- The proposed works will not generate vibration such that any control measures will be required.

Ambient Air Monitoring

The consultant (Consara 2013) reported given the nature of the asbestos contamination, combined with setting of the site in an outdoor open space, asbestos control monitoring is considered necessary. The Remediation Contractor shall be required to prepare an AMP that shall include an air monitoring program for asbestos. The AMP will also include a program for dust monitoring and dust monitoring equipment should demonstrate that dust levels are kept as low as reasonably possible.

The consultant (Consara 2013) provided at a minimum the AMP must adopt the requirements of WA DoH 2009, perimeter monitoring should be conducted to ensure compliance with the ambient air 24 hour PM_{10} goal of 50 $\mu g/m^3$ with no exceedances (or as superseded at the time of preparation of the SRAP).

Additionally, the consultant (Consara 2013) provided if volatile organic odours are detected during remediation works a calibrated PID monitor will be made available on site should this be considered necessary.

Material Transporting and Tracking

The consultant (Consara 2013) reported records of any materials movement and placement within the site are to be kept and maintained. Details of the placement of excavated material to a Containment Area including the volumes and source of the materials and timing of their placement will be required to be tracked by the Remediation Contractor in a Materials Tracking Plan. Details of any off-site disposal of soil or other

materials from the Site during the remediation works will be required to be recorded by the Remediation Contractor in the Materials Tracking Plan.

Additionally, the consultant (Consara 2013) provided transfer of the material to Containment Areas or for off-site disposal:

- Will occur via the use of either off-road articulated dump trucks or scrapers;
- Loads will not exceed the capacity of the trucks/or scrapers;
- Spillages of contaminated material are to be prevented; and
- All appropriate site rules shall be observed including obeying restricted speed limits, vehicles to proceed in a forward direction only (i.e. reversing to be avoided where practicable) and trucks to remain on designated site routes where possible.

8.5 Occupational Health and Safety Plan

The consultant (Consara 2013) reported a site specific OH&S Plan has been prepared for the site which contains procedures and requirements (including PPE requirements) that will be implemented during the remediation works. The OH&S Plan includes details of the following:

- Asbestos management – a site specific asbestos management plan must be developed prior to works.
- Details of key personnel and contact telephone numbers.
- Anticipated hazards - a summary of the potential contaminants that have been identified in fill materials to be removed or retained on-site, with brief descriptions of physical form and some general health and safety information
- Potential hazards and prevention.
- Details of PPE.
- Emergency response.
- Incident reporting

8.6 Validation Plan

The consultant (Consara 2013) reported a Validation Plan is required to be implemented by the Remediation Consultant to ensure the remediation objectives have been achieved. The purpose of the Validation Plan is to develop a framework for the validation of the site to verify the suitability of each area for the proposed use.

The consultant (Consara 2013) reported the validation plan needs to be specified in the SRAP and will contain the following at minimum:

- Data quality objectives;
- Validation criteria; and
- Sampling, Analysis and Quality Plan and Methodologies.

8.6.1 Validation Criteria

The consultant (Consara 2013) reported the adopted soil remediation acceptance criteria are required to be the same as the site acceptance criteria adopted during the investigation process. The site is to be redeveloped for a range of purposes. Consequently

remediation works that are required due to the presence of asbestos the soil validation results will be assessed again the following criteria (or as superseded at the time of preparation of the SRAPs).

The consultant (Consara 2013) reported in assessing the analytical results for samples submitted for chemical analysis, where concentrations of chemicals of concern in individual samples are greater than the remediation acceptance criteria (RAC) but are less than 2.5 times the RAC, statistical analysis of the discrete data set to which this sample belongs, if of sufficient size, will be applied by calculating the 95% Upper Confidence Limit (UCL) on the mean concentrations of the chemical of concern. If the resulting 95% UCL of the mean concentration of the chemical of concern is less than the RAC then it would be considered that this RAC has not been exceeded. However, it is noted such a result must be considered in conjunction with all other relevant RAC, to determine if remediation has been successful.

Additionally, the consultant (Consara 2013) reported whilst it is expected remediation works will be required due to asbestos. If chemical contamination is identified that requires remediation then in addition to the above, the validation soil analytical results obtained during the remediation works relating to chemical contamination will be assessed against HIL E and F (NEPC 1999), PILs (DEC 2006) and Threshold Criteria (EPA 1994), or as superseded at the time of preparation of the SRAPs, and as outlined below in **Table 8.3**.

The consultant (Consara 2013) noted that NEPC 1999 is currently under review and a draft of a revised NEPM "*Draft Variation to the National Environment Protection (Assessment of Site Contamination) Measure*" dated September 2010 has been issued and is expected to be finalised in 2013. The draft NEPM has not yet been endorsed by NSW EPA, however, under the requirements of the National Environment Protection Council (New South Wales) Act 1995 (NEPC (NSW) Act) the NSW EPA will endorse the finalised NEPM under Section 105 of the CLM Act 1997. As such the draft NEPM is not currently applied in NSW to determine the suitability of sites or to determine the requirements for remediation/management, however, on its finalisation it will supersede the NEPC 1999. Given the remediation and validation works could be undertaken over the next 10 to 20 years, it is likely the revised NEPM will be finalised prior to completion of some of the remediation works. As such the criteria specified in the concept RAP derived from NEPC 1999 and other guidance issued by NSW EPA will be required to be replaced with the relevant criteria set out in the new revised NEPM.

Table 8.3 Soil Clean-up Threshold Criteria (Consara 2013)

Substance	Health-Based Investigation Criteria (Parks/open space) (HIL – E)[1]	Health-Based Investigation Criteria (Commercial/ industrial) (HIL – F)[2]	NSW EPA 1994	Provisional Phytotoxicity Based Criteria (PIL)[3] (mg/kg)
Metals				
Arsenic	200	500	-	20
Cadmium	40	100	-	3
Chromium (III)	24%	60%	-	400
Chromium (VI)	200	500	-	1
Copper	2000	5000	-	100
Lead	600	1500	-	600
Manganese	3000	7500		
Mercury (inorganic)	30	75	-	1
Nickel	600	3000	-	60
Zinc	14000	35000	-	200

Substance	Health-Based Investigation Criteria (Parks/open space) (HIL – E)[1]	Health-Based Investigation Criteria (Commercial/ industrial) (HIL – F)[2]	NSW EPA 1994	Provisional Phytotoxicity Based Criteria (PIL)[3] (mg/kg)
TPH				
TPH C_6 – C_9	-	-	65[4]	-
TPH C_{10} – C_{36}	-	-	1,000[4]	-
BTEX				
Benzene	-	-	1[4]	-
Toluene	-	-	1.4[4]	-
Ethyl benzene	-	-	3.1[4]	-
Total Xylene	-	-	14[4]	-
PAHs				
Benzo (a) pyrene	2	5	-	-
Total PAHs	40	100	-	-
PCBs				
Total PCBs	20	50	-	-
OCPs				
Aldrin+Dieldrin	20	50	-	-
Chlordane	100	250	-	-
DDT+DDD+DDE	400	1000	-	-
Heptachlor	20	50	-	-

Note 1: Health Based Investigation Levels for parks / open space, (Column 3, DEC 2006)
Note 2: Health Based Investigation Levels for commercial / industrial, (Column 5, DEC 2006)
Note 3: Provisional Phytotoxicity Based Investigation Levels (Column 5, DEC 2006)

In addition to the above the consultant (Consara 2013) noted during the remediation works any stockpiled materials or other materials that are to remain on-site in validated areas must not contain metal, rubber, plastic or synthetic material or other forms of general rubbish, foreign substances, suspicious staining and/or odours.

Statistical Distribution of Contaminant Concentrations

The consultant (Consara 2013) reported in assessing the analytical results for samples submitted for chemical analysis, where concentrations of chemicals of concern in individual samples are greater than the remediation acceptance criteria (RAC) but are less than 2.5 times the RAC, statistical analysis of the discrete data set to which this sample belongs, if of sufficient size, will be applied by calculating the 95% Upper Confidence Limit (UCL) on the mean concentrations of the chemical of concern. If the resulting 95% UCL of the mean concentration of the chemical of concern is less than the RAC then it would be considered that this RAC has not been exceeded. However, it is noted such a result must be considered in conjunction with all other relevant RAC, to determine if remediation has been successful.

Off-Site Disposal Criteria

The consultant (Consara 2013) reported for areas of the site that contain minor volumes of asbestos contaminated materials or chemical contaminated soils there is an option for the off-site disposal of these materials. Consequently, if during the course of the remediation works, any excavated materials are required to be disposed off-site, they must be classified in accordance with NSW DECC (2009) *Waste Classification Guidelines. Part 1: Classifying Waste* or as superseded at the time of preparation of the SRAPs.

Imported Materials Criteria

The consultant (Consara 2013) reported materials proposed to be imported onto the site for the purposes of re-instatement or landscaping are to be assessed in accordance with the following criteria (or as superseded at the time of preparation of the SRAPs):

- Virgin excavated natural materials (VENM) must satisfy the criteria stated in NSW DECC (2009) and NSW DEC (2006) guidelines and be demonstrated to be:
    - Natural material (such as clay, gravel, sand, soil or rock fines);
    - Excavated or quarried materials that are not contaminated with manufactured chemicals or process residues, as a result of industrial, commercial, mining or agricultural activities; and
    - Materials that do not contain any sulfidic ores or soils or any other waste.
- Topsoils, growing media, mulch etc for landscaping purposes must be visually inspected (at source and upon delivery at the Site) for foreign substances, suspicious staining and/or odours;
- Materials permitted to be brought onto the site via an exemption issued under the POEO Act. The requirements of any such exemption, prior to, during and/or after importation of materials must be fully complied with; and
- Any materials proposed to be imported to the site must not contain any of the following:
    - Marine mud, peat, vegetation, timber, organic, soluble or perishable materials, Dangerous or toxic material or material susceptible to combustion;
    - Metal, rubber, plastic or synthetic material or other forms of general rubbish; and/or
    - Construction/demolition debris.

The consultant (Consara 2013) reported if the imported material sampling/analyses has not been conducted by the Remediation Consultant or in strict accordance with the requirements set out in the SRAP then the results of an additional inspection and sampling/analyses of the imported materials that verifies the suitability of the materials as they are received at the Site must be provided to the Site Auditor for review and endorsement prior to their placement on the Site.

Beneficial Reuse Criteria

The consultant (Consara 2013) reported validation and certification of materials proposed to be beneficially re-used on site for the purposes of construction of roadways or to achieve final levels are to be assessed in accordance with the following criteria:

- The remediation assessment criteria;
- Must not contain any of the following:
    - Marine mud, peat, vegetation, timber, organic, soluble or perishable materials,
    - Dangerous or toxic material or material susceptible to combustion; and/or
    - Metal, rubber, plastic or synthetic material or other forms of general rubbish; and
- Must be visually inspected for and confirm that the materials do not contain foreign substances, suspicious staining and/or odours.

Groundwater Criteria

The consultant (Consara 2013) reported the results of the previous assessment works on the site have identified the presence of groundwater in the underlying weathered shales and which flows to the east to north east towards Eastern Creek. Eastern Creek is known to be moderately to highly degraded. Given the Site and off-site areas are located in urbanised area, and ready access is available to a reticulated, potable water supply system, the potential for groundwater to be used for drinking water or for other beneficial purposes is currently considered to be negligible. Consequently, the NHMRC & NRMMC (2011) guidelines for drinking water are not considered applicable to the site and with respect to human use, groundwater immediately downgradient of the site is known to be unsuitable for any beneficial purpose. Similarly, the receiving waters of Eastern Creek is not known to be used for recreational purposes and consequently the NHMRC (2008) guidelines for recreational waters are not considered applicable to the site.

The consultant (Consara 2013) reported in proximity to the Site, Eastern Creek is expected to be fresh. ANZECC & ARMCANZ 2000 states for such conditions and considering the nature of the ultimate receiving environment that the Trigger Levels for Fresh Waters should be applied. Therefore, where required, the consultant (Consara 2013) has adopted the Fresh Water Trigger Levels with a 95% level of species protection has been adopted for assessing the quality of groundwater due to the disturbed nature of the regional groundwater and Eastern Creek in proximity to the Site.

8.6.2 Validation Approach

The consultant (Consara 2013) reported the validation approach on the site will involve a program of soil sampling and analysis across the areas subject to remediation and the compilation of survey, materials tracking and as-built plans for a Containment Area and capping.

8.6.3 Scope of Validation Works

The consultant (Consara 2013) reported the scope of work required during validation will comprise:

- Validation sampling of excavations or surfaces formed as a result of remediation works;
- Assessment of the suitability of materials for beneficial re-use on site, if any;
- Assessment of the suitability of materials to be imported onto the site for use in reinstatement of excavations where required or as capping materials for a Containment Area;
- Periodic inspections during materials placement works within a Containment Area and during capping works;
- Receipt and review of materials tracking and placement and off-site disposal documentation, detail design drawings and final as-built specifications of a Containment Area and other capping completed from the Remediation Contractor; and
- Preparation of a Validation Report.

8.6.4 Validation Sampling, Analytical and Quality Plan

The consultant (Consara 2013) reported the validation sampling, analysis and quality plan (VSAQP) must be specified in the SRAP.

The consultant (Consara 2013) specified the VSQAP must include sampling location, analytical plan and the specific quality assurance and control measures to be undertaken. Additionally, it must include the validation requirements for the following:

- Excavation surfaces.
- Materials to be disposed offsite.
- Materials to be beneficially reused on site.
- Materials to be imported to site.
- Where required, groundwater monitoring.

Validation Sampling and Analysis for Asbestos

The consultant (Consara 2013) reported the VSAQP must describe the sampling and analytical density and methods to be applied for the validation of asbestos in soils in accordance with WA DoH (2009).

At a minimum the consultant (Consara 2013) specified the following must be included:

- Validation sampling densities, including the lateral and vertical extents, must be developed in accordance with requirements of WA DoH (2009) and be appropriately justified;
- Validation soil samples collected for asbestos screening and analysis must include the collection of a 0.5 L and 10L sample from each sampling location. In accordance with the WA DoH (2009), the 10 L sample shall be screened manually on-site through a < 7 mm sieve or spread out for inspection on a contrasting colour material (recommended for FA):
- If ACM is identified at greater than 7 x 7 mm the pieces from each 10 L sample will be placed in a sealed plastic bag and sent to a laboratory NATA accredited for weighing and asbestos analysis. The remaining 10L sample will also be sent to a laboratory NATA accredited for weighing and asbestos analysis;
- If ACM is not identified at greater than 7 x 7 mm but where observations during screening identify potential ACM (<7mm) and FA the 10L sample shall be sent to a laboratory NATA accredited for weighing and asbestos analysis;
- If ACM is not identified at greater than 7 x 7 mm and where observations during screening do not identify the potential for ACM (<7mm) and FA to be present the 10 L sample shall be retained and not analysed, however, the 0.5 L sample for this location will be sent to a laboratory NATA accredited for weighing and asbestos analysis. If the results of the analysis of the 0.5 L sample identify the presence of asbestos, consideration must be given to conducting analysis of the 10L sample for asbestos;
- Soil asbestos analysis should be undertaken to comply with or be demonstrated to be able to achieve the Australian Standard Method for the Qualitative Identification of asbestos in bulk samples (AS4964-2004) (or as superseded at the time of preparation of the SRAPs);
- Laboratory reports on the analysis of asbestos must include a description of the sample, the results of the identification of asbestos in soil (to a detection limit of at least 0.1g/kg) and the results of trace analysis conducted including whether asbestos was detected or not detected, regardless of its form;

- Determination of asbestos concentrations in soil must be conducted for every potentially contaminated soil strata or horizon; and
- No averaging or statistical analysis is to be conducted on the results of asbestos analysis in soils across the Site.

Quality Assurance / Quality Control (QA/QC)

The consultant (Consara 2013) reported that data quality objectives (DQO) for the validation process will be developed in accordance with the seven step process referred to in DEC 2006.

Both a field and laboratory quality assurance/quality control (QA/QC) program will conducted during the site investigation works. Field QA/QC will consist of the following procedures:

- Collection and analysis of 'blind duplicate' soil samples for a suite of potential chemicals of concern (intra-laboratory duplicates).
- Collection and analysis of 'split duplicate' soil samples for a suite of potential chemicals of concern (inter-laboratory duplicate).
- Collection of rinsate samples to determine the potential for cross-contamination between samples occurring due to sampling equipment.

Laboratory QA/QC will consist of the following procedures:

- Analysis and reporting of laboratory duplicate samples.
- Analysis and reporting of laboratory method blank samples.
- Analysis and reporting of laboratory control samples.
- Analysis and reporting of laboratory control spikes, matrix and surrogate spikes.

The QA/QC to be undertaken by the consultant has been reviewed and summarised in **Table 8.2** against the PARCC parameters (precision, accuracy, representativeness, comparability and completeness).

Table 8.2 Summary of Proposed QA/QC (Consara 2013)

Data Quality Indicator	Frequency	Data Quality Acceptance Criteria
Precision		
Blind duplicates (intra laboratory)	1 / 10 samples	<50% RPD
Blind duplicates (inter laboratory)	1 / 20 samples	<50% RPD
Laboratory Duplicates	Not specified	<50%
Accuracy		
Surrogate spikes	Not specified	70-130%
Laboratory control samples	Not specified	70-130%
Matrix spikes	Not specified	70-130%
Representativeness		
Sampling appropriate for media and analytes	All samples	
Samples extracted and analysed within holding times.	All samples	Organics (14 days), Mercury (28 days) Inorganics (6 months)
Rinsate blank	1 per piece of reusable sampling equipment (daily)	<LOR
Comparability		
Standard and consistent operating procedures for sample collection & handling	All samples	All samples
Standard analytical methods used for all analyses	All samples	All samples
Consistent field conditions, sampling staff and laboratory	All samples	All samples

Data Quality Indicator	Frequency	Data Quality Acceptance Criteria
analysis, experienced sampler		
Limits of reporting appropriate and consistent	All samples	All samples
Completeness		
Sample description and COCs completed and appropriate	All samples	All samples
Appropriate documentation	All samples	All samples
Satisfactory frequency and result for QC samples	All QA/QC samples	-
Data from critical samples is considered valid	-	Critical samples valid

The consultant (Consara 2013) reported the proposed validation works will include the use of laboratories which are NATA accredited for the chemical analyses undertaken. Laboratory analysis will be conducted in accordance with NEPM and are referenced to USEPA methods. The analytical schedule, laboratory methods, laboratory LORs and reference methods to be applied for the validation works must be appropriate to meet the project DQOs and DQIs.

8.6.5 Validation of Containment and Capping

The consultant (Consara 2013) reported during the containment and capping of any contaminated materials on the site the following must occur:

- Prior to the commencement of the placement of the materials a survey of the lateral extent and relative levels of the surface of the Containment Area is to be undertaken by a Registered Surveyor.
- Establish and maintain records of the origin of materials that are transferred and the location of their placement within the Containment Area.
- Periodic inspections of the placement and capping works and of the records being kept by the Remediation Contractor to ensure that the records have been maintained and are up to date.
- The Remediation Contractor must ensure that a survey of the lateral extent and relative levels at the final surface of the placed materials, the marker layer, the capping layer and the final surface of the Containment Area is undertaken by a Register Surveyor.
- Provision of as-built plans of the Containment Area including of the cap and records demonstrating installation in accordance with the SRAP.

8.6.6 Remediation Works Contingency Plan

The consultant (Consara 2013) provided a contingency plan which outlines procedures for the identification and management of unexpected issues or events that may arise during the remediation works and the corresponding corrective actions. It contains provisions for the following events:

- Unexpected finds (suspect soils, underground tanks, other unexpected items uncovered during remedial works).
- Validation results that do not meet the adopted soil remediation acceptance criteria.
- Heritage items.

8.6.7 Validation Report

The consultant (Consara 2013) reported on completion of the remediation works, validation of the resultant surfaces, such as the base and/or walls will be required to be

undertaken in accordance with the Validation Approach and Validation Sampling, Analysis and Quality Plan which is to be included in the SRAPs and must meet the minimum requirements set out in the Concept RAP.

The consultant (Consara 2013) reported the approach to the validation of the resultant excavation surfaces requires the application of asbestos field screening methodologies and asbestos and chemical analysis. It was also noted where the results of the previous investigations do not identify the requirement for remediation, these results will be used for validation purposes.

The consultant (Consara 2013) also reported sampling and analysis will also be required to be undertaken on any materials to be imported onto the site for use in re-instatement of the excavations should this be required and on any materials excavated that are proposed to be beneficially re-used elsewhere on the Site.

The consultant (Consara 2013) provided ffollowing completion of successful remediation, the results of the validation works will be presented in a validation report that will be prepared in accordance with the requirements of OEH 2011.

8.7 Long Term Environmental Management Plan

The consultant (Consara 2013) reported a LTEMP will be required for any containment areas constructed during the remediation works and will be developed in in accordance with the requirements of NSW DEC (2006) (or as superseded at the time of preparation of the SRAPs) and to be written in plain English to be understood by non-professionally trained personnel.

The consultant (Consara 2013) noted each LTEMP must address the following:

- Why the Long-term EMP is required;
- Who is responsible for implementing the Long-term EMP;
- Where the Long-term EMP applies;
- How the Long-term EMP will be implemented, including corrective actions and reporting requirements; and
- When the Long-term EMP is required to be implemented and its duration.

The consultant (Consara 2013) reported the LTEMPs prepared for the Containment Areas must include the following information:

- The objective/s;
- Description of a Containment Area and capping, with as-built drawings showing the location, the depth, construction, depth to marker layer and description of the contents of the Containment Area;
- A survey plan at A3 scale showing the locations of:
- The cadastral boundaries of the Containment Area as it applies to the area on which it is located;
- Description of the nature of the contaminated materials within the Containment Area;
- Description of the restrictions and controls for the area on which the Containment Area is located;

- Descriptions of what measures should be taken if the marker layer of the Containment Area is breeched;
- Descriptions of what measures should be taken if the capping layer of the Containment Area is breeched;
- Description of responsibilities for persons implementing various elements of the Long-term EMP and the person/s responsible for ensuring the its overall management;
- Detail on how the LTEMP will be legally enforceable;
- Timeframe that applies to the LTEMP; and
- Health and safety requirements each relevant element required by the LTEMP.

The consultant (Consara 2013) reported the LTEMPs prepared for the areas in which potential residual asbestos contamination may be present must include the following information:

- The objective/s;
- Description of the areas to which the LTEMP applies;
- A survey plan at A3 scale showing the locations of:
- Description of the nature of the potential residual contamination present;
- Description of the restrictions and controls for the area on which the potential residual contamination is located;
- Descriptions of what measures should be taken if residual contamination is identified;
- Description of responsibilities for persons implementing various elements of the Long-term EMP and the person/s responsible for ensuring the its overall management;
- Detail on how the LTEMP will be legally enforceable;
- Timeframe that applies to the LTEMP; and
- Health and safety requirements each relevant element required by the LTEMP.

8.8 Consultant Conclusions

The consultant (Consara 2013) reported the Concept RAP was designed to detail the future remedial and management stages planned to be implemented on the site in order to render it suitable for the proposed uses.

The consultant (Consara 2013) concluded the concept RAP details the remediation approach to be applied and includes development of SRAPs, LTEMPs, material tracking, the design parameters and validation works.

In addition the consultant (Consara 2013) considered the development of the Concept RAP provided the overarching information required to support the Staged Development Application for the Site and is consistent with the conceptual nature of the development application in which approval has been sought for the concept proposal for the redevelopment of the site.

Overall the consultant (Consara 2013) considered if the remediation and validation works set out in the Concept RAP are implemented the remedial objectives will be achieved and the site will be suitable for the proposed land uses.

8.9 Audit Findings

The consultant's nominated remediation objectives were appropriate and consistent with the proposed commercial/industrial and parks/opens space uses of the site.

The consultant considered a range of remediation/management options and adopted capping/containment and some offsite disposal and ongoing management via an LTEMP as the preferred remediation approach for the site. With consideration to the nature and extent of the identified soil contamination, the auditor accepts the preferred/adopted approach to be appropriate and consistent with relevant guidance.

Based on the information contained in the consultant's concept RAP (Consara 2013) it is considered the proposed remediation:

- is technically feasible;
- environmentally justifiable given the large quantity of materials that would otherwise have to either be treated onsite or disposed offsite; and
- is consistent with relevant laws, policies and guidelines.

Although not specifically stated by the consultant (Consara 2013), the auditor notes that no remediation of groundwater is considered necessary to enable the proposed land uses, unless a potential source of groundwater contamination is encountered during additional site investigations or development/remediation works.

Upon successful completion of the remediation and validation activities, the consultant (Consara 2013) stated that a validation report will be prepared. The auditor notes that the report will need to be prepared in accordance with the requirements of OEH 2011 and DEC 2006, which will also need to include documentation of any materials disposed off-site and imported onto the site and be provided to the site auditor for review and endorsement, with Site Audit Report and Site Audit Statement issued outlining the suitability of the site for the intended uses.

The auditor specifically notes that where remediation of the site is to occur in stages, then separate validation reports and, where applicable, LTEMPs must be prepared for each stage.

Additionally, while the concept RAP specified broad QA/QC measures it did not specify the use of the following:

- New (disposable) sampling equipment used where possible for each sampling location.
- Equipment decontamination between sampling locations using phosphate free detergent and water.
- Transporting samples under chain of custody conditions, to laboratories that were NATA accredited for the analysis performed.

The auditor requires these field QA/QC measures to be included within the VSAQP within the SRAPs. Additionally, the consultant (Consara 2013) did not specify the collection of trip blanks and the transport of the validation samples in ice cooled boxes. The auditor considers this acceptable if asbestos is the only contaminant of concern. However, should

additional investigations reveal other chemical contaminants of concern then trip blanks and ice cooled transport for the samples should be specified within the VSAQP.

The site management provisions appear to broadly control the potential impacts associated with the proposed remediation works, and appear adequately protective of both the remediation workforce and the surrounding environment (including the neighbouring community).

The remediation strategy proposed for the site is considered appropriate for the site given the identified contamination issues, and is able to make the site suitable for future commercial and open space uses, subject to the development of SRAPs. As such, the proposed remediation and validation work process, as detailed in Consara (2013), meets the requirements of the site audit.

9 Audit Summary Opinion

As stated in **Section 1.3**, the objective of the site audit was to independently review the site assessment reports (DP 2009 and CDM 2013) and RAP (Consara 2013) to determine if the land can be made suitable for the proposed uses by implementation of the processes outlined in the Concept RAP. The auditor provides the following opinions in relation to the decision process for assessing the suitability of sites (DEC 2006).

9.1 Reporting in accordance with EPA requirements

The documents provided by the consultant have been checked against, and meet the requirements of, OEH 2011. As such, the reporting of the site investigation process and proposed remediation/validation process meets the requirements of the site audit.

9.2 Aesthetic issues have been adequately addressed

In general, the consultants (DP 2009 and CDM 2013) provided a detailed assessment and adequate consideration to contaminant odours emanating from the site, soil discolouration and the presence of asbestos containing materials during the site investigation process and the proposed remediation/validation works.

The auditor notes that any adverse contaminant odours posed by these materials, soil discolouration or presence of asbestos containing materials are unlikely to impact the future uses of the site due to the proposed remedial strategy (excavation and containment or off-site disposal of impacted soils) required to make the site suitable for proposed commercial and open space land uses. However, the Concept RAP (Consara 2013) makes provision for assessing aesthetic issues during the remediation and validation process. As such, aesthetic issues have been, and will be, appropriately addressed.

9.3 Soils have been assessed against the appropriate investigation levels

Then chemical criteria adopted by the consultant (DP 2009 and CDM 2013) have been checked against, and are consistent with, appropriate criteria endorsed by the EPA for the proposed commercial and open space land uses. As such the soils are considered to have been assessed against appropriate investigation levels.

The consultant (CDM 2013) adopted WA DoH 2009 for the asbestos criteria. In the absence of any NSW or national endorsed criteria for asbestos in soil, the auditor has exercised professional judgement in accordance with the requirements of DEC 2006 and is satisfied that the asbestos criteria in WA DoH 2009 are appropriately protective of human health and represent some, if not the most, conservative criteria for asbestos in soil in the world, as at the time of the audit. On this basis, the asbestos criteria adopted by the consultant are considered appropriate and accepted by the auditor for use in the assessment and validation of asbestos in soil at the site.

9.4 Background soil concentrations have been adequately addressed

The consultants (DP 2009 and CDM 2013) generally sampled to depths which provided penetration into natural soils within the site to give an indication and representation of local natural soil profiles. The chemical concentrations in soil samples from the natural soil profile were below the appropriate soil criteria and were generally within published background ranges (where available). As such, background soil concentrations are considered to have been adequately addressed.

9.5 The site management strategy is appropriate

In accordance with the requirements of DEC 2006, the site management strategy outlined in the Concept RAP (Consara 2013) is considered to be:

- technically feasible;
- environmentally justifiable given the large quantity of materials that would otherwise have to either be treated onsite or disposed offsite; and
- consistent with relevant laws, policies and guidelines.

On this basis, the auditor accepts that the proposed site management strategy is appropriate and, if implemented appropriately, will make the site suitable for the proposed uses.

9.6 Contaminant migration (actual or potential) has been addressed

The consultant (CDM 2013) addressed both the potential and actual migration of the identified contaminants of concern through an assessment of groundwater.

There were no reported concentrations of contaminants identified in groundwater which were considered to pose any unacceptable risks to any off-site human or ecological receptors. As such, the requirements of the site audit in relation to consideration of contaminant migration have been met.

10 Audit Summary Conclusions

Based on the information reviewed as part of this site audit and subject to the limitations in **Section 11**, the following conclusions are made:

- The site assessment and proposed remedial/validation activities are considered to have met the requirements of the *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (*2nd Edition) (DEC 2006).
- The site assessment activities identified historically imported fill and waste materials within various areas of the site which contained reworked silty clay, demolition wastes, bitumen/road base and fragments of asbestos containing materials.
- The levels of some contaminants of potential concern (i.e., asbestos, lead and TPH) in fill/waste soils which are considered to require remediation or management under the proposed commercial and open space land uses.
- There were no levels of the identified contaminants of potential concern in groundwater which are considered not to require remediation or management under the proposed commercial and open space land uses.
- There was no evidence of potential or actual migration of contaminants from the site which may result in unacceptable risks to surrounding human or ecological receptors.
- The remediation and validation works described in the Concept RAP prepared for the site (Consara 2013) are considered appropriate to render the site suitable for proposed commercial and open space land uses, subject to the following conditions applicable for each stage of the site development:
  - Any additional investigations conducted within each stage of the site must be reviewed and accepted by a Site Auditor.
  - Where required, the Specific Remediation Action Plans for each stage of the site development must be reviewed and accepted by a Site Auditor prior to commencement of remediation works within that stage.
  - Where required, the Asbestos Management Plan for each stage of the site must be reviewed and accepted by a Site Auditor prior to commencement of remediation works within that stage of the site.
  - Where required, the validation reports for each stage of the site must be reviewed and accepted by a Site Auditor prior to occupation of that stage of the site.
  - Where required, any Long Term Environmental Management Plans for each stage of the site plan must be reviewed and accepted by a Site Auditor prior to occupation of that stage of the site.

11 Limitations

This audit was conducted with a reasonable level of scrutiny, care and diligence on behalf of the client for the purposes outlined in s.47(1) of the *Contaminated Land Management Act 1997.* The data used to support the conclusions reached in this audit were obtained by other consultants and the limitations which apply to the consultant's report(s) apply equally to this audit report.

Every reasonable effort has been made to identify and obtain all relevant data, reports and other information that provide evidence about the condition of the site, and those that were held by the client and the client's consultants, or that were readily available. No liability can be accepted for unreported omissions, alterations or errors in the data collected and presented by other consultants. Accordingly, the data and information presented by others are taken and interpreted in good faith.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

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

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

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS Environmental Pty Ltd and the Site Auditor reserve the right to review the report in the context of the additional information.

Appendix A

Guidelines made or approved by the EPA

Guidelines made or approved by the EPA (s.105 CLM Act 1997)

Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites, Australian and New Zealand Environment and Conservation Council and the National Health and Medical Research Council, 1992 (ANZECC/NHMRC 1992)

Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Paper No 4, 2000 (ANZECC/ARMCANZ 2000)

Australian Drinking Water Guidelines, National Health and Medical Research Council and Agriculture and Resource Management Council of Australia and New Zealand, 2011 (NHMRC/NRMMC 2011)

Composite Sampling, Lock, W. H., National Environmental Health Forum Monographs, Soil Series No.3, 1996, SA Health Commission, (NEHF 1996)

Contaminated Sites: Guidelines for Assessing Service Station Sites, NSW EPA, 1994 (EPA 1994)

Contaminated Sites: Sampling Design Guidelines, NSW EPA, 1995 (EPA 1995)

Contaminated Sites: Guidelines for the Vertical Mixing of Soil on Former Broad-Acre Agricultural Land, NSW EPA, 1995 (EPA 1995b)

Contaminated Sites: Guidelines for the Assessment and Clean Up of Cattle Tick Dip Sites for Residential Purposes, NSW Agriculture and CMPS&F Environmental, February 1996 (NSW Agr. 1996)

Contaminated Sites: Guidelines for Assessing Banana Plantation Sites, NSW EPA, 1997 (EPA 1997)

Contaminated Sites: Guidelines for Assessing Former Orchards and Market Gardens, NSW EPA, 2005 (EPA 2005)

Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd Edition), NSW DEC, 2006 (DEC 2006)

Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination, NSW DEC, March 2007 (DEC 2007)

Contaminated Sites: Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997, NSW DECC, June 2009 (DECC 2009)

Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites, NSW OEH, 2011 (OEH 2011)

Environmental Health Risk Assessment: Guidelines for assessing human health risks from environmental hazards, Department of Health and Ageing and EnHealth Council, Commonwealth of Australia, June 2002 (EnHealth 2002)

National Environment Protection (Assessment of Site Contamination) Measure, National Environment Protection Council, 1999 (NEPC 1999)

Appendix B

Audit Correspondence

JBS42270-51555

17 August 2012

Western Sydney Parklands Trust
c/o Eric Brodie
Cadence Australia
Level 1, 10 Mallett Street
Camperdown, NSW 2050
Via email: ebrodie@cadenceaust.com

Interim Audit Advice (0503-1112-01): Sampling, Analytical and Quality Plan, Eastern Creek Business Hub, Rooty Hill Road South, Rooty Hill, NSW

Dear Eric,

1. Introduction

Andrew Lau, of JBS Environmental Pty Ltd, has been engaged by Western Sydney Parklands Trust (the client), care of Cadence Australia, to conduct a site audit at the Eastern Creek Business Hub, Rooty Hill Road South, Rooty Hill, NSW (`the site' as shown in **Attachment 2**).

Andrew Lau is a Site Auditor accredited by the NSW Environment Protection Authority (EPA) under the *Contaminated Land Management Act 1997* (CLM Act 1997) (Accreditation Number 0503). The audit is being conducted ultimately for the purpose of certifying the suitability of the site for its intended uses. The audit relates to the proposed development of the site for mixed commercial, retail, recreational and tourism, and open space uses.

This interim advice does not constitute a Site Audit Statement or a Site Audit Report, but is provided to assist in the assessment and management of contamination issues at the site in regard to requirements of the site audit. The information provided herein should not be considered pre-emptive of the final audit conclusions, but rather represent the findings of the audit based on a preliminary review of available site information. Furthermore, the interim advice should not be regarded as "approval" of any proposed investigations or remedial activities, as any such approval is beyond the scope of an independent review.

2. Review of Reports

This review has been undertaken to provide an independent review of the suitability and appropriateness of a Sampling, Analysis and Quality Plan (SAQP). The following reports were reviewed to prepare this advice:

- *Phase 1 Contamination Assessment, Proposed Redevelopment, Parcel 2.4, Western Sydney Parklands, Rooty Hill Road South, Doonside*, Douglas Partners Pty Ltd, 10 November 2009 (DP 2009).
- *Sampling, Analytical and Quality Plan, Eastern Creek Business Hub, Rooty Hill Road South, Rooty Hill NSW*, CDM Smith Australia Pty Ltd, 17 August 2012 (CDM Smith 2012).

3. Audit Comments / Opinions

Based on the information reviewed as part of this interim audit advice and subject to the limitations in **Attachment 1**, the following opinions are presented:

- The SAQP (CDM Smith 2012) has given appropriate consideration to the findings of the previous Phase 1 Contamination Assessment (DP 2009) undertaken at the site.
- The SAQP (CDM Smith 2012) has identified a number of data gaps which need to be addressed and has outlined a program of investigations which the auditor considers to be suitable and consistent with relevant guidelines to enable an appropriate assessment of the contamination status of the site to be undertaken.
- If the future investigation works are undertaken in accordance with the SAQP (CDM Smith 2012), then the auditor is satisfied that conclusions will be able to be drawn relating to the suitability of the site for the intended uses, or otherwise recommendations made in the form of remediation/management requirements to make the site suitable for the intended uses.

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Should you have any queries or require further clarification, please feel free to contact the undersigned by phone on (02) 8338 1011 or email alau@jbsgroup.com.au.

Yours sincerely,

Andrew Lau
NSW EPA Accredited Site Auditor (0503)
JBS Environmental Pty Ltd

Attachments: (1) Limitations
(2) Site Plans

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Tel: 02 8338 1011 I Fax: 02 8338 1700 www.jbsgroup.com.au

Attachment 1 – Limitations

The audit is being conducted with a reasonable level of scrutiny, care and diligence on behalf of the client for the purposes outlined in the *Contaminated Land Management Act 1997.* The data used to support the conclusions reached as part of the audit were obtained by other consultants and the limitations which apply to the consultant's report(s) apply equally to this Interim Audit Advice.

Every reasonable effort has been made to identify and obtain all relevant data, reports and other information that provide evidence about the condition of the site, and those that were held by the client and the client's consultants, or that were readily available. No liability can be accepted for unreported omissions, alterations or errors in the data collected and presented by other consultants. Accordingly, the data and information presented by others are taken and interpreted in good faith.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

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

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

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS Environmental Pty Ltd and the Site Auditor reserve the right to provide additional Interim Audit Advices in the context of the additional information.

Attachment 2 – Site Plans

A4

PROJECT-FILE NAME: **S12388-01-F001**
DATE: **16/08/2012**
DRAWN: **RR**
APPROVED: **RO**

SOURCE: NEARMAPS.COM

CLIENT
WESTERN SYDNEY PARKLANDS TRUST

PROJECT
SAQP, EASTERN CREEK
BUSINESS HUB, ROOTY HILL, NSW

TITLE
SITE LOCATION PLAN

CDM Smith

FIGURE
1

Plan Showing Ownership Data - Western Sydney Parklands Precincts 2.3 & 2.4

SCALE 1:2000

SCALE 1:300

SCALE 1:100

LEGEND

- E1: Easement for Pipeline 24.835 wide [Vide Q916928]
- E2: Easement for Drainage 4.57 wide [Vide G642905]
- E3: Easement for Batter [Vide K920274]
- E4: Easement for Eaves and Gutters [Vide H614401]
- E5: Easement for Eaves and Gutters [Vide H614401]
- E6: Positive Covenant [Vide DP1051904]
- E7: Restriction(s) on the use of Land [Vide DP1051904]
- Precinct Lot

NOTES:

1. Digital Cadastral DataBase © 2009 NSW Dept. of Lands
2. Easement positions are indicative only and are subject to confirmation by survey

ID	Lot/Section/DP	Owner
1	5//DP1041487	BLACKTOWN CITY COUNCIL
2	1//DP1103025	WESTERN SYDNEY PARKLANDS TRUST
3	101//DP581882	THE COUNCIL OF THE CITY OF BLACKTOWN
4	1//DP909138	THE PRESBYTERIAN CHURCH (NEW SOUTH WALES) PROPERTY TRUST
5	4//DP1041487	BLACKTOWN CITY COUNCIL
6	3//DP1041487	WESTERN SYDNEY PARKLANDS TRUST
7	100//DP882326	WESTERN SYDNEY PARKLANDS TRUST
8	5/B/DP8681	WESTERN SYDNEY PARKLANDS TRUST
9	4/B/DP8681	WESTERN SYDNEY PARKLANDS TRUST [AUTO-CONSOL 3439-80]
10	3/B/DP8681	WESTERN SYDNEY PARKLANDS TRUST [AUTO-CONSOL 3439-80]
11	1//DP135665	WESTERN SYDNEY PARKLANDS TRUST [AUTO-CONSOL 9630-178]
12	13/B/DP8681	WESTERN SYDNEY PARKLANDS TRUST [AUTO-CONSOL 9630-178]
13	1/B/DP8681	WESTERN SYDNEY PARKLANDS TRUST
14	3//DP830836	WESTERN SYDNEY PARKLANDS TRUST
15	2//DP830836	WESTERN SYDNEY PARKLANDS TRUST
16	4//DP830836	WESTERN SYDNEY PARKLANDS TRUST
17	1//DP830836	WESTERN SYDNEY PARKLANDS TRUST
18	2//DP1041487	WESTERN SYDNEY PARKLANDS TRUST
18	2//DP1041487	WESTERN SYDNEY PARKLANDS TRUST
19	5//DP830836	WESTERN SYDNEY PARKLANDS TRUST
20	6//DP830836	WESTERN SYDNEY PARKLANDS TRUST
21	A//DP358346	WESTERN SYDNEY PARKLANDS TRUST
22	8//DP31130	WESTERN SYDNEY PARKLANDS TRUST
23	1//DP31130	WESTERN SYDNEY PARKLANDS TRUST
24	2//DP31130	ALBERT GATES MARGARET ALLAN GATES AS JOINT TENANTS
25	3//DP31130	MINISTER ADMINISTERING THE ENVIRONMENTAL PLANNING & ASSESSMENT ACT 19
26	4//DP31130	BARRY CLYDE DAWSON
27	5//DP31130	MINISTER ADMINISTERING THE ENVIRONMENTAL PLANNING & ASSESSMENT ACT 19
28	6//DP31130	WESTERN SYDNEY PARKLANDS TRUST
29	7//DP31130	WESTERN SYDNEY PARKLANDS TRUST
30	2/A/DP8681	WESTERN SYDNEY PARKLANDS TRUST
31	7//DP830836	WESTERN SYDNEY PARKLANDS TRUST
32	8//DP830836	WESTERN SYDNEY PARKLANDS TRUST
33	9//DP830836	WESTERN SYDNEY PARKLANDS TRUST
34	10//DP830836	WESTERN SYDNEY PARKLANDS TRUST
35	3/A/DP8681	WESTERN SYDNEY PARKLANDS TRUST
36	12//DP882325	WESTERN SYDNEY PARKLANDS TRUST
37	11//DP882325	WESTERN SYDNEY PARKLANDS TRUST
38	14//DP882325	WESTERN SYDNEY PARKLANDS TRUST
39	1//DP1069269	WESTERN SYDNEY PARKLANDS TRUST
40	2//DP1069269	WESTERN SYDNEY PARKLANDS TRUST
41	14//DP1051904	AGL GAS NETWORKS LIMITED
42	50//DP1121258	ROADS AND TRAFFIC AUTHORITY OF NEW SOUTH WALES
43	12//DP1041487	ROADS AND TRAFFIC AUTHORITY OF NEW SOUTH WALES
44	11//DP1041487	ROADS AND TRAFFIC AUTHORITY OF NEW SOUTH WALES

ID	Road Ownership Status
45	ROAD BEING THE RESIDUE OF LAND IN CERTIFICATE OF TITLE VOLUME 826 FOLIO 243
46	PUBLIC CROWN SUBDIVISION ROAD
47	PUBLIC CROWN RESERVED ROAD
48	ROAD BEING THE RESIDUE OF LAND IN CERTIFICATE OF TITLE VOLUME 147 FOLIO 41
49	PUBLIC CROWN SUBDIVISION ROAD

No.	Date	Revision Details	INI
B	30-04-2010	Ownership information updated, Easements added	KDS
A	20-07-2009	Table Amended	SAS

PREPARED FOR: Western Sydney Parklands

CHECKED BY/DATE: KDS/07-05-2010
APPROVED BY/DATE: DWF/07-05-2010
GIS REF: F719-G-003b.mxd
JOB REF: F719

CO-ORDS: MGA
DATUM: N/A
DATE OF PLAN: 07-05-2010

1:5,000 @ A3

0 50 100 150 200 250 300 Metres

P:\F719\Mapping\Acad-Gis\F719-G-003b.mxd, 7/05/2010 12:06:16 PM, by fnorzahari

JBS42270-53403

22 February 2013

Western Sydney Parklands Trust
c/o Eric Brodie
Cadence Australia
Level 1, 10 Mallett Street
Camperdown, NSW 2050
Via email: ebrodie@cadenceaust.com

Interim Audit Advice (0503-1112-02): Phase 2 Environmental Site Assessment, Eastern Creek Business Hub, Rooty Hill Road South, Rooty Hill, NSW

Dear Eric,

1. Introduction

Andrew Lau, of JBS Environmental Pty Ltd, has been engaged by Western Sydney Parklands Trust (the client), care of Cadence Australia, to conduct a site audit at the Eastern Creek Business Hub, Rooty Hill Road South, Rooty Hill, NSW (`the site' as shown in **Attachment 2**).

Andrew Lau is a Site Auditor accredited by the NSW Environment Protection Authority (EPA) under the *Contaminated Land Management Act 1997* (CLM Act 1997) (Accreditation Number 0503). The audit is being conducted ultimately for the purpose of certifying the suitability of the site for its intended uses. The audit relates to the proposed development of the site for mixed commercial, retail, recreational and tourism, and open space uses.

This interim advice does not constitute a Site Audit Statement or a Site Audit Report, but is provided to assist in the assessment and management of contamination issues at the site in regard to requirements of the site audit. The information provided herein should not be considered pre-emptive of the final audit conclusions, but rather represent the findings of the audit based on a preliminary review of available site information. Furthermore, the interim advice should not be regarded as "approval" of any proposed investigations or remedial activities, as any such approval is beyond the scope of an independent review.

2. Review of Reports

This review has been undertaken to provide an independent review of the appropriateness of a Phase 2 Environmental Site Assessment (ESA) report. The following report was reviewed to prepare this advice:

- *Phase 2 Environmental Site Assessment, Eastern Creek Business Hub, Rooty Hill Road South, Rooty Hill NSW*, CDM Smith Australia Pty Ltd, 13 February 2013 (CDM Smith 2013).

The following documents were also considered during the site audit:

- *Phase 1 Contamination Assessment, Proposed Redevelopment, Parcel 2.4, Western Sydney Parklands, Rooty Hill Road South, Doonside,* Douglas Partners Pty Ltd, 10 November 2009 (DP 2009).
- *Sampling, Analytical and Quality Plan, Eastern Creek Business Hub, Rooty Hill Road South, Rooty Hill NSW,* CDM Smith Australia Pty Ltd, 17 August 2012 (CDM Smith 2012).

This interim audit advice letter was completed by Andrew Lau with the assistance of JBS Environmental's Senior Audit Assistant, Mr Ken Henderson.

3. Site Details

3.1. Site Identification

The site details have been summarised in **Table 2.1**. The proposed development of the site includes the subdivision into multiple development areas, referenced as Superlot 1, Superlot 2, Superlot 3, Areas A and B (road easements), Areas P and Q (underground service easements), and Areas C, X and Y (open space areas). It is noted that Superlot 3 and Areas B, P and Q were not investigated by the consultant during the

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most recent investigation (CDM Smith 2013). Plans identifying the subject site and proposed development areas have been presented in **Attachment 2**.

Table 2.1 Summary Site Details

Street Address:	Eastern Creek Business Hub, Rooty Hill Road South, Rooty Hill NSW, 2766
Property Description:	Refer to Lot and DP summary in **Attachment 2**.
Local Government Area:	City of Blacktown
Property Size:	Approximately 34 ha
Zoning:	SEPP (WSP) 2009:UL-Western Parklands
Previous Use	Residential and Woodland
Current Use	Vacant Cleared Land and Woodland
Anticipated Future Use	Mixed commercial, retail, recreational and tourism, and open space uses.

3.2. Site Layout and Activities

At the time of the most recent site investigation, the consultant (CDM Smith 2013) reported that the site was predominantly vacant cleared land and woodland, with several houses located at the northwest corner of the site. Additional observations as provided by the consultant are as follows:

- The site was secured by star picket fences at the northern and western site boundaries and a chain fence at the east site boundary. A portion of the western boundary and the southern boundary were not fenced and were accessible by the public.
- Various residences were located in the northeast portion of the site.
- The site surface was unsealed and was covered with grass and weeds, with many larger well established trees and small bush/shrubs distributed across the entire site.
- An open stormwater drain was located at the northern boundary of Superlot 1 (**Attachment 2**) which connected to a stormwater ditch located in the central portion of the site (Area Y, **Attachment 2**). The consultant noted the stormwater drain in Superlot 1 had been partially excavated, with residual soil material stockpiled on along the southern bank of the culvert.
- Demolition waste was observed by the consultant predominantly in the southern portion of the site at Superlot 1 (**Attachment 2**), however, multiple stockpiles of demolition waste were present at other areas of the site, with a larger stockpile located in the southern portion of the site. Concentrated areas of debris were located within both the southern and northern vegetated portions of Area X. Multiple stockpiles were also located across Superlot 2, which were overgrown by grass and weeds.
- The consultant reported that the stockpiled waste material was mostly derived from historical on-site demolished building rubble and soil. Potential asbestos containing materials (ACM), concrete, bitumen, steel, varying soil materials and organic matter were observed within the stockpiles. Additionally, the consultant reported that contractors familiar with site have stated that it was common knowledge that illegal dumping occurs within the southern portion of Superlot 1.
- No evidence of stress to plants, unexplained odours, or areas of significant staining was noted at the site.
- Two historical wells were observed by the consultant during investigation works at the site. One of the wells was a dug cement well of approximately 8m in depth located in the central-southern portion of Superlot 1 (unknown use). The second well, referenced as BH6, was located at the western boundary of Superlot 1, and the consultant reported that this is likely an environmental monitoring well installed during a previous environmental investigation.
- Gated access roads were observed by the consultant from both Beggs Road to the west and from Great Western Highway to the south.

The information provided in the consultant's report (CDM Smith 2013) was consistent with the observations made by the auditor during a site inspection conducted on 7 October 2012.

3.3. Topography

The consultant (CDM Smith 2013) reported the site has an elevation of between 38 and 53 metres Australian Height Datum (m AHD) and the surrounding area gently declines from west to east towards Eastern Creek.

3.4. Soil and Geology

The consultant (CDM Smith 2013) reported that, according to the Penrith 1:100 000 Geological Series Sheet 9030 Ed. 1 (Clark and Jones (Eds), 1991), the Site is underlain by the Triassic aged Wianamatta,

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Blue Mountains Bringelly Shale sub-group, which comprises alluvial and estuarine formed shale, carbonaceous claystone, claystone, laminite, fine to medium-grained lithic sandstone, and rare coal and tuff. This is underlain by the Ashfield Shale including dark-grey to black claystone-siltstone and fine sandstone-siltstone laminite. A thin layer of Mittagong Formation underlies this, comprising interbedded shale, laminite and medium-grained quartz sandstone, which is underlain at approximately sea level by medium to very course-grained quartz sandstone, minor laminated mudstone and siltstone lenses.

3.5. Hydrology

The consultant (CDM Smith 2013) reported that Eastern Creek is the closest flowing surface water body to the site, located approximately 300m to east of the site. A large detention basin (located in the central portion of Area A, refer to **Attachment 2**), a smaller drainage area located in the southern portion of Area X (**Attachment 2**) and other several localised draining surface water bodies are located on-site. A constructed drainage channel was located in the southern portion of the site. The previous consultant (DP 2009) reported that a man-made channel running below the M7 Motorway allows drainage to Eastern Creek.

3.6. Hydrogeology

The consultant (CDM Smith 2013) reported the groundwater at the site is likely to be present within a shallow aquifer within the weathered shale, and that groundwater within the shallow aquifer would flow to the east toward Eastern Creek. Eastern Creek appears to be part of the drainage line from Prospect Reservoir (located approximately 4km to the south east of the site) and the Hawkesbury River (located approximately 20km to the north of the site).

The previous consultant (DP 2009) conducted a review of the NSW Natural Resource Atlas website (http://www.nratlas.nsw.gov.au) and identified one bore within the search area, located approximately 700 m to the west of the site. The works summary for the bore indicated that it was used for waste disposal and was drilled to a depth of about 218 m, with no groundwater details provided.

During the field investigation, the consultant (CDM Smith 2013) concluded the following in relation to groundwater as measured in the site monitoring wells (which included 11 newly installed monitoring wells and one previously existing well):

- Groundwater was measured at depths between 1 m and 3.2 m bgs (or between 41.84 and 35.97 m AHD), with a groundwater flow direction inferred to the northeast across the site towards Eastern Creek.
- The temperature of the groundwater ranged between 14.8^{o}C and 18.4^{o}C.
- The average pH was measured at 6.73 pH units.
- The ORP (oxidation reduction potential) ranged between -58.8 mV and 130.7 mV.
- The average conductivity was measured at 26 108 micro Siemens/cm (uS/cm).
- Dissolved oxygen was measured at 0.83 ppm and 3.8 ppm.

Based on the above measurements, the consultant concluded that the groundwater at the site is of poor quality and unsuitable for most uses.

3.7. Surrounding Environment

The consultant (CDM Smith 2013) reported that the site is surrounded by the following:

- North – Morreau Reserve (a recreational park) with residential housing to the northwest across Rooty Hill Road South.
- East – the Westlink M7 motorway with vacant lots which are park of the Western Sydney Parklands) beyond. Eastern Creek is located approximately 300 m east of the site.
- South – Great Western Highway with Eastern Creek Public School and sports fields beyond (both located across Rooty Hill Road South).
- West – Rooty Hill Road South, with residential housing beyond.

4. Summary Site History

The consultant (CDM Smith 2013) conducted a review of aerial photographs, historic title deeds, WorkCover records and a previous environmental report (DP 2009). The summary of site historical information presented by the consultant indicated former general farming, poultry farming, and blacksmithing activities at the site. All associated buildings (which were constructed between 1950 and 1980) and materials associated with these activities have been removed or demolished, with exception of areas of farmland at the north of the site which still exist.

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In addition, the consultant reported that the site currently comprises the Shale Plains Woodland, Cumberland Plain Woodlands, the Alluvial Woodland and grassed fields (all of which appear in to be good health), with several residences in the northeast of Superlot 2. Farmland with horses and farm residences were at the northern end of the site.

5. Summary of Contamination Issues

5.1. Soil

Soil sampling was conducted by the consultant (CDM Smith 2013) at 150 sampling locations by advancing test pits or boreholes to a maximum depth of 2.5 m bgs. Sample locations were advanced at most areas of the site except for Superlot 3 and Area B, which were anticipated to be investigated at a later stage of work. In addition, Areas P and Q were not part of the investigation and these areas are currently part of an easement for a high pressure gas pipeline and associated buffer zone. Soil samples were analysed for heavy metals (including arsenic, cadmium, chromium, copper, manganese, mercury, lead, nickel and zinc), polycyclic aromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene and xylenes (BTEX), organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs), semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs) and asbestos.

A total of 323 samples collected from a range of depths were submitted for analysis. Analytical results were assessed against current guidelines for commercial/industrial development sites (for areas of the site to be constructed as commercial development) and parks/open space (for areas of the site to be retained as open space woodlot). The consultant (CDM Smith 2013) reported the following:

<u>Superlot 1</u>

- Concentrations of heavy metals were present in analysed soil samples at levels within typical background ranges and/or below the adopted health criteria suitable for industrial settings (the intended future use at this area of the site).
- VOCs, PCBs and OCPs were reported at concentrations below the laboratory limit of reporting (LORs) and/or site acceptance criteria (SAC) in all analysed samples. The consultant reported that these results are generally consistent with the VOC screening results and with the observations made during test pitting and drilling as no odours, staining, or sheens were identified.
- TPH C_6-C_{36} and BTEX were reported at concentrations below the laboratory LORs and/or SAC in all analysed samples, with the exception of TPH C_{10}-C_{36} in two soil samples (sample TP27L1B 0.1-0.15m and TP05L1 SP). The consultant reported that sample TP27L1B 0.1-0.15m was collected directly from bitumen material and is not indicative of soil concentrations within the same test pit location. Sample location TP05L1 SP was collected from a stockpile with no concentrations of TPH reported in soil samples collected from the underlying natural soils (i.e. between ground surface and 0.6 m bgs) and the consultant reported that this sample is not indicative of surrounding soil concentrations.
- SVOCs were reported at concentrations below the laboratory LORs and/or SAC in all analysed samples.
- Asbestos was detected in three of 58 analysed samples as collected from soil, surface debris and stockpiled waste material.
- Fill materials or waste was observed within the planned open space areas in the north east corner of Superlot 1. No visible asbestos was identified within the open space areas in Superlot 1.

<u>Superlot 2 and Area A</u>

- Concentrations of heavy metals were present in analysed soil samples at levels within typical background ranges and/or below the adopted health criteria suitable for industrial settings (the intended future use at these areas of the site).
- VOCs, PCBs and OCPs were reported at concentrations below the laboratory LORs and/or SAC in all analysed samples. The consultant reported that these results are generally consistent with the VOC screening results and with the observations made during test pitting and drilling as no odours, staining, or sheens were identified.
- TPH C_6-C_{36} and BTEX were reported at concentrations below the laboratory LORs and/or SAC in all analysed samples.
- SVOCs were reported at concentrations below the laboratory LORs and/or SAC in all analysed samples.
- Asbestos was detected in 14 of 47 analysed samples as collected from soil, surface debris and stockpiled waste material.

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- No observations of odours or staining, and no fill, waste or asbestos were identified during the investigation of Area A.

Area Y and Area C

- Concentrations of heavy metals were present in analysed soil samples at levels within typical background ranges and/or below the adopted health-based criteria suitable for industrial settings and parks/recreational settings. However, manganese was reported in analysed soil samples at levels exceeding the phytotoxicity-based investigation level (PIL) criteria at a number of locations. The consultant reported that there were no visible negative effects on the Shale Plains Woodland plant life observed during sampling, and concentrations of manganese that are located in surface soils in Areas Y and C are considered to likely be ecologically tolerable.
- VOCs, PCBs and OCPs were reported at concentrations below the laboratory LORs in all analysed samples.
- TPH C_6-C_{36} and BTEX were reported at concentrations below the laboratory LORs and/or SAC in all analysed samples.
- SVOCs were reported at concentrations below the laboratory LORs and/or SAC in all analysed samples.
- Asbestos was not detected in any of the analysed soil samples as collected from Area Y and Area C.
- Field observations at Area C include shallow road base (bitumen) fill at some sampling locations, however, no odours or staining or visible asbestos was identified.
- Field observations at Area Y include no odours or staining with no visible asbestos identified, and no fill or waste was observed with exception of one location in which silt with demolition waste, tiles, bricks and concrete were observed to a depth of 0.1 m bgs.

Area X

- Concentrations of heavy metals were present in analysed soil samples at levels within typical background ranges and/or below the adopted health-based criteria suitable for industrial settings and parks and/or recreational settings, with the exception of manganese at six locations and lead at one location. In addition, arsenic, cadmium, copper, lead, manganese and zinc was reported in analysed soil samples at levels exceeding the PIL criteria at a number of locations. The consultant reported that there was no visible negative effects on the Shale Plains Woodland plant life observed during sampling, and conditions in Area X are considered to likely be ecologically tolerable.
- VOCs, PCBs and OCPs were reported at concentrations below the laboratory LORs in all analysed samples.
- TPH C_6-C_{36} and BTEX were reported at concentrations below the laboratory LORs in all analysed samples.
- SVOCs were reported at concentrations below the laboratory LORs and/or SAC in all analysed samples.
- Asbestos was detected in five of the 14 analysed soil samples as collected from Area X.
- Field observations include the identification of asbestos at the surface and in shallow fill at various locations within Area X.

5.2. Groundwater

The consultant installed eleven monitoring wells during the Phase 2 ESA investigation (CDM Smith 2013), which is in addition to one previously existing monitoring well. The newly installed monitoring wells were installed to a maximum depth of 11 m bgs.

Twelve groundwater samples were collected by the consultant from the on-site monitoring wells and analysed for heavy metals, TPH, BTEX, SVOCs (which included OCPs and PAHs) and VOCs. Analytical results were assessed against current guidelines for marine and freshwater (ANZECC *Guidelines for Fresh and Marine Water Quality* 2000 for the protection of 95% of freshwater and marine species). The consultant (CDM Smith 2013) reported the following:

- Concentrations of all analysed metals were below the adopted groundwater investigation levels (GILs) with the exception of cadmium, copper, manganese, nickel and zinc.
- TPH C_6-C_{36}, BTEX, SVOCs (including OCPs and PAHs) and VOCs were reported at concentrations below the laboratory LORs in all analysed samples.

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6. Consultant's Conclusions

The consultant (CDM Smith 2013) provided the following conclusions in relation to the Phase 2 ESA:

- A review of site history information indicated former general farming, poultry farming, and blacksmithing at the site. Only areas of farmland at the north portion of the site still exist.
- The site comprises the Shale Plains Woodland, Cumberland Plain Woodlands, Alluvial Woodland and grass fields that appear to be in good health, with several residences in the north east of Superlot 2 and farmland/farm residences at the northern end of the site. Stockpiles of waste and buried waste that consisted of demolished building materials and fly-tipped waste covered by vegetation were identified in various locations at the site.
- ACM was identified at the site, however, no respirable fibres of asbestos were detected above laboratory detection limits. The source of ACM was likely fly-tipped waste introduced to the site, and demolished historical building material.
- Metals (primarily manganese and nickel) were detected at the site above ecotoxicity criteria, which was likely introduced by historical poultry farming activities and blacksmithing or fly-tipped waste. The concentrations were generally within background levels associated with urban soils, or were in vegetated areas that showed no effects of toxicity. There were no visible signs of stress or disease in plants at the site and grass, tree and shrub communities appeared in good health. The consultant noted that manganese concentrations in soil in the region of the site are known to be elevated.
- Some areas the site contained waste and asbestos impacted soils that will require management, consisting of the following:
    - ACM present in the some surface soil locations at Superlot 1, Superlot 2 and Area X.
    - Waste materials identified in several locations in Superlot 1, Superlot 2, Area X and Area Y.
    - Roadbase bitumen material in Area C.
    - Several small waste stockpiles and ACM near the gas pipeline adjacent to Area C.
- Groundwater at the site contained heavy metal concentrations above freshwater ecosystem criteria, but the source of heavy metals is likely off-site, and any risk to identified potential receptors is considered low. The consultant noted that manganese concentrations in groundwater in the region of the site are known to be elevated.
- No management/remediation of groundwater is required.
- The site may be developed for the mixed industrial and commercial use through the implementation of a remediation strategy and Remediation Action Plan (RAP) for each proposed development area.
- An excavation program can be optimised to allow the placement of impacted soils, waste and ACM below hard standing areas and minimise the need for off-site disposal.

7. Audit Opinions

Based on the information reviewed as part of this interim audit advice and subject to the limitations in **Attachment 1**, the following opinions are presented:

- The information provided by the consultant (CDM Smith 2013) in regards to the site condition and surrounding environment has been checked against and generally meets the requirements of EPA 1997. The information provided was also consistent with the observations made by the auditor during the site inspection on 7 October 2012.
- The extent of site history information presented by the consultant (CDM Smith 2013) is considered adequately complete for the purposes of identifying a range of potential contamination issues at the site as part of the site investigation process.
- The number of soil and groundwater sampling locations and the rationale adopted by the consultant (CDM Smith 2013) during the site investigation provided generally adequate coverage of the site noting potential areas of concern and associated contaminants of potential concern (COPCs) identified as part of the site history review. However, Superlot 3 and Areas B, P and Q were not investigated by the consultant during the most recent investigation (CDM Smith 2013), and these areas will require investigation at a later date as part of the staged redevelopment of the site.
- The conclusions provided by the consultant (CDM Smith 2013) are considered broadly appropriate, noting the requirement for remediation/validation of impacted soil and fill materials in parts of the site as part of the redevelopment. RAPs will be required to be developed and implemented for

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parts of the site during development, and any additional contamination identified is most appropriately managed through this process.

- Validation reports are required to be prepared for each area of the site in which remediation is required to confirm that the remediation/management works are undertaken in a manner consistent with the requirements of the RAP. It is noted that Long-Term Environmental Management Plans (LTEMPs) must be prepared as needed if impacted materials are encapsulated or covered at each proposed development area.
- Whilst procedures have been proposed by the consultant (CDM Smith 2013) for the remediation and/or management of asbestos, insufficient information is currently available to determine the appropriateness of these nominated procedures. As such, appropriate remedial methodologies must be documented in the RAP(s), to be reviewed and accepted by the Auditor prior to commencement of remediation.

Please note that this interim advice does not constitute a Site Audit Statement or a Site Audit Report, but is provided to assist in the assessment and management of contamination issues at the site in regard to requirements of the site audit. The information provided herein should not be considered pre-emptive of the final audit conclusions, but rather represent the findings of the audit based on a preliminary review of available site information. Furthermore, the interim advice should not be regarded as "approval" of any proposed investigations or remedial activities, as any such approval is beyond the scope of an independent review.

Should you have any queries or require further clarification, please feel free to contact me by phone on (02) 8248 0300 or email alau@jbsgroup.com.au.

Yours Sincerely,

Andrew Lau
NSW EPA Accredited Site Auditor
JBS Environmental Pty Ltd

Attachments: (1) Limitations
(2) Site Plans and Figures

Level 1, 50 Margaret St, Sydney NSW, 2000 | Level 2, 12 Thelma St, West Perth WA, 6005
Tel: 02 8245 0300 | Fax: 02 8245 0399 www.jbsgroup.com.au

Attachment 1 – Limitations

The audit is being conducted with a reasonable level of scrutiny, care and diligence on behalf of the client for the purposes outlined in s.47(1) of the *Contaminated Land Management Act 1997.* The data used to support the conclusions reached as part of the audit were obtained by other consultants and the limitations which apply to the consultant's report(s) apply equally to this Interim Audit Advice.

Every reasonable effort has been made to identify and obtain all relevant data, reports and other information that provide evidence about the condition of the site, and those that were held by the client and the client's consultants, or that were readily available. No liability can be accepted for unreported omissions, alterations or errors in the data collected and presented by other consultants. Accordingly, the data and information presented by others are taken and interpreted in good faith.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

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

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

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS Environmental Pty Ltd and the Site Auditor reserve the right to provide additional Interim Audit Advices in the context of the additional information.

Attachment 2 – Site Plans and Figures

A4

PROJECT-FILE NAME: **S12388-01-F001**
DATE: **16/08/2012**
DRAWN: **RR**
APPROVED: **RO**

SOURCE: NEARMAPS.COM

CLIENT
WESTERN SYDNEY PARKLANDS TRUST

PROJECT
SAQP, EASTERN CREEK
BUSINESS HUB, ROOTY HILL, NSW

TITLE
SITE LOCATION PLAN

CDM Smith

FIGURE
1

Plan Showing Ownership Data - Western Sydney Parklands Precincts 2.3 & 2.4

SCALE 1:2000

SCALE 1:300

SCALE 1:100

LEGEND

- E1: Easement for Pipeline 24.835 wide [Vide Q916928]
- E2: Easement for Drainage 4.57 wide [Vide G642905]
- E3: Easement for Batter [Vide K920274]
- E4: Easement for Eaves and Gutters [Vide H614401]
- E5: Easement for Eaves and Gutters [Vide H614401]
- E6: Positive Covenant [Vide DP1051904]
- E7: Restriction(s) on the use of Land [Vide DP1051904]
- Precinct Lot

NOTES:

1. Digital Cadastral DataBase © 2009 NSW Dept. of Lands
2. Easement positions are indicative only and are subject to confirmation by survey

ID	Lot/Section/DP	Owner
1	5//DP1041487	BLACKTOWN CITY COUNCIL
2	1//DP1103025	WESTERN SYDNEY PARKLANDS TRUST
3	101//DP581882	THE COUNCIL OF THE CITY OF BLACKTOWN
4	1//DP909138	THE PRESBYTERIAN CHURCH (NEW SOUTH WALES) PROPERTY TRUST
5	4//DP1041487	BLACKTOWN CITY COUNCIL
6	3//DP1041487	WESTERN SYDNEY PARKLANDS TRUST
7	100//DP882326	WESTERN SYDNEY PARKLANDS TRUST
8	5/B/DP8681	WESTERN SYDNEY PARKLANDS TRUST
9	4/B/DP8681	WESTERN SYDNEY PARKLANDS TRUST [AUTO-CONSOL 3439-80]
10	3/B/DP8681	WESTERN SYDNEY PARKLANDS TRUST [AUTO-CONSOL 3439-80]
11	1//DP135665	WESTERN SYDNEY PARKLANDS TRUST [AUTO-CONSOL 9630-178]
12	13/B/DP8681	WESTERN SYDNEY PARKLANDS TRUST [AUTO-CONSOL 9630-178]
13	1/B/DP8681	WESTERN SYDNEY PARKLANDS TRUST
14	3//DP830836	WESTERN SYDNEY PARKLANDS TRUST
15	2//DP830836	WESTERN SYDNEY PARKLANDS TRUST
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17	1//DP830836	WESTERN SYDNEY PARKLANDS TRUST
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20	6//DP830836	WESTERN SYDNEY PARKLANDS TRUST
21	A//DP358346	WESTERN SYDNEY PARKLANDS TRUST
22	8//DP31130	WESTERN SYDNEY PARKLANDS TRUST
23	1//DP31130	WESTERN SYDNEY PARKLANDS TRUST
24	2//DP31130	ALBERT GATES MARGARET ALLAN GATES AS JOINT TENANTS
25	3//DP31130	MINISTER ADMINISTERING THE ENVIRONMENTAL PLANNING & ASSESSMENT ACT 19
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33	9//DP830836	WESTERN SYDNEY PARKLANDS TRUST
34	10//DP830836	WESTERN SYDNEY PARKLANDS TRUST
35	3/A/DP8681	WESTERN SYDNEY PARKLANDS TRUST
36	12//DP882325	WESTERN SYDNEY PARKLANDS TRUST
37	11//DP882325	WESTERN SYDNEY PARKLANDS TRUST
38	14//DP882325	WESTERN SYDNEY PARKLANDS TRUST
39	1//DP1069269	WESTERN SYDNEY PARKLANDS TRUST
40	2//DP1069269	WESTERN SYDNEY PARKLANDS TRUST
41	14//DP1051904	AGL GAS NETWORKS LIMITED
42	50//DP1121258	ROADS AND TRAFFIC AUTHORITY OF NEW SOUTH WALES
43	12//DP1041487	ROADS AND TRAFFIC AUTHORITY OF NEW SOUTH WALES
44	11//DP1041487	ROADS AND TRAFFIC AUTHORITY OF NEW SOUTH WALES

ID	Road Ownership Status
45	ROAD BEING THE RESIDUE OF LAND IN CERTIFICATE OF TITLE VOLUME 826 FOLIO 243
46	PUBLIC CROWN SUBDIVISION ROAD
47	PUBLIC CROWN RESERVED ROAD
48	ROAD BEING THE RESIDUE OF LAND IN CERTIFICATE OF TITLE VOLUME 147 FOLIO 41
49	PUBLIC CROWN SUBDIVISION ROAD

No.	Date	Revision Details	INI
B	30-04-2010	Ownership information updated, Easements added	KDS
A	20-07-2009	Table Amended	SAS

PREPARED FOR: Western Sydney Parklands

CHECKED BY/DATE: KDS/07-05-2010
APPROVED BY/DATE: DWF/07-05-2010
GIS REF: F719-G-003b.mxd
JOB REF: F719

CO-ORDS: MGA
DATUM: N/A
DATE OF PLAN: 07-05-2010

1:5,000 @ A3

0 50 100 150 200 250 300 Metres

P:\F719\Mapping\Acad-Gis\F719-G-003b.mxd, 7/05/2010 12:06:16 PM, by fnorzahari

Kellie Guenther

From: Andrew Lau
Sent: Thursday, 14 March 2013 9:53 PM
To: Eric Brodie; Rebecca Organo
Cc: Kellie Guenther
Subject: Eastern Creek - audit comments on Concept RAP

Eric/Bec,

I've reviewed the draft Concept RAP (CRAP) (indeed an unfortunate acronym).

Here are my comments that I'd like addressed:

Please include an executive summary, as per OEH 2011 requirements.

Section 1.3 - In relation to Area Q, I think it is necessary to make it clearer whether it is or isn't part of `the site', as opposed to just saying that it's not subject to the remediation works set out in the CRAP. If it is part of the site and it's not the subject of the CRAP, then presumably you need a statement (somewhere) confirming that it is suitable in its current form for the proposed use.

Section 1.4 – given that the remediation/validation/sign off might be undertaken by others, I thought my engagement was only up until the Section B SAS/SARs on the CRAP. If so, you'll need to change the wording of my role.

Section 1.6 – the RAP should identify regulatory approvals or licences relevant to the proposed remediation works and you might consider describing it in this manner rather than just `the proposed works', which could imply much broader approvals/licenses unrelated to the remediation works.

Section 2.2.2 – the RAP needs to further demonstrate and support the notion that contamination in the Phase 2 portion of the site will be consistent with the Phase 1 portion of the site. Reference should be made to the findings of the Douglas Partners report for the Phase 2 portion of the site, and also how the findings of the Douglas Partners report for the Phase 1 portion of the site were essentially confirmed/verified with the detailed assessment conducted in the Phase 1 portion of the site. The RAP should demonstrate how the contamination issues in the Phase 1 and Phase 2 portions of the site are broadly similar in nature and extent, to support the application of the remedial measures outlined in the concept RAP to the Phase 2 portion of the site in the absence of detailed assessment works being undertaken at this point in time.

Section 3 – please provide detailed plan and correct lot dp number(s) identifying `the site'.

Section 3 – it would be useful (in supporting category 1 or 2 SEPP 55 claims) to state whether the relevant flood, heritage, conservation area, etc listings appear on the planning certificates in the relevant sub-sections.

Section 3.8 – (refer to previous comment regarding douglas partners results) Please include additional information about the contamination identified in the preliminary contamination assessment, including the lead in excess of the HIL and some PIL exceedences for zinc and mercury.

Section 3.9 – please review the previous lead concentrations and confirm the exceedence does not fall within the part of the site where there may be sensitive (i.e., child pay area?) use.

Section 4 (various subsections) – please note that as an external reviewer (only), I have no authority to `approve' elements of the remediation approach, but can `accept as appropriate'.

Section 4.4.4 - please include a data gap investigation phase prior to preparation of SRAPs for the parts of the site where additional testing is required and include a section in the CRAP outlining the data gaps, broadly outlining how they are to be addressed and how justifying how these data gaps don't prevent the CRAP sufficiently defining the plan of remediation to be followed to make the site suitable (refer also to previous comment regarding Douglas partners data).

Section 4.5 - please describe how the nominated soil criteria will be applied, including the use of any statistical measures and other considerations such as aesthetics, consistent with relevant guidelines.

Section 4.5.3 - in the event that any materials are brought onto the site under an exemption in force at the time of importation, then the CRAP should reiterate the need to comply with the conditions of the exemption.

Section 4.7 - please provide further justification for per and post groundwater monitoring, given the identified COPCs.

Section 4.9 - please refer to previous comment relating to data gap investigations.

Section 4.9.3.1 - reference should be made to ANZECC 1999 cap/containment guidelines. The proposed low permeability cap seems to be an unnecessary requirement given the identified COPC is asbestos. A minimum capping thickness must be specified and any departure from the recommended 0.5m capping thickness in ANZECC 1999 will have to be appropriately justified. I will accept a lesser capping thickness in areas where there is pavements/buildings, however, any services should be located in clean materials rather than impacted materials. I'm unsure if I have interpreted the reference to 150mm in the CRAP as relating to the capping layer (which i dont accept) or overlying topsoil (which I do).

Section 4.9.3.2 - I'd like to see a clear requirement for large loose sheets or pipes of asbestos to be removed from the site and not subject to the same placement/compaction process within the containment cell. I'm not referring to broken fragments or pipes within the soil matrix, rather readily segregated sheets / pipes, that are unlikely to meet geotechnical requirements in any event.

Section 5.2 - unexpected finds sampling requirements should also refer to WA DoH 2009, given additional asbestos is likely to be this most common unexpected find at the site during development works based on the previous investigations and site history.

Section 6.2.1 - AMP should also include details on decontamination .

Section 7 - please correct asbestos in workplace code of practice reference (also in previous sections). Given potential requirement to wear coveralls during particular portions of the works, please also include heat stress as a potential hazard. Given the adoption of the WA DoH 2009 guidance throughout the CRAP, consideration should be given to using the recommended dust criterion of 50 ug/m3 for defining when additional RPE will be required.

Section 8 - please nominate laboratory methods and LORs for asbestos (including sample size) and detail sampling frequencies for asbestos, consistent with requirements of WA DoH 2009 for both in situ materials and stockpiled materials.

Please call if you have any queries (I'm out out of the office tomorrow but back on Monday).

Andrew

Andrew Lau | Principal Contaminated Land | JBS Environmental Pty Ltd

Level 2, 12 Thelma St West Perth WA | Level 1, 50 Margaret St Sydney NSW

T: 08 9488 0100 (WA) | T: 02 8245 0300 (NSW) | M: 0412 512 614 | www.jbsgroup.com.au

Groundwater | Contaminated Land | Planning and Approvals | Auditing and Compliance | Hazardous Materials and Air Monitoring

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From: Eric Brodie [mailto:Eric.Brodie@rms.nsw.gov.au]
Sent: Tuesday, 12 March 2013 11:04 AM
To: Andrew Lau
Subject: Eastern Creek

Hi Andrew

It would be great if you could get your comments on the Eastern Creek Concept RAP to Rebecca this week, and ideally the Sec B SAS if all is in order. This would allow us to make the resubmission to DP&I.

Kind regards, Eric

Appendix C

Site Plan

A3

PROJECT No.	**C121009**
FILE NAME	**F003**
DATE	**26.02.13**
DRAWN	**RR**
APPROVED	**RO**

LEGEND

CURRENT PROPERTY BOUNDARIES

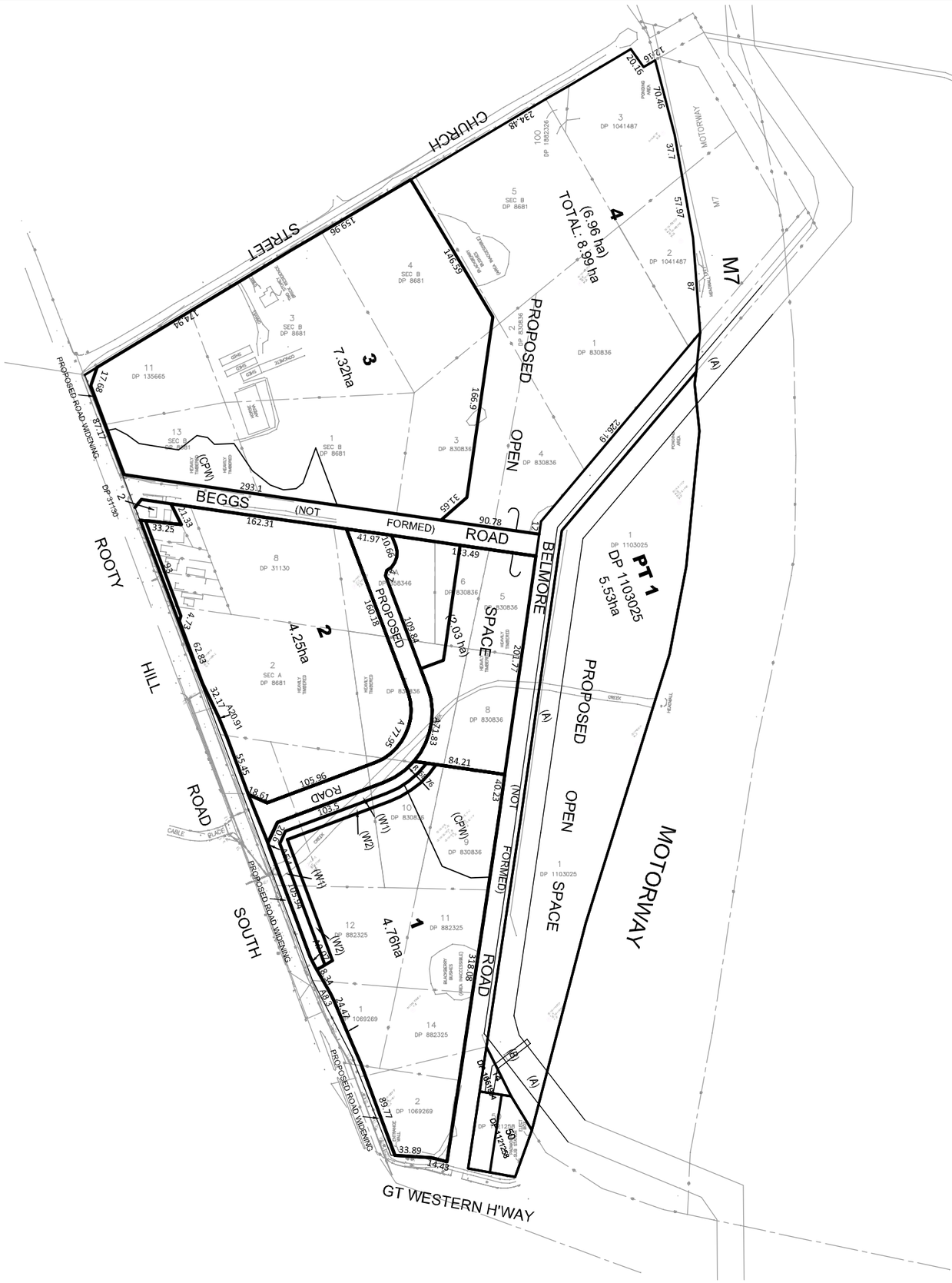
(A) : Q916928 - EASEMENT FOR PIPELINE 24.385 WIDE (VIDE DP 499004)

(B) : PROPOSED PIPELINE EASEMENT5 WIDE AND 7.5 WIDE (VIDE DP1044968)

(W1): PROPOSED EASEMENT FOR DRAINAGE OF WATER 10 WIDE

(W2): PROPOSED TEMPORARY EASEMENT FOR DRAINAGE OF WATER 8 WIDE

(CPW): CUMBERLAND PLAIN WOODLAND PROTECTION AREA



0 50 100 150 200
(metres)

CLIENT
WESTERN SYDNEY PARKLANDS TRUST

PROJECT
CONCEPT REMEDIATION ACTION PLAN, EASTERN CREEK BUSINESS HUB, ROOTY HILL, NSW

TITLE
SUBDIVISION PLAN

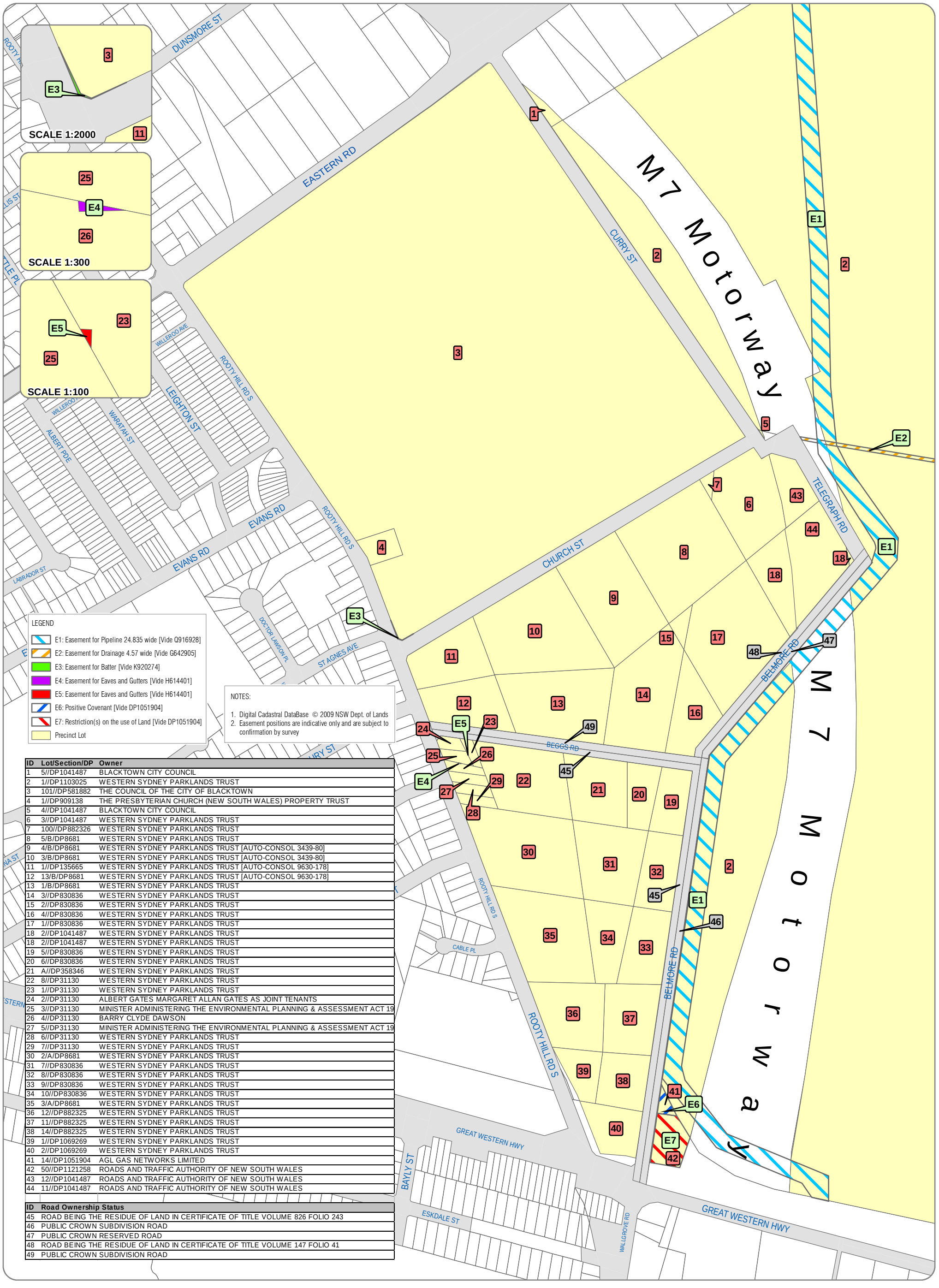
FIGURE No.
3

CONSARA
CONTAMINATED SITES assessment ▪ remediation ▪ advice

Plotted By: ReynoldsR Plot Date: 07/04/13 - 20:21 Cad File: E:\personal_CAD R2_CONSARA\C121009_ECHB\FIGURES\C121009-F003.dwg

Plan Showing Ownership Data - Western Sydney Parklands Precincts 2.3 & 2.4

SPATIAL INSITES DEVELOPMENT CONSULTANTS



ID	Lot/Section/DP	Owner
1	5//DP1041487	BLACKTOWN CITY COUNCIL
2	1//DP1103025	WESTERN SYDNEY PARKLANDS TRUST
3	101//DP581882	THE COUNCIL OF THE CITY OF BLACKTOWN
4	1//DP909138	THE PRESBYTERIAN CHURCH (NEW SOUTH WALES) PROPERTY TRUST
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12	13/B/DP8681	WESTERN SYDNEY PARKLANDS TRUST [AUTO-CONSOL 9630-178]
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21	A//DP358346	WESTERN SYDNEY PARKLANDS TRUST
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42	50//DP1121258	ROADS AND TRAFFIC AUTHORITY OF NEW SOUTH WALES
43	12//DP1041487	ROADS AND TRAFFIC AUTHORITY OF NEW SOUTH WALES
44	11//DP1041487	ROADS AND TRAFFIC AUTHORITY OF NEW SOUTH WALES

ID	Road Ownership Status
45	ROAD BEING THE RESIDUE OF LAND IN CERTIFICATE OF TITLE VOLUME 826 FOLIO 243
46	PUBLIC CROWN SUBDIVISION ROAD
47	PUBLIC CROWN RESERVED ROAD
48	ROAD BEING THE RESIDUE OF LAND IN CERTIFICATE OF TITLE VOLUME 147 FOLIO 41
49	PUBLIC CROWN SUBDIVISION ROAD

No.	Date	Revision Details	INI
B	30-04-2010	Ownership information updated, Easements added	KDS
A	20-07-2009	Table Amended	SAS

PREPARED FOR: Western Sydney Parklands

CHECKED BY/DATE:	KDS/07-05-2010
APPROVED BY/DATE:	DWF/07-05-2010
GIS REF:	F719-G-003b.mxd
JOB REF:	F719
CO-ORDS:	MGA
DATUM:	N/A
DATE OF PLAN:	07-05-2010

N

1:5,000 @ A3

0 50 100 150 200 250 300 Metres

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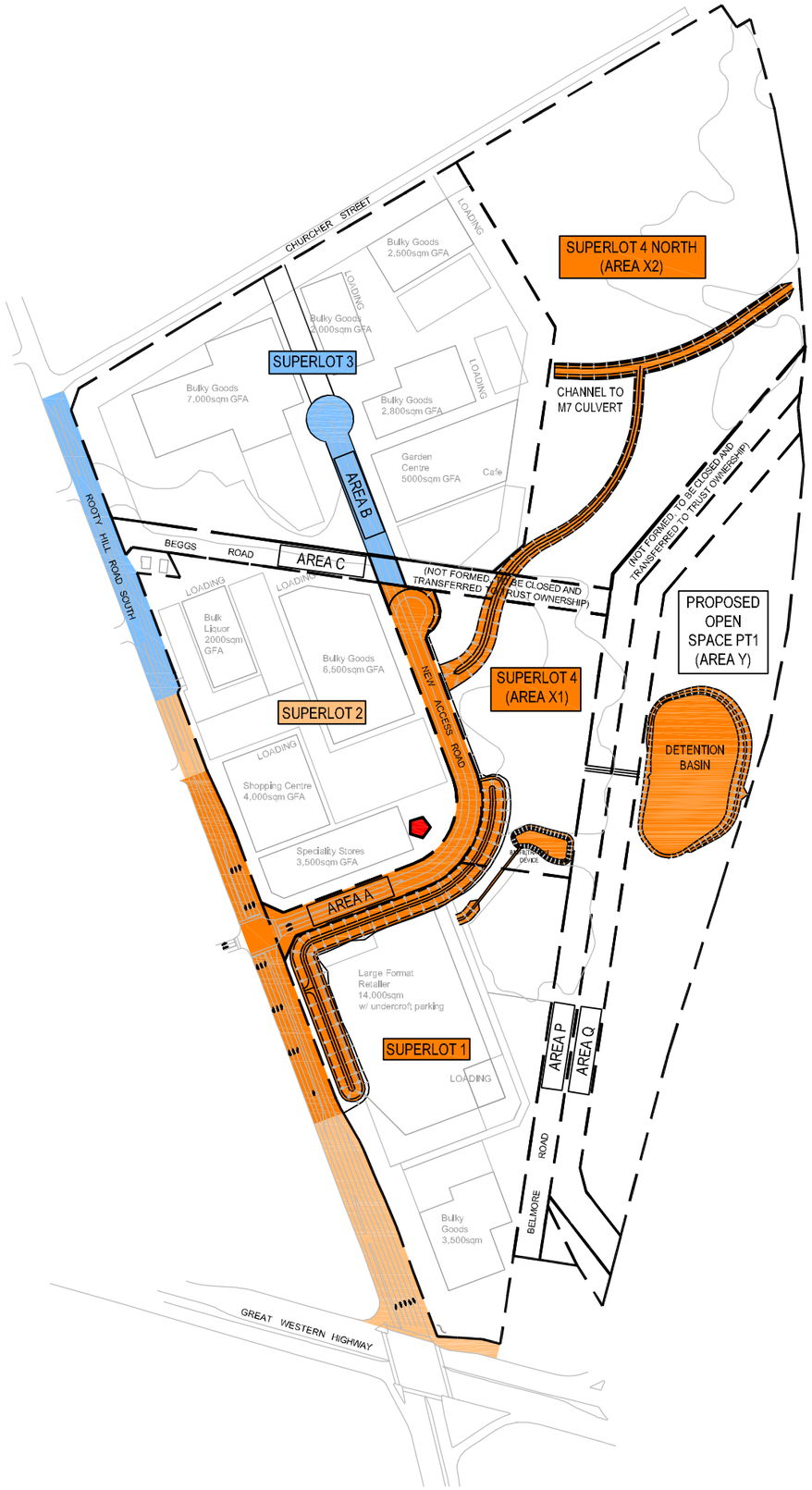
A3

PROJECT No.	**C121009**
FILE NAME	**F004**
DATE	**07.04.13**
DRAWN	**RR**
APPROVED	**RO**

LEGEND

- SUPERLOT BOUNDARY
- PHASE 1 (EARLY WORKS)
- PHASE 1B
- PHASE 2



0 50 100 150 200
(metres)

CLIENT
WESTERN SYDNEY PARKLANDS TRUST

PROJECT
CONCEPT REMEDIATION ACTION PLAN, EASTERN CREEK BUSINESS HUB, ROOTY HILL, NSW

TITLE
PHASING PLAN

FIGURE No.
4

CONSARA
CONTAMINATED SITES assessment ▪ remediation ▪ advice

NOTES

- BOUNDARY DIMENSIONS AND AREAS HAVE BEEN COMPILED FROM PLANS MADE AVAILABLE AT LPI, NSW AND ARE SUBJECT TO FINAL SURVEY.
- CONTOURS IF SHOWN ARE AN INDICATION OF THE TOPOGRAPHY AND SHOULD ONLY BE USED FOR PLANNING PURPOSES. IF DETAILED DESIGN IS TO BE UNDERTAKEN, SPOT LEVELS SHOULD BE USED.
- DO NOT SCALE OFF THIS PLAN – RELATIONSHIP OF IMPROVEMENTS AND DETAIL TO BOUNDARIES IS DIAGRAMMATIC AND IF CRITICAL SHOULD BE CONFIRMED BY A BOUNDARY SURVEY.
- THESE PLANS SHOULD BE READ IN CONJUNCTION WITH DIGITAL DATA ISSUED TO CLIENT. THE DIGITAL DATA CONTAINS NUMEROUS LAYERS OF INFORMATION WHICH ARE NOT SHOWN ON THESE PLANS FOR THE SAKE OF CLARITY.
- NO CADASTRAL SURVEY HAS BEEN UNDERTAKEN TO CONFIRM THE LOCATION AND DIMENSION OF THE PROPERTY BOUNDARIES. SHOULD CONSTRUCTION BE PLANNED CLOSE TO THE PROPERTY BOUNDARIES, IT IS CRITICAL THAT A CADASTRAL SURVEY BE COMPLETED FIRST.
- AERIAL PHOTOGRAPHY HAS BEEN SOURCED FROM NEARMAP PTY LTD AND IS USED UNDER NEARMAP PTY LTD COMMERCIAL LICENSE

(A) : Q916928 - EASEMENT FOR PIPELINE 24.385 WIDE (VIDE DP 499004)
(B) : PROPOSED PIPELINE EASEMENTS WIDE AND 7.5 WIDE (VIDE DP1044968)

20 0 20 40 60 80 100 METRES

SCALE 1 : 1000

Area A

Point ID	Easting	Northing	Elevation	Known As
372	301372.58	6259576.56	40.85	01LA
370	301305.32	6259537.60	41.44	02LA

Area C

Point ID	Easting	Northing	Elevation	Known As
335	301465.29	6259772.21	38.93	25LC
336	301371.17	6259783.98	39.99	26LC
337	301270.99	6259798.25	42.14	35LC
338	301192.46	6259811.43	44.94	36LC

Area X

Point ID	Easting	Northing	Elevation	Known As
502	301559.51	6260194.30	37.14	01LX
503	301571.67	6260181.56	37.11	02LX
524	301617.55	6260142.65	37.92	BH/3LXBTOP
504	301595.67	6260156.50	36.99	04LX
306	301545.45	6260174.84	37.32	05LX
305	301511.40	6260158.26	38.30	06LX
304	301516.40	6260148.98	38.34	07LX
308	301464.85	6260117.81	39.89	08LX
307	301495.59	6260134.97	39.18	09LX
309	301457.28	6260129.46	40.09	10LX
310	301422.07	6260105.16	40.73	11LX
314	301415.64	6260078.55	40.45	12LX
303	301536.01	6260096.98	38.07	13LX
507	301621.00	6260091.98	37.26	14LX
297	301577.80	6260070.44	37.53	15LX
295	301525.69	6260055.65	37.92	16LX
316	301497.53	6260056.15	38.74	17LX
315	301450.87	6260062.20	39.84	18LX
296	301531.63	6260045.09	37.73	19LX
301	301633.81	6260043.75	38.03	BH20LX/PVC
300	301633.79	6260043.74	38.45	BH20LX/TOP
293	301541.57	6260004.75	38.34	BH22LX/PVC
292	301541.49	6260004.80	38.57	BH22LX/TOP
298	301586.16	6260048.19	37.48	21LX
294	301463.40	6260005.48	38.39	23LX
320	301504.17	6259963.16	37.83	24LX
290	301572.99	6259973.38	37.47	25LX
302	301634.09	6259980.51	37.30	26LX
288	301582.33	6259917.03	37.62	27LX
289	301582.53	6259917.04	37.60	27LX
326	301523.10	6259903.92	37.91	28LX
327	301458.84	6259912.14	38.54	29LX
328	301490.00	6259884.06	38.07	30LX
329	301454.65	6259845.88	38.45	31LX
331	301523.23	6259848.31	38.05	32LX
330	301479.97	6259817.84	38.44	33LX
392	301486.85	6259755.75	38.68	34LX
391	301444.82	6259757.44	39.31	35LX
390	301395.03	6259759.93	39.79	36LX
389	301383.91	6259757.82	39.87	37LX
399	301407.58	6259724.89	39.97	38LX
394	301442.06	6259723.70	39.81	39LX
393	301452.32	6259716.10	39.80	40LX
396	301429.66	6259715.43	39.91	41LX
397	301432.53	6259704.91	40.10	42LX
400	301385.96	6259697.14	40.47	43LX
398	301440.52	6259690.91	40.03	44LX
401	301387.63	6259684.21	40.46	45LX
402	301425.80	6259670.19	40.29	46LX
404	301483.06	6259670.86	39.65	47LX
403	301453.55	6259641.67	39.81	48LX
406	301420.61	6259591.14	40.34	49LX
405	301457.82	6259581.38	40.15	50LX

Area Y

Point ID	Easting	Northing	Elevation	Known As
279	301613.28	6259829.54	37.91	01LY
277	301632.34	6259804.66	38.67	BH01/PVC
278	301632.41	6259804.70	38.83	BH01/TOP
274	301562.56	6259768.50	38.21	03LY
275	301613.11	6259761.09	38.06	04LY
273	301579.47	6259720.07	38.68	05LY
272	301540.46	6259665.72	39.21	06LY
271	301594.28	6259655.46	38.63	07LY
270	301553.79	6259599.84	39.26	08LY
269	301567.44	6259537.28	39.47	09LY
268	301544.85	6259521.69	40.10	10LY
267	301515.98	6259537.79	40.05	11LY
266	301523.67	6259507.40	40.40	12LY
265	301552.76	6259492.50	40.21	13LY
264	301506.71	6259452.28	40.83	14LY
263	301521.19	6259392.81	40.40	15LY
262	301494.73	6259357.16	40.77	16LY
259	301513.16	6259331.40	41.67	BH17LY/PVC
260	301513.14	6259331.42	41.78	BH17LY/TOP
102	301593.27	6259583.27	39.47	BH5/PVC

Area 1

Point ID	Easting	Northing	Elevation	Known As
222	301418.89	6259539.84	40.59	01L1
226	301457.92	6259518.96	40.84	02L1
223	301431.15	6259509.72	41.84	BH3L1/PVC
224	301431.17	6259509.71	41.91	BH3L1/TOP
408	301428.79	6259507.52	41.65	BH3L1B/PVC
409	301428.78	6259507.55	41.90	BH3L1B/TOP
228	301391.62	6259495.36	41.08	04L1
221	301337.77	6259508.99	41.55	05L1
219	301276.27	6259493.09	42.06	06L1
218	301292.40	6259471.70	43.07	BH7L1/PVC
214	301292.37	6259471.70	43.20	BH7L1/TOP
220	301316.85	6259463.05	41.81	08L1
227	301446.07	6259453.94	41.25	09L1
229	301373.41	6259431.09	41.96	10L1
230	301329.53	6259433.43	42.44	11L1
231	301327.19	6259420.05	42.48	12L1
232	301301.46	6259413.06	42.49	13L1
236	301434.13	6259390.53	41.45	14L1
233	301351.06	6259369.96	42.46	15L1
234	301406.03	6259361.45	41.96	16L1
235	301414.29	6259361.53	41.88	17L1
237	301430.96	6259340.15	41.78	18L1
240	301387.32	6259328.21	42.26	19L1
242	301344.92	6259335.04	42.74	20L1
238	301424.41	6259320.13	42.11	21L1
239	301417.00	6259308.72	42.11	22L1
245	301382.80	6259303.22	42.59	23L1
243	301336.88	6259306.23	43.01	24L1
244	301356.29	6259293.98	43.12	25L1
246	301386.34	6259295.54	42.59	26L1
247	301386.27	6259270.57	43.26	27L1
254	301428.60	6259274.66	42.96	28L1
255	301419.08	6259261.18	43.07	29L1
248	301361.69	6259252.04	44.44	BH30L1/PVC
249	301361.66	6259252.07	44.55	BH30L1/TOP
251	301374.65	6259235.72	43.55	31L1
252	301394.62	6259227.51	43.25	32L1
253	301401.35	6259211.15	43.34	33L1
216	301274.18	6259450.47	42.85	BH/6/TOPPVC
241	301388.65	6259339.83	42.31	WELL/PAMELA

Area 2

Point ID	Easting	Northing	Elevation	Known As
371	301316.51	6259567.28	41.19	03L2
369	301256.68	6259550.18	41.98	04L2
368	301290.36	6259574.52	41.75	05L2
367	301263.65	6259579.84	41.82	06L2
375	301352.06	6259623.13	40.78	07L2
373	301355.08	6259587.38	40.90	08L2
374	301363.98	6259607.06	40.64	09L2
376	301321.20	6259621.02	41.41	10L2
366	301226.15	6259589.97	42.68	11L2
377	301385.68	6259649.92	40.66	12LA
363	301253.93	6259627.36	42.74	13L2
365	301216.65	6259632.53	43.52	14L2
364	301226.94	6259634.53	43.26	15L2
379	301287.89	6259662.78	42.43	16L2
360	301195.45	6259654.63	45.13	BH17L2/PVC
361	301195.49	6259654.65	45.33	BH17L2/TOP
362	301229.06	6259675.05	43.93	18L2
378	301346.35	6259702.12	40.95	19L2
381	301334.84	6259727.49	42.12	BH/BH20L2/PVC
382	301334.86	6259727.50	42.25	BH/BH20L2/TOP
383	301284.99	6259715.58	42.54	21L2
353	301208.62	6259690.19	44.73	22L2
352	301229.91	6259713.40	44.29	23L2
388	301322.32	6259751.48	41.42	24L2
387	301317.55	6259765.37	41.30	27L2
386	301303.34	6259755.69	42.13	28L2
384	301249.54	6259762.62	43.39	29L2
385	301257.08	6259776.82	42.95	30L2
350	301204.03	6259772.40	44.64	31L2
349	301199.86	6259790.94	44.87	32L2
351	301219.75	6259742.58	44.37	33L2
358	301186.19	6259693.86	45.29	34L2

CLIENT

CADENCE AUSTRALIA PTY LTD

PROJECT

DETAIL SURVEY

OF

WESTERN SYDNEY PARKLANDS
PRECINCTS 2.3 & 2.4
CNR GREAT WESTERN HIGHWAY,
M7 MOTORWAY & ROOTY HILL RD STH

EASTERN CREEK

NOTES

The title boundaries shown hereon were not marked at the time of survey and have been determined by plan dimensions only and not by field survey.

Services shown hereon have been located where possible by field survey. If not able to be so located, services have been plotted from the records of relevant authorities where available and have been noted accordingly on the plan. Where such records do not exist or are inadequate a notation has been made hereon.

Prior to any demolition, excavation or construction on the site, the relevant authority should be contacted for possible location of further underground services and detailed locations of all services.

PPP/CF	LPL	DD/MM/YY	COMMENT

Symbols shown are indicative only. The symbol size and orientation does not necessarily represent the real size or orientation of the feature.

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ISO 9001:2008
FS 32690

HEIGHT DATUM: AHD	LOCAL AUTHORITY: BLACKTOWN COUNCIL
HEIGHT ORIGIN: PM 30122 RL 43.58	SCALE: 1:1000 (A0)
MERIDIAN: 56	CONTOUR INTERVAL: 1.0 Metre
CO-ORD SYSTEM: MGA	SURVEYOR: TD — DATE OF SURVEY: 18/10/12
CCAD FILE: 73106	DRAWN: TD — DATE: 20/10/12
AUTOCAD FILE: 73106	CHECKED: RWL — DATE: 30/10/12
ARCHIVE FILE: 73106	APPROVED: RWL — DATE: 30/10/12
PLAN NUMBER: SY073106.000	PHASE: 007
	SHEET: 1 OF 1

LMc