



Site Audit Report

**Southern Wetlands Dedication Area
Penrith Lakes Scheme
Castlereagh NSW**

Prepared for

Penrith Lakes Development Corporation (PLDC)

Prepared By:

James Davis

NSW EPA Accredited Contaminated Land Site Auditor

Accreditation Number: 0301

Final Report

February 2016

Report Reference: 600033_0301-1319-13

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. 0301-1319-13

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 James Davis Company Enviroview Pty Ltd

Address PO Box 327

GLADESVILLE NSW

Postcode 1675

Phone 0467 375 481

Fax 02 9817 7004

Site details

Address Southern Wetlands Dedication Area, Penrith Lakes Scheme

CASTLEREAGH NSW

Postcode 2749

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

See attached list and attached plan. Note the land identified as the Residual Materials Consolidation Area (RMCA) within the boundary of the Southern Wetlands Dedication Area is not included in this Site Audit.

Local Government Area Penrith City Council

Area of site (e.g. hectares) 336.6Ha

Current zoning 1(a2) Rural - Interim
Development Order No. 93, August 1980.

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*.

.....
.
***Strike out as appropriate**

Site audit commissioned by

Name Mick O'Brien Company Penrith Lakes Development Corporation

Address PO Box 457

Cranebrook NSW

Postcode 2749

Phone 02 4729 0044

Fax 02 4730 1462

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

Purpose of site audit

- A. To determine land use suitability (please specify intended use[s])
Residential landuse with access to soil

OR

- ~~B(i) To determine the nature and extent of contamination, and/or~~
- ~~B(ii) To determine the appropriateness of an investigation/remedial action/management plan*, and/or~~
- ~~B(iii) To determine if the land can be made suitable for a particular use or uses by implementation of a specified remedial action plan/management plan* (please specify intended use[s])~~

Information sources for site audit

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

Coffey Geosciences, DLA Environmental

Title(s) of report(s) reviewed

Coffey (June 2001) Preliminary Contamination Assessment Penrith Lakes Scheme
Cranebrook, NSW Coffey Reference: S20418/8-Bb 28 June, 2001.

JBS Environmental (April 2011) Draft Asbestos Assessment Penrith Lakes Development Corporation Limited (PLDC) & Waste Assets Management Corporation (WAMC) Penrith Lakes, 89-151 Old Castlereagh Road Castlereagh, NSW JBS Environmental Reference: JBS 41511-16970 (Rev B).

DLA Environmental (December 2011) Off Specification Mulch Management Plan, Penrith Lakes, 89-151 Old Castlereagh Road, Castlereagh, NSW, Revision 6.0.

DLA Environmental (December 2011) Sampling, Analysis and Quality Plan, Validation of Off-Specification Mulched Areas, Penrith Lakes Development Corporation, 85-151 Old Castlereagh Road, Castlereagh, NSW, Revision 4.0.

DLA Environmental (December 2011) Unexpected Find of Asbestos Containing Material Protocol Imported Organics Materials Penrith Lakes Development Corporation 89 – 151 Old Castlereagh Road NSW. (Appendix 1 of DLA Environmental [December 2011] Off Specification Mulch Management Plan).

DLA Environmental (February 2014) Addendum–Off-Specification Mulch (OSM) Management Plan. Revision 4.4

DLA Environmental (January 2016) Final Validation Report Southern Wetlands Dedication Area Penrith Lakes Scheme. 21 January 2016. DLA Environmental Report Reference DL2591_PJ0653.

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

**Strike out as appropriate*

Environmental Protection Authority (30 June 2014) Letter regarding implementation of Amended Off-specification Management Plan from Giselle Howard, Director – Metropolitan, NSW EPA. EPA Reference DOC13/74598-12.

Environ (28 February 2013) Re: Review of Off Specification Mulch Management Plan. Interim Site Audit Advice from Graeme Nyland. Environ Reference: AS120855.

Office of Environmental and Heritage (18 October 2011) Letter regarding organics remediation strategy from Greg Sheehy, Acting Director – Metropolitan, NSW EPA. OEH Reference DOC11/47389.

Site audit report

Title: Site Audit Report, Southern Wetlands Dedication Area, Penrith Lakes Scheme, Castlereagh NSW

Report No: 600033_0301-1319-13

Date: 29th February 2016

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.

Overall comments

Due to the potential for the presence of materials containing asbestos in the form of fragments of fibre cement in the soil at the Site, it is recommended that an unexpected finds protocol consistent with the objective of the unexpected finds protocol Appendix 1 of the DLA Environmental (December 2011) Off Specification Mulch Management Plan, Penrith Lakes, 89-151 Old Castlereagh Road, Castlereagh, NSW, Revision 6.0, is maintained in relation to the future management of excavation or earthworks at the Site.

Section B

~~Purpose of the plan¹ 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 and management plan* (insert title, date and author of plan)~~

~~subject to compliance with the following condition(s):~~

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

* **Strike out as appropriate**

Overall comments

.....
.....
.....
.....
.....
.....

PART III: Auditor's declaration

I am accredited as a site auditor by the NSW Environment Protection Authority under the *Contaminated Land Management Act 1997* (**Accreditation No. 0301**).

I certify that:

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

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



Signed

Date 29th February 2016

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

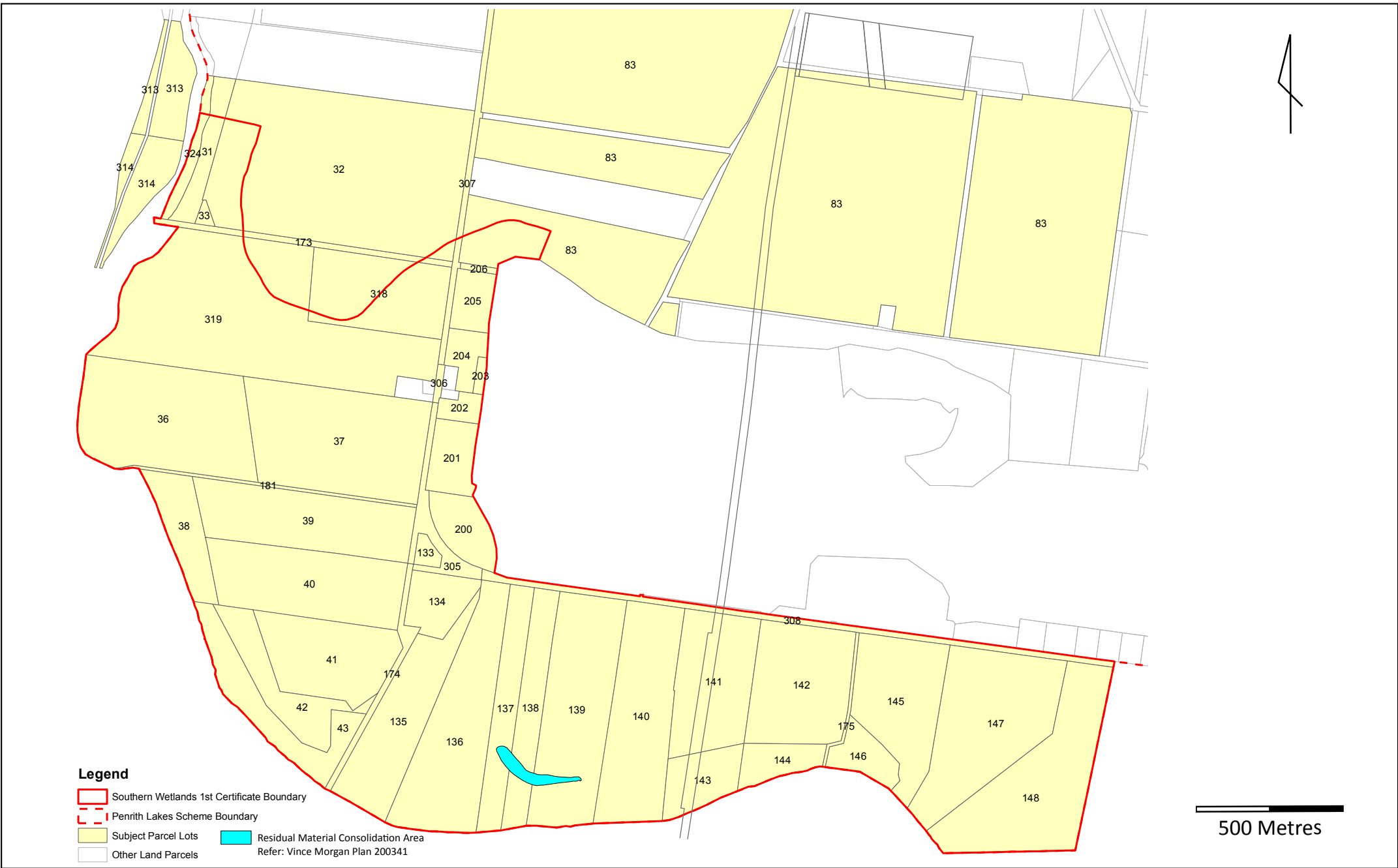
the **local council** for the land which is the subject of the audit.

Attachment 1.

Site Audit Statement – 0301-1319-13

Southern Wetlands Dedication Area Penrith Lakes Property Description

Part Lot 102 DP1043503 Lot 1 DP200839
Lot 57 DP668807 Lot 1 DP419190
Lot Y DP421674
Lot X DP421674
Lot 56 DP78686
Lot 2 DP128036
Lot 1 DP128036
Lot B DP374807
Lot A DP374807
Lot 1 DP236125
Part Lot 7 DP1148035
Part Lot 2 DP236125
Part Lot 541 DP1131982
Part Lot 540 DP1131982
Part Lot 6 DP1148035
Part Lot 2 DP1092607
Lot 1 DP1092607
Lot 9 DP1013504
Lot 8 DP1013504
Lot 7 DP1013504
Lot 6 DP1013504
Lot 5 DP1013504
Lot 4 DP1013504
Lot 3 DP1013504
Lot 1 DP882352
Lot 1 DP45727
Lot 1 DP47720
Part Lot 1 DP882354
Lot 310 DP752021
Lot 309 DP752021
Lot 321 DP752021
Lot 308 DP752021
Lot 338 DP752021
Lot 337 DP752021
Lot 307 DP752021
Lot 306 DP752021
Lot 305 DP752021
Part Lot 304 DP752021
Part Lot 325 DP752021
Part Lot 303 DP752021
Lot 302 DP752021
Lot 2 DP200839



Legend

- Southern Wetlands 1st Certificate Boundary
- Penrith Lakes Scheme Boundary
- Subject Parcel Lots
- Residual Material Consolidation Area
Refer: Vince Morgan Plan 200341
- Other Land Parcels

500 Metres



Site Audit Site - Site Audit Statement 0301-1319-13
Southern Wetlands Dedication Area Penrith Lakes Scheme

Date: 19 February 2016
 Drawn By: JRAD
 Checked: JRAD
 ENVIROVIEW PTY LTD

Report Title

Site Audit Report
Southern Wetlands Dedication Area
Penrith Lakes Scheme
Castlereagh NSW

Report Reference: Ref: 600033_0301-1319-13
Revision Status: Final

Site Audit Details:

Enviroview Project Reference: 600033
Site Auditor: James Davis
Site Auditor Accreditation Number: 0301
Date Site Audit Commenced: 1 October 2013


List of Site Audit Statements that this report relates to:

0301-1319-13

Client Details:

Site Audit Commissioned By: Penrith Lakes Development Corporation (PLDC)
Client Contact: Mick O'Brien

Document Control:

Revision Status	Date	Approved For Issue	Distribution		
			Client	Council	NSW EPA
Final	29/02/2015		e	N/A	N/A

Notes: (h) – hard copy and number of copies; (e) – electronic soft copy in portable document format (pdf)

This document may only be used for the purpose for which it was commissioned; and in accordance with the Terms of Engagement for the commission. This document should not be used or copied without written permission from Enviroview Pty Ltd. © 2016 Enviroview Pty Ltd

Enviroview Pty Ltd
PO Box 327
Gladesville NSW 1675

Executive Summary

This Site Audit Report (SAR) and subsequent Site Audit Statement (SAS) have been produced to document the findings of a Site Audit, conducted by James Davis of Enviroview Pty Ltd, a New South Wales Environmental Protection Authority (NSW EPA) Contaminated Land Accredited Site Auditor on the subject Site identified as the Southern Wetlands Dedication Area of the Penrith Lakes Scheme located at Castlereagh, NSW.

The objective and scope of the Site Audit was to independently review the assessment and remediation of the Site and the environmental consultant's reports that have been prepared for the site and to determine whether the site is suitable for the proposed land use. The land comprising of the Southern Wetlands Dedication Area is intended for dedication to the NSW Government as residential land use. As such this Site Audit has been undertaken with consideration to residential land use with access to soil, which includes the less sensitive; park, recreational and open space land use as well as other less sensitive land uses.

The outcome of the Site Audit is this SAR and subsequent SAS, (SAS number 0301-1319-13) a copy of which will be attached to the front of this report.

In order to achieve the objective of the Site Audit, the Site Auditor reviewed the site assessment, remedial planning, remediation, and validation works undertaken and as reported by the various environmental and contaminated land consultants. The Site Auditor has inspected the Site and the Site Audit assessed if the consultant's work complied with relevant procedures and guidelines and also whether it provides a robust basis for determining whether the objective has been met with regard to the suitability of the land for the proposed land use.

The Site Auditor has considered the following matters in relation to the investigation and remediation works implemented:

- The provisions of the *Contaminated Land Management Act 1997* and the Contaminated Land Management Act (1997) Regulations and subsequent amendments;
- The provisions of any environmental planning instruments applying to the Site; and
- The guidelines made or approved by the NSW DEC under s.105 of the *Contaminated Land Management Act 1997*.

The reports relating to the assessment, remediation and validation have been reviewed and are considered to have met the requirements of the *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition)* (NSW DEC, 2006) and other guidelines endorsed under s.105 of the *Contaminated Land Management Act 1997*, and therefore the objectives of the Site Audit.

The NSW DEC (2006) *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition)* prescribe that during an assessment of the suitability of a site for an existing or proposed land use in an urban context, site auditors should follow the decision process and checklist for assessing urban redevelopment sites. The remediation and validation works that have been conducted are considered to have met the requirements of NSW EPA (2006) *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition)* and the

decision-making process prescribed, and therefore the site is suitable for the proposed land use.

The Site Auditor is satisfied that the remediation and validation works have been appropriately implemented, and in conjunction with the investigation works that were previously conducted, and that the Site is suitable for residential land use with access to soil, including less sensitive land uses such as Recreational, Park and open space.

In conclusion, a Site Audit Statement will be issued certifying that, in the opinion of the Site Auditor that the Site is suitable for residential land use with access to soil. The site does not include the area identified as the Residual Materials Consolidation Area (RMCA) that is located wholly within the Southern Wetlands Dedication Boundary. This area will be the subject of a separate Site Audit with regard to the suitability of the Site for a particular purpose.

Due to the potential for the presence of materials containing asbestos in the form of fragments of fibre cement in the soil at the Site, it is recommended that an unexpected finds protocol consistent with the objective of the unexpected finds protocol found in the Off-Specification Mulch Management Plan is maintained in relation to the future management of excavation or earthworks at the Site. This will not form a condition of the Site land use as the suitability of the Site is not contingent on the protocol being followed, however it is appropriate of any Site where asbestos may be present in soils. A copy of the abovementioned protocol is attached to this report.

Acronyms and Abbreviations

ACM	Asbestos Containing Material
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
ASTs	Above ground storage tanks
BTEX	benzene, toluene, ethylbenzene, and xylenes
bgl	Below Ground Level
COC	Chain of custody (can also be contaminants of concern)
DA	Development Application
DEC	Department of Environment and Conservation (NSW)
DECC	Department of Environment and Climate Change (NSW)
DECCW	Department of Environment, Climate Change and Water (NSW)
DP	Deposited Plan
HILs	health-based investigation levels
IA	interim advice
LOR	Limit of Reporting
m	Metre
MW	monitoring well
NEHF	National Environmental Health Forum
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
NRMMC	Natural Resource Management Ministerial Council
NSW	New South Wales
OCPs	Organochlorine pesticides
OEH	The NSW Office of Environment and Heritage
OPPs	Organophosphorus pesticides
PAH	polycyclic aromatic hydrocarbons
PCoC	Potential contaminants of concern
PID	Photoionisation Detector
PQL	Practical Quantification Limit
RAP	Remedial Action Plan
RPD	Relative Percent Difference
SAQP	Sampling Analysis and Quality Plan
SAR	Site Audit Report
SAS	Site Audit Statement
SEPP 55	State Environmental Planning Policy No. 55 – Remediation of Land
SMP	Site Management Plan
TPH	Total Petroleum Hydrocarbons
USTs	Underground storage tanks
VOCs	Volatile organic compounds
WHS	Work Health Safety

Table of Contents

Executive Summary i

Acronyms and Abbreviations..... i

1 Introduction..... 1

 1.1 Overview 1

 1.2 Guideline Documents 2

 1.3 Site Auditor..... 3

 1.4 Type of Site Audit 3

 1.5 Objective and Scope of the Site Audit 4

 1.6 Documents Reviewed..... 4

 1.7 Site Audit Inspections..... 5

 1.8 Audit Correspondence..... 5

 1.9 Chronology of Site Assessment and Site Audit Works 5

2 Site Description..... 7

 2.1 Site Identification 7

 2.2 Site Condition and Surrounding Environment..... 7

 2.3 Topography and Geology 8

 2.4 Hydrology and Hydrogeology 8

 2.5 Audit Discussion of Site Description 9

3 Site History 10

 3.1 Audit Discussion of Site History 12

4 Potential Contaminants of Concern..... 13

 4.1 Audit Discussion of Potential Contaminants of Concern..... 13

5 Data Quality Objectives 14

 5.1 Audit Discussion on Data Quality Objectives..... 14

6 Site Assessment 15

 6.1 Coffey Geosciences (2001) 15

 6.2 Audit Discussion of Coffey Investigation Review..... 17

 6.3 JBS Environmental (April 2011) 18

 6.3.1 Sampling Analytical and Quality Program 19

 6.3.2 Assessment Criteria 20

 6.3.3 Quality Assurance / Quality Control (QA/QC)..... 20

6.3.4	Field Observations	23
6.3.5	Soil Investigation Results	24
6.4	Audit Discussion of JBS Environmental Investigation	25
7	Off Specification Mulch Management Plan	26
7.1	Remediation Objectives	26
7.2	Remediation Options and Proposed Approach	26
7.3	Remediation Validation Criteria	28
7.3.1	Visual Clearance Inspection	29
7.3.2	Organic/Soil Sampling	29
7.3.3	Airborne Asbestos Fibre Monitoring	30
7.4	Contingency Plans	30
7.5	Site Management	30
7.6	Regulatory Compliance	30
7.7	Long Term Site Management	31
7.8	Off Specification Mulch Management Plan Addendum (February 2014)	31
7.8.1	Amended Remediation Scenarios	32
7.8.2	Amended Validation Program	33
7.9	Audit Discussion of the Off Specification Management Plan and Addendum	34
8	Remedial Activities and Validation	36
8.1	Remediation of Off-Specification Mulch	37
8.2	Additional Validation Sampling Program	37
8.3	Analytical Strategy	38
8.4	Site Validation Criteria	38
8.5	Additional Validation Analytical Results	40
8.5.1	Field Observations	40
8.5.2	Soil Analytical Results	40
8.5.3	QA/QC Comments	41
8.6	Additional Site Assessment	42
8.7	Holcim Validation	46
8.8	Consultant Interpretation of Validation Results	48
8.9	Consultant's Conclusions	48
9	Audit Evaluation of Remedial Validation Reporting	49
9.1.1	Remediation and Validation Work Program	49
9.1.2	Validation Data Quality Assurance and Quality Control	49

9.1.3	Site Validation Criteria	50
9.1.4	Validation Results	51
10	Evaluation of Site Land Use Suitability	52
11	Conclusions	54
12	Limitations	55
13	References.....	56

List of Tables

Table 1-1 Site Inspections

Table 1-2 Summary of Assessment, Remediation and Site Audit Works

Table 2-1 Summary Site Details

Table 2-2 Summary Site Geology

Table 3-1 Summary of Aerial Photograph Review – Southern Wetlands Dedication Area (DLA Environmental, January 2016)

Table 6-1 JBS Environmental (2011) Analytical Schedule

Table 6-2 System for the classification of investigated areas

Table 6-3 Investigation QA/QC summary

Table 8-1 Soil Remediation Criteria (mg/kg)

Table 8-2 TRH Criteria – HSL Criteria for 0-1.0m

Table 8-3 TRH Criteria – Environmental Screening Levels and Management Levels Criteria

Table 8-4 Soil Metals Results (mg/kg) (DLA Environmental, 2016)

Table 9-1 Validation QA/QC Summary

List of Appendices

Appendix A: Audit Interim Advice

Appendix B: Site Plans

Appendix C: Coffey Geosciences Plan of Areas of Environmental Concern

Appendix D: JBS Environmental Asbestos Areas

Appendix E: JBS Environmental Test Pit Locations

Appendix F: JBS Environmental Tables of Results

Appendix G: DLA Environmental Validation Sample Location Plans

Appendix H: DLA Environmental Results Tables

1 Introduction

1.1 Overview

This Site Audit Report (SAR) and subsequent Site Audit Statement (SAS) have been produced to document the findings of a Site Audit, conducted by James Davis of Enviroview Pty Ltd, a New South Wales Environment Protection Authority¹ (NSW EPA) Contaminated Land Accredited Site Auditor accredited under Part 4 of the *Contaminated Land Management Act 1997* as a Site Auditor.

The Site Audit has been conducted in accordance with the requirements of the *Contaminated Land Management Act 1997* (the 'Act'). The Act defines the Site Audit as follows:

"site audit" means a review:

- (a) that relates to management (whether under this Act or otherwise) of the actual or possible contamination of land, and
- (b) that is conducted for the purpose of determining any one or more of the following matters:
 - (i) the nature and extent of any contamination of the land,
 - (ii) the nature and extent of any management of actual or possible contamination of the land,
 - (iii) whether the land is suitable for any specified use or range of uses,
 - (iv) what management remains necessary before the land is suitable for any specified use or range of uses,
 - (v) the suitability and appropriateness of a plan of management, long-term management plan or a voluntary management proposal.

Furthermore the Act provides the following definitions:

"Site Audit Report" means a site audit report prepared by a site auditor in accordance with Part 4 [of the Act].

"site audit statement" means a site audit statement prepared by a site auditor in accordance with Part 4 [of the Act].

The *Contaminated Sites: Guidelines for the NSW Auditor Scheme (2nd edition)*, (NSW DEC, 2006) further describes the site assessment and Site Audit process where the consultant is

¹ The NSW EPA has undergone a number of name changes in the recent past; however certain statutory functions and powers have always and continue to be exercised in the name of the Environmental Protection Authority (NSW EPA). From September 2003 the NSW EPA became part of the NSW Department of Environment and Conservation (NSW DEC), then on 27 April 2007, the NSW DEC became the NSW Department of Environment and Climate Change (NSW DECC), and in August 2009, the NSW DECC became the NSW Department of Environment, Climate Change and Water (NSW DECCW) and then on 4 April 2011, the NSW DECCW became the NSW Office of Environment and Heritage (NSW OEH) within the NSW Department of Premier and Cabinet. Most recently, on 29 February 2012, the NSW EPA became a separate statutory authority. The NSW EPA is responsible for environmental regulation and associated activities throughout NSW including those activities regulated under the *Contaminated Land Management Act 1997*. The use of the names OEH, DECCW, DECC, DEC and NSW EPA in this report are used with regard to the name relevant at the time and context of the reference, but are considered generally interchangeable and can be interpreted as one and the same.

commissioned to assess the contamination and the site auditor reviews the consultant's work.

The Site Auditor inspected the Site and reviewed relevant documents prepared by the consultants relating to the assessment and remediation of the Site.

The Site Audit considered the following matters in relation to the investigation and remediation works implemented:

- The provisions of the Act and the *Contaminated Land Management Act (1997) Regulations* and subsequent amendments;
- The provisions of any environmental planning instruments applying to the Site; and
- The guidelines made or approved by the NSW EPA under s.105 of the Act.

1.2 Guideline Documents

Guidelines made or approved by the NSW EPA under s.105 of the Act at the time of the Site Audit include:

- Contaminated Sites: Guidelines for Assessing Service Station Sites, NSW EPA, 1994 (NSW EPA, 1994)
- Contaminated Sites: Guidelines for the vertical mixing of soil on former broad-acre agricultural land, NSW EPA, 1995 (NSW EPA, 1995)
- Contaminated Sites: Sampling Design Guidelines, NSW EPA, 1995 (NSW EPA, 1995)
- Contaminated Sites: Guidelines for Assessing Banana Plantation Sites, NSW EPA, 1997 (NSW EPA, 1997)
- Contaminated Sites: Guidelines for Assessing Former Orchards and Market Gardens, NSW DEC 2005 (NSW DEC, 2005)
- Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition), NSW DEC, 2006 (NSW DEC, 2006)
- Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination, NSW DEC, 2007 (NSW DEC, 2007)
- Contaminated Sites: Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997, NSW DECC, 2009 (NSW DECC, 2009)
- Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites, NSW OEH, 2011 (NSW OEH, 2011)
- National Environment Protection (Assessment of Site Contamination) Measure, National Environment Protection Council, 1999 (Amended May 2013) (NEPC, 1999, Amended 2013)
- 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 - Rescinded by NHMRC 2002 (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 Natural Resource Management Ministerial Council, 2011 (NHRMC/NRMMC, 2011)
- Composite Sampling. Lock, W. H., National Environmental Health Forum Monographs, Soil Series No.3, 1996, SA Health Commission, Adelaide (NEHF, 1996)
- 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 2012 (EnHealth, 2012)
- 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)

From time to time the NSW EPA may amend the guidelines made or approved under s.105 of the Act. For instance the Contaminated Sites: *Guidelines for Assessing Service Station Sites*, NSW EPA, 1994 (NSW EPA, 1994), (listed above) have recently been rescinded and replaced with the Technical Note: Investigation of Service Station Sites (NSW EPA, 2014). The Technical Note is not made or approved under the Act.

The NSW EPA approved the amendment to the NEPM (1999) on 11 June, however a substantial component of the work reviewed for the Site Audit was concluded prior to the public release and approval under the Act. As such the works was not reviewed with regard to the amended NEPM in all instances. It is the view of the Site Auditor that this has not had any affect to the outcome or validity of the Site Audit.

1.3 Site Auditor

James Davis of Enviroview Pty Ltd, is a NSW EPA Contaminated Land Accredited Site Auditor (NSW EPA Accreditation Number 0301) and conducted the Site Audit.

The Site Audit was initiated by a request from Michael O'Brien, of the Penrith Lakes Development Corporation (PLDC) who engaged the Site Auditor on 1st October 2013 to undertake a number of Site Audits at Penrith Lakes.

1.4 Type of Site Audit

The purpose of the Site Audit is to provide an independent review of works conducted and to provide a Site Audit Statement with regard to the suitability of the Site for particular land uses. The Site Audit is not being conducted to meet a condition of a planning instrument or other legislative or regulatory requirement and as such the Site Audit is not considered a Statutory Site Audit as defined by section 47(c) of the *Contaminated Land Management Act 1997*.

1.5 Objective and Scope of the Site Audit

The objective and scope of the Site Audit was to independently review the environmental consultant's Final Validation Report prepared for the Site and to determine whether the Site is suitable for the proposed land use. The proposed land use is public open space, however future development scenarios may also incorporate residential land use with access to soil. Therefore, this Site Audit will be in consideration of the most sensitive of these land uses being residential with access to soils.

In order to achieve this aim, the Site Auditor reviewed the work undertaken as reported by the consultant and assessed whether the consultant's work complied with relevant procedures and guidelines, and whether it provides a robust basis for determining whether the land is suitable for the proposed land use.

The outcome of the Site Audit is this SAR and subsequent SAS, (SAS number 0301-1319-13) a copy of which is attached to the front of this report.

1.6 Documents Reviewed

The following documents were reviewed as part of this Site Audit:

Coffey (June 2001) Preliminary Contamination Assessment Penrith Lakes Scheme Cranebrook, NSW
Coffey Reference: S20418/8-Bb 28 June, 2001.

JBS Environmental (April 2011) Draft Asbestos Assessment Penrith Lakes Development Corporation Limited (PLDC) & Waste Assets Management Corporation (WAMC) Penrith Lakes, 89-151 Old Castlereagh Road Castlereagh, NSW JBS Environmental Reference: JBS 41511-16970 (Rev B).

DLA Environmental (December 2011) Off Specification Mulch Management Plan, Penrith Lakes, 89-151 Old Castlereagh Road, Castlereagh, NSW, Revision 6.0.

DLA Environmental (December 2011) Sampling, Analysis and Quality Plan, Validation of Off-Specification Mulched Areas, Penrith Lakes Development Corporation, 85-151 Old Castlereagh Road, Castlereagh, NSW, Revision 4.0.

DLA Environmental (December 2011) Unexpected Find of Asbestos Containing Material Protocol Imported Organics Materials Penrith Lakes Development Corporation 89 – 151 Old Castlereagh Road NSW. (Appendix 1 of DLA Environmental [December 2011] Off Specification Mulch Management Plan).

DLA Environmental (February 2014) Addendum–Off-Specification Mulch (OSM) Management Plan. Revision 4.4

DLA Environmental (January 2016) Final Validation Report Southern Wetlands Dedication Area Penrith Lakes Scheme. 21 January 2016. DLA Environmental Report Reference DL2591_PJ0653.

The following documents were made available to the Site Auditor and were utilised for context of the background information available for the Site.

Environmental Protection Authority (30 June 2014) Letter regarding implementation of Amended Off-specification Management Plan from Giselle Howard, Director – Metropolitan, NSW EPA. EPA Reference DOC13/74598-12.

Environ (28 February 2013) Re: Review of Off Specification Mulch Management Plan. Interim Site Audit Advice from Graeme Nyland. Environ Reference: AS120855.

Office of Environmental and Heritage (18 October 2011) Letter regarding organics remediation strategy from Greg Sheehy, Acting Director – Metropolitan, NSW EPA. OEH Reference DOC11/47389.

1.7 Site Audit Inspections

The Site Auditor has inspected the Penrith Lakes Scheme and the specific Site subject of this Site Audit. The following table lists the details of the inspections of the Site conducted by the Auditor.

Table 1-1 Site Inspections

Date	Attendance	Purpose
26 June 2013	James Davis – Enviroview Pty Ltd, Site Auditor Amanda Walmsley – PLDC Manager – Compliance & Integrated Monitoring	Inspection of stockpiled off-specification mulch and areas where mulch was applied to land
8 October 2013	James Davis Amanda Walmsley	Site inspection of Eastern Lakes Area post remediation. Various CA and SA locations
26 November 2013	James Davis Amanda Walmsley	Site inspection of Wildlife Lake, Lewis Lagoon, Hadley Paddocks, Lake B and Vincent Creek areas as well as the Cranebrook West land. Various CA and SA locations.
12 November 2014	James Davis Steve Malone – PLDC Remediation Superintendent Shane Williams – DLA Environmental	Site inspection of a number of sites within the PLDC Penrith Lakes Scheme including the Southern Wetlands Dedication Area.
21 September 2015	James Davis PLDC Representative Russell Jarman – DLA Environmental David Lane – DLA Environmental	Site Inspection of Southern Wetlands and Residual Materials Consolidation Area (RMCA)
30 October 2015	James Davis Kerry Edwards = PLDC Russell Jarman – DLA Environmental David Lane – DLA Environmental	Site Inspection of Southern Wetlands and Residual Materials Consolidation Area (RMCA)

1.8 Audit Correspondence

Correspondence in the form of Site Audit interim advice was issued in regard to the Site Audit to clarify and request additional information and to provide guidance on the Site Audit requirements. Site Audit interim advice is provided in **Appendix A**.

1.9 Chronology of Site Assessment and Site Audit Works

The process of site assessment, auditor review and preparation of final audit statement and report undertaken at the site has been summarised in the following table.

Table 1-2 Summary of Assessment, Remediation and Site Audit Works

Date	Action
May 2000	Preliminary contamination study of the Penrith Lakes site prepared by Coffey Geosciences
June 2001	Coffey prepare a Preliminary Contamination Assessment for the Penrith Lakes site – only asbestos indicated is in agricultural irrigation lines
2006-2010	Importation of off-specification mulch (OSM) contained asbestos in the form of

Date	Action
	fragments of asbestos cement.
November 2010 - January 2011	DLA Environmental undertake clearance inspections for Asbestos on specific parts of the Penrith Lakes site
18 January - 10 March 2011	JBS Environmental inspect all of the areas instructed to at the Penrith Lakes site
April 2011	Presentation of Draft Asbestos Assessment report by JBS Environmental
2 September 2011	Draft Penrith Lakes Off Specification Mulch Management Plan (OSMMP) prepared by DLA Environmental presented to OEH for review.
18 October 2011	Letter from OEH agreeing with the strategy set out in the OSMMP
November 2011	Validation Report issued for Gem Hawk Compound within the Southern Wetland Dedication Area
December 2011	Finalisation of the OSMMP and Sampling analysis quality plan by DLA Environmental
28 February 2012	Interim Advice of review of the OSMMP by Mr Graeme Nyland (EPA Accredited Site Auditor)
20 March 2012	Soil Inspection Report issued for Upper Castlereagh School, located within the Southern Wetlands Dedication Area
9 May 2013	Former SGS Compound Site Assessment Report issued by DLA Environmental
9 July 2013	Asbestos Clearance Certificate issued for SGS Compound, located within the Southern Wetlands Dedication Area
31 July 2013	Asbestos Clearance Certificate issued for the Former Readymix Site, located within the Southern Wetlands Dedication Area
1 October 2013	Formal engagement of James Davis as NSW EPA Accredited Site Auditor to conduct a Site Audit on the Site within the PLDC lands
February 2014	Addendum to the off-specification management plan finalised
2 February 2014	Interim Advice of review of Addendum to the OSMMP by James Davis (EPA Accredited Site Auditor)
26 February 2014	Asbestos Clearance Certificate issued for Purcell's Lane, located within the Southern Wetlands Dedication Area
5 May 2014	Asbestos Clearance Certificate issued for Birdseye Corner/Purcell's Lane, located within the Southern Wetlands Dedication Area
22 July 2014	Interim Validation Report issued for Amgrow Area, located within the Southern Wetlands Dedication Area by DLA Environmental
February 2015	Interim Validation Report Issued for Leaky Dam, located within the Southern Wetlands Dedication Area, by DLA Environmental
22 May 2015	Asbestos Clearance Certificate issued for Lee's Cottage
6 August 2014	Interim Validation Report issued for East Cell Tailings, located within the Southern Wetlands Dedication Area
15 October 2014	Asphalt Clearance Report for Purcell's Lane issued
4 December 2014	Asbestos Clearance Certificate issued for Sheer's Lane, located within the Southern Wetlands Dedication Area
August 2015	Commencement of filling of Residual Materials Consolidation Area (RMCA)
17 November 2015	SGS Hardstand Area Assessment Report issued by DLA Environmental
17 November 2015	Riverbank Validation Report Issued by DLA Environmental, located within the Southern Wetlands Dedication Area
18 December 2015	Interim Advice of review of the Validation Report for Southern Wetlands Dedication Area issued by James Davis (EPA Accredited Site Auditor)
January 2016	Completion of RMCA filling and cap placement
29 February 2016	Preparation of a Site Audit Statement and Site Audit Report (this report) for Site Audit number 0301-1319-13 for the Southern Wetlands Dedication Area, conducted by James Davis of Enviroview Pty Ltd

2 Site Description

2.1 Site Identification

A summary of the Site identification details is provided in following table.

Table 2-1 Summary Site Details

Street Address:	Southern Wetlands Dedication Area Penrith Lakes Scheme Castlereagh NSW
Property Description:	Part Lot 102 DP1043503, Lot 57 DP668807, Lot Y DP421674, Lot X DP421674, Lot 56 DP78686, Lot 2 DP128036, Lot 1 DP128036, Lot B DP374807, Lot A DP374807, Lot 1 DP236125, Part Lot 7 DP1148035, Part Lot 2 DP236125, Part Lot 541 DP1131982, Part Lot 540 DP1131982, Part Lot 6 DP1148035, Part Lot 2 DP1092607, Lot 1 DP1092607, Lot 9 DP1013504, Lot 8 DP1013504, Lot 7 DP1013504, Lot 6 DP1013504, Lot 5 DP1013504, Lot 4 DP1013504, Lot 3 DP1013504, Lot 1 DP882352, Lot 1 DP45727, Lot 1 DP47720, Part Lot 1 DP882354, Lot 310 DP752021, Lot 309 DP752021, Lot 321 DP752021, Lot 308 DP752021, Lot 338 DP752021, Lot 337 DP752021, Lot 307 DP752021, Lot 306 DP752021, Lot 305 DP752021, Part Lot 304 DP752021, Part Lot 325 DP752021, Part Lot 303 DP752021, Lot 302 DP752021, Lot 2 DP200839, Lot 1 DP200839, Lot 1 DP419190.
Zoning:	1(a2) Rural - Interim Development Order No. 93, August 1980.
Local Government Area:	Penrith City Council
Property Size:	Total area 336.6 ha

A plan showing the Site Audit Site is provided in **Appendix B**.

The Site Audit Site is located on the southern edge of the Penrith Lakes Scheme. The Penrith Lakes scheme occupies a total area of approximately 1,935Ha and comprises an operational gravel quarry, lakes, a Regatta Centre, Commercial Offices, internal roadways, car parking areas and parklands.

The land comprising of the Southern Wetlands Dedication Area is undergoing rehabilitation and revegetation following historical quarrying activities. At the time of preparing this report, the site comprised several water bodies, wetlands, grassed open areas and cleared lands.

The Site Audit Site does not include the area identified as the Residual Materials Containment Area (RMCA), which is wholly within the Southern Wetlands Dedication Area. The RMCA will be the subject of a separate Site Audit. The RMCA area that is excluded from this Site Audit is marked on the Plan provided in **Appendix B**.

2.2 Site Condition and Surrounding Environment

The site is an irregular shape and located south of the Sydney International Regatta Centre and what is identified as the Lake A Dedication Area of the Penrith Lakes Scheme. The Nepean River forms the western and southern boundaries of the site. From its westernmost to eastern most extent, the site is approximately 3.5 kms long. A series of water bodies is currently proposed for the site.

The Penrith Lakes Scheme has been quarried and the landforms and landscapes rehabilitated over the past 30 years. The Southern Wetlands Dedication Area was

extensively quarried and been subjected to substantial filling and land-forming works as part of the rehabilitation of the quarried areas of the Penrith Lakes Scheme.

2.3 Topography and Geology

The topography of the Penrith Lakes area is generally at 20 metres Australian Height Datum (AHD). The Site is largely without grade except with localised areas sloping towards lakes. Quarrying activities has heavily influenced the entire Site.

The regional geology comprised quaternary period gravel, sand and silty clay. Soil in the area consists of fluvial soils of the Upper Castlereagh Group, where the landscape typically comprises terraces of the Nepean and Hawkesbury Rivers. Limitations of soils in this landscape group include erosion hazards, dispersible and impermeable soils.

Due to the extensive quarrying, the Southern Wetlands site topography and soils have been extensively modified.

The Penrith Lakes Scheme is located within Quaternary Age alluvial sands and gravels of the Cranebrook Formation, underlain by the Bringelly Shale formation. The Bringelly Shale formation outcrops to the east of the site, resulting in potentially variable bedrock levels across the site, from deep in the west to shallow in the east. The following table shows a generalised description of the local geology.

Table 2-2 Summary Site Geology

Depth (mBGL)	Material Type	Material Description
0 to 2 (varies)	Fill	Varies, clayey sandy silt, silty sandy clay
>2 to 8	Alluvium	Clay and clayey silt, increasing sand content with depth
>8 to 10	River Gravels	Fine to coarse grained gravel, 1-2m thick layer
>10	Bedrock	Grey shale

2.4 Hydrology and Hydrogeology

The water within the site comes from onsite and through the surrounding rural residential catchments to the Penrith Lakes Scheme. Penrith Lakes Development Corporation (PLDC) manages run-off water through a natural freshwater ecological system to maintain water quality. Generally, the water moves from the south to the north of the site and ultimately drains into the Penrith Lakes Scheme.

Given the mostly unsealed nature of the site, precipitation falling onto the site is expected to either infiltrate the relatively permeable surface soils or evaporate. Heavier rainfall would result in surface runoff.

Coffey (Coffey Geosciences, June 2001) reported the regional groundwater flow as likely to be towards the west, which is towards the Nepean River. Groundwater beneath the site is unlikely to be greater than 5mbgs (and less considering the surface water observed by the Site Auditor) and confined to zones of relatively higher permeability (i.e. gravel/sand layers). As the construction of landforms in the rehabilitation process requires the placement of overburden soils to a depth of 15-20m to construct lake foreshores, the hydrogeology has been largely altered and emplacement compaction is anticipated to have largely altered the hydro-geological flows.

Groundwater investigations at the site have not been undertaken. Coffey (Coffey Geosciences, June 2001) did include a search of registered groundwater bores that identified several bores in the vicinity of the site, many within the Scheme area, however many of these have been destroyed during the quarry activities.

The Department of Meteorology NSW presents the average annual rainfall for the Penrith Lakes area at 705.6 mm annually, with an average of 68 days of greater than >1mm rainfall. The annual average temperature range is from 12.3°- 24.5° C, and an annual average daytime temperature of 23°C at 3pm.

2.5 Audit Discussion of Site Description

The information provided by the various consultants who have reported on Penrith Lakes Scheme (Coffey Geosciences, June 2001), (JBS Environmental, April 2011), (DLA Environmental, January 2016) in regards to the site condition and surrounding environment has been checked against, and meets the requirements of NSW EPA Guidelines (NSW OEH, 2011).

A review of the deposited plans confirms that the site plan, site location and documentation provided by the consultant are generally consistent with the deposited plan for the site. The consultant did not present the current Lot and DP descriptions for the site, which was obtained for the purposes of the Audit from PLDC. However the requirements of the site audit in relation to site identification have been met, based on the plans provided by the consultant and cadastral overlay. It is noted that approximately half of the Lots have boundaries that extend into the Nepean River.

The consultant has provided the information required in regard to topography and hydrology, geology and hydrogeology.

The information provided in the consultant's report is also consistent with the observations made by the Site Auditor during the various site inspections to the Penrith Lakes Scheme.

Overall, the information provided by the consultant in relation to site condition and the surrounding environment is considered adequate for the purposes of assessing the suitability of the site for the intended purposes. As such, in the Site Auditor's opinion the information provided meets the requirements of the Site Audit.

3 Site History

The consultants (Coffey Geosciences, June 2001), (JBS Environmental, April 2011), and (DLA Environmental, January 2016) reviewed historical data relating to the site.

Coffey provided a site history based on aerial photographs, NSW EPA and heritage records, and review of the Preliminary Contamination Assessment report for the Penrith Lakes Scheme area up to 2001. DLA Environmental (DLA Environmental, January 2016) provided some detail of the more recent activities.

In summary the history of the scheme area prior to and even during the Quarry use was predominantly for agricultural purposes, comprising mainly grazing, dairying, market gardening, orchids, turf farms and rural land. The site has a long history of quarrying from the Nepean River and adjacent floodplain to extract sand and gravel materials. Apart from these two main activities the only differing land uses identified within the Scheme area was the use of two areas of the site as a gun club and a composting facility, which were located in the north and western parts of the Scheme site respectively.

Quarrying activities were initially carried out within the Nepean River and commenced prior to the 1950s. Anecdotal evidence suggests that quarrying from the river was carried out near the southwestern corner of the Scheme boundary. Quarrying from the river was carried out mainly with the use of draglines and materials were processed near the high banks of the river. Quarrying in the central parts of the floodplain apparently commenced in the early 1960s. Individual quarrying companies carried out their operations within their own landholdings. The three main quarry companies operating were Farley and Lewis (now CSR), Pioneer and Boral. Each quarry company controlled their own quarrying operations until 1980 when the Penrith Lakes Development Corporation (PLDC) was set up to control quarrying operations within the Scheme area in a more united controlled manner. The PLDC is made up of the three shareholder companies (CSR, Boral and Pioneer).

A review of aerial photos showed that a large proportion of the site has been progressively quarried and rehabilitated and presently many parts of the land is grass covered with several areas of establishing trees. The land surface generally slopes down to the lakes which discharge to the south of each lake through a series of pipes and culverts. There are a number of access roads within the site that have been constructed to facilitate maintenance requirements.

The following table, prepared by DLA Environmental summarises the review of aerial photographs with specific regard to the Southern Wetlands area.

Table 3-1 Summary of Aerial Photograph Review – Southern Wetlands Dedication Area (DLA Environmental, January 2016)

Aerial Photograph	Description
October 1965	The Site contains several rural properties, which are largely open grassed pastures. Built structures and dams are visible. It appears some quarrying activities are occurring within the riverbank boundary to the south and the Amgrow establishment is visible to the west of the dedication area.
October 1980	Quarrying works have increased and cover the majority of the Southern boundary of the dedication area. Quarrying has also increased to the western boundary with a clear access path crossing the river. A water body is visible to the south however this is not in the current configuration of the now dedication boundary.
June 1987	Photos not available for the entire western extent however the former Readymix Plant appears to be in operation with a car park and stockpiled material present. Water bodies have increased in size to the south of the Site with a road visible through the middle of the main water body to allow quarrying from what is now the Sydney International Regatta Centre. No further farming properties are visible to the south of the dedication boundary.
June 1990	Water bodies to the south are similar to the current dedication boundaries. Farmlands are still visible to the west of the dedication area however the total extent is not visible.
June 1996	No significant changes observed within the dedication boundary, with farm lands still present along Old Castlereagh Road to the north of the dedication area, previously quarried water bodies for tailings dams to the south and the Readymix Plant visible to the southwest. The Penrith Lakes water bodies north of the dedication boundary appear fully formed in their current configuration.
July 2003	The Amgrow precinct to the west of the dedication area has been quarried along with all of the remaining farmlands within the dedication area. The SGS hardstand is visible. The individual water bodies to the south of the dedication area have been flooded to two large water bodies with the previous road through the middle of the tailings dams no longer visible.
May 2007	No significant changes observed.
October 2009	The leaky dam has been excavated with the overall water levels within the tailings pond decreased. Land forming works are apparent within the Amgrow area, as well as two smaller water bodies around the SGS compound.
May 2012	The Holcim quarry appears abandoned. Water bodies surrounding the SGS hardstand are no longer visible. All of the Amgrow area and surrounding riverbank are covered in vegetation.
June 2015	No further quarry works apparent with some land forming occurring around the southern water bodies and near the Holcim area.

The quarry and rehabilitation works resulted in relocation of overburden (B-horizon) soils from the area to a depth of 8-10 metres, and then extraction of sand and gravel to a further depth of 8-10m below this. Overburden soils were then progressively emplaced within this area from active quarry areas nearby within the Penrith Lakes Scheme. This progressive quarry and rehabilitation approach is approved in existing development consents and aims to minimise handling of overburden and consequently minimise potential for contamination.

Quarrying and landform construction was completed within the south of the site in 1996 and the north in 2001. Final landscape rehabilitation was undertaken in 2006-2007. The area has remained under a consistent maintenance regime since then.

A gun club was located towards the northern part of the Penrith Lakes scheme and was used for target shooting (such as clay pigeons). Firing was to the northeast into an adjacent wetland. It is unsure when the gun club was established although it is known to have existed in 1960. Anecdotal evidence suggests that the gun club was not used often and ceased operations in 1997 when quarrying operations encroached this area. Information supplied by PLDC staff indicates that topsoils stripped from the gun club area were transported and placed along the edges of some of the lakes and Pioneer tailings dams towards the eastern part of the scheme area, but not within the Southern Wetlands Dedication Area.

A search was conducted by the Site Auditor in March 2014 of all records pertaining to section 58 of the *Contaminated Land Management Act 1997* and revealed that the site is not subject to any notices from the NSW EPA with regard to contaminated land, also no other properties in the vicinity of the site were encumbered by any notices.

3.1 Audit Discussion of Site History

The information required by NSW EPA 1997, in regard to the documentation of the site history has been provided and meets the requirements of the Site Audit with regard to the objectives of the Site Audit.

The site history information provided by the consultants has been checked against, and meets the requirements of the guidelines made or approved by the NSW EPA.

The extent of site history information presented by the consultant is considered adequate for the purposes of identifying potential contamination issues at the site.

4 Potential Contaminants of Concern

Coffey (Coffey Geosciences, June 2001) considered the potential contaminants of concern at the site to comprise:

- heavy metals and pesticides (organochlorine pesticides (OCP)) from previous agricultural use
- asbestos from asbestos cement pipes used for supply of irrigation water (located offsite, in the west of the Scheme area)
- total petroleum hydrocarbon (TPH), polycyclic aromatic hydrocarbons (PAH), benzene toluene, ethylbenzene and xylenes (BTEX) from the use of heavy machinery during construction of Castlereagh Road.

With the appreciation of the importation and use of the off-specification mulch used in specific areas across the Penrith Lakes Scheme, including the Southern Wetlands Dedication Area, Asbestos - predominantly in the form of fragments of cement sheet as reported by JBS Environmental (JBS Environmental, April 2011) is the key contaminant of concern.

In addition to the above, the Final Validation Report prepared by DLA Environmental (DLA Environmental, January 2016) also included Polychlorinated Biphenyls (PCBs) as a contaminant of concern, however no explanation was provided as to why it was included.

4.1 Audit Discussion of Potential Contaminants of Concern

The consultants have identified a range of potential contamination issues at the site based on the findings of the site history review, preliminary assessment and further assessment relating to the off-specification mulch used across the Penrith Lakes Scheme.

With specific regard to the Southern Wetlands Dedication Area site the key contaminant of concern was Asbestos, however with the area involving a number quarry related activities and the former composting facility, the inclusion of the wider suite of contaminants of concern in the validation reporting is appropriate. As such the potential contaminants of concern identified are considered acceptable to enable assessing the suitability of the site for the proposed land uses and have met the objectives of the Site Audit.

5 Data Quality Objectives

The Data Quality Objectives (DQO) process is used to define the type, quantity and quality of data needed to support decisions relating to the environmental condition of a site. It provides a systematic approach for defining the criteria that a data collection design should satisfy. The USEPA developed the DQO process as a seven step iterative planning approach, to be undertaken prior to investigative work.

NSW DEC (2006) states that Site Auditors must check that the consultant has properly addressed and adopted DQOs for the investigation or validation programme and that the consultant's report includes the following:

- A statement of predetermined DQOs for the field and laboratory procedures, including quantitative DQOs (in this instance these DQO are related to the implementation of adequate field and laboratory QA/QC and are referred to as Data Quality Indicators for the quantitative assessment of data quality);
- A plan to achieve pre-determined DQOs; and,
- Procedures to be undertaken if the data does not meet the expected DQOs.

5.1 Audit Discussion on Data Quality Objectives

Data Quality Objectives are a planning tool that is an independent process from the Quality Assurance/Quality Control processes that are standard in both investigation and validation reports. The DQOs are specific to each investigation and should be completed prior to any field work to assist in development of an optimal sampling analytical and quality plan in order to most effectively reach the projects objectives.

DQOs were developed and followed throughout the investigation and validation by both JBS Environmental (JBS Environmental, April 2011) and DLA Environmental (DLA Environmental, January 2016) and contained an evaluation of QA/QC parameters. Where pertinent features of the DQOs presented by the consultants are presented in the specific sections that detail the investigations works.

6 Site Assessment

The assessments of the land within the Penrith Lakes Scheme areas are defined by the investigation of two specific and quite separate issues at the Sites. The first is the assessment focused on identifying the potential for contamination related to the historical uses of the site prior to and during the quarry operation, and the second being the assessment and management of the potential for contamination of soils by Asbestos in the form of fragments of asbestos cement sheet, brought onto the site in the off-specification mulch during final land forming and rehabilitation of the quarry. The following sections provide detail of those investigations.

6.1 Coffey Geosciences (2001)

In 2001, Coffey Geosciences conducted a Preliminary Environmental Site Assessment for the whole of the Penrith Lakes Scheme in the report titled Preliminary Contamination Assessment Penrith Lakes Scheme Cranebrook, NSW (Coffey Geosciences, June 2001).

Coffey Geosciences conducted the assessment to meet the requirements for the proposed amendments to the Penrith Lakes Scheme SREP No. 11. The study was conducted for Urban Pacific Limited as lead consultant to the NSW Department of Urban Affairs and Planning (DUAP). The assessment was to investigate potential issues relating to land and groundwater contamination that may affect the project and to meet the requirements of State Environmental Planning Policy (SEPP 55) Managing Land Contamination and Remediation of Land (Department of Urban Affairs and Planning, 1998).

The scope and objective of the preliminary assessment was to assess whether the land is suitable to be rezoned or whether it can be made suitable for residential use.

The report made reference to a previous brief preliminary contamination study was carried out by Coffey dated 9 May 2000, based on a brief prepared by PLDC. This report was not provided to the Site Auditor. Coffey concluded that there existed some potential areas of environmental concern associated with the historical and current land uses although the activities were identified as having a low risk of causing land contamination.

The construction of landforms following the quarrying, suitable for future urban residential development, was reported as involving the filling of the land to depths up to 20m using material obtained from the quarry overburden. The Penrith Lakes Development Corporation (PLDC) has carried out this work continuously in a consistent manner since the early 1980s.

The consultant provided a comprehensive site history that included interviewing a number of PLDC staff as well as other land users such as shareholders, farmers and others in relation to site history, past potentially contaminating activities, chemical and fuel management and waste management in addition to the usual examination of publically accessible records from the NSW EPA, Penrith Council and land titles information and the review of aerial photographs held by PLDC and the Department of Land and Water Conservation to assess the potential for contaminating activities and previous land uses dating back to 1947.

The site was inspected and visual observations of the site conditions and surrounding environment, including photography, site boundary conditions and details of relevant local sensitive environments and a review of geological, soil and topographic maps of the area. It was noted that a detailed site walkover of individual private properties was not carried out

and the observation of site conditions on private properties was made from accessible public roads only.

The report found that the potential for contamination was associated with the past agricultural use with historical use of pesticides and fertilisers associated with the agricultural activities within the Scheme area, more so with the market gardens than with dairying and grazing. Anecdotal information suggests that the market gardening activities were more concentrated on the western side of Castlereagh Road whilst dairying and grazing was more prominent on the eastern side.

Irrigation water for the market gardens was sourced from the Nepean River and channelled through a series of asbestos cement irrigation pipes. Anecdotal evidence also suggests that the asbestos irrigation pipes were more prominent on the western side of Castlereagh Road (which coincides with the more intense market gardening) whilst water bores were the more common source of water on the eastern side of Castlereagh Road with only occasional asbestos irrigation pipes in this area. It was reported that generally the pipes were about 0.5m below the ground surface.

It was reported that the PLDC conducted a programme of locating and removing the asbestos irrigation pipes to the west of Castlereagh Road. No such programme was implemented on the eastern side, which has now been quarried. The consultant reported that it was likely that any pipes located within quarried areas would have been removed with the overburden materials and transported to a filling area or landform, unfortunately there is no further information available on this issue and whether the pipes were removed, disposed of or reburied within the Penrith Lakes scheme.

The consultant presented a plan provided in **Appendix C** that shows where asbestos pipes had been removed from the trenches and soil stockpiles.

Other sources of potential soil contamination arising from agriculture and rural site identified included:

- Vehicle maintenance areas and fuel/chemical storage;
- Waste disposal areas;
- Asbestos structures.

The report also identified that a gun club had been located towards the northern part of the Penrith Lakes scheme and was used for target shooting. It is unsure when the gun club was established although it is known to have existed in 1960. The consultant (Coffey Geosciences, June 2001) noted that through interviews conducted with local landowners it was considered that the gun club was not used often and ceased operations in 1997 when quarrying operations encroached this area noted it. It was reported that the topsoils stripped from the gun club area, and potentially impacted with lead had been placed along the edges of some of the lakes towards the eastern part of the site, however none of these areas are within the Southern Wetlands area. Plans showing these areas were provided by the consultant and are presented in **Appendix C**.

The assessment concluded that there were potential areas of environmental concern associated with historical and current land uses on the site, however they reported that the existing landform areas that have been constructed and are proposed for urban

development have a low potential for widespread contamination that would preclude the rezoning for residential use but cautioned that since the presence of localised hot spots within these future urban areas could not be precluded, the suitability of individual lots within these areas may need to be assessed based on the proposed use with respect to land contamination and that this could be carried out at a later stage. The report also recommended that any potential areas of environmental concern identified be investigated and remediated prior to quarrying operations continuing therefore reducing the risk of land contamination in the landforms. This specifically included the following recommendations:

- Detailed environmental site investigation, which entails sampling and analysis, should be carried out for processing plants, contractor's (Cook) compound and Envirogreen prior to quarrying of these areas, to establish contaminant levels and implement remediation strategies to reduce the risk of land contamination on future landforms. As these areas may not be quarried for several years to come, a site history review should also be extended to cover these additional years;
- demolition of future asbestos structures in accordance with relevant codes of practice and licensed contractors with appropriate offsite disposal;
- continued delineation of buried asbestos irrigation pipes including removal by licensed contractors and validation;
- environmental investigation (including sampling and analysis) surrounding former farm houses including remediation or offsite disposal of potentially impacted soils prior to quarrying these areas.
- environmental investigation (including sampling and analysis) of the potentially affected lake foreshore areas (from former gun club soils) should be assessed before NPWS accept transfer of the land from PLDC.

With regards to the Southern Wetlands Dedication Area, the following items identified by Coffey were noted:

- Historical application of pesticides and fertilisers associated with the former agricultural use of the landscape and the presence of markets gardens in the area;
- Asbestos irrigation pipes to the west of Castlereagh Road that have been located and removed; and
- Fuel storage, workshop activities, waste product dumping and stockpiling associated with the operation of the CSR Plant and Envirogreen Composting Facility.

6.2 Audit Discussion of Coffey Investigation Review

The preliminary assessment by Coffey (Coffey Geosciences, June 2001) provides valuable information on the use of the land within the Penrith Lakes scheme prior to and for those operations that were taking place at the time. Many of the landowners that were interviewed would not now be available to discuss the activities that occurred on their premises prior to the quarry activities. However the key findings of the report are that the activities that occurred had a generally low potential for causing contamination that would be expected to present an unacceptable risk to human health and/or the environment. The

recommendations made were sound, however there is no evidence from subsequent reports made available that they were followed.

Coffey did not consider the potential risk of contamination to groundwater, but based on the lack of significant potential for contamination, the Site Auditor considers the potential for groundwater contamination to have occurred at the site to be low.

The adequacy of the information provided has already been the subject of comment from the Site Auditor in the consideration of the site history and discussion of site conditions covered in previous sections. It is of note that the report did not comment on any areas of concern to the east of Castlereagh Road.

6.3 JBS Environmental (April 2011)

This section provides details of the investigation undertaken at the site by the consultant in August 2010 (JBS Environmental, April 2011).

JBS Environmental undertook investigations in contaminated organic mulch that had been widely used within Penrith Lakes for rehabilitation works including landform stabilization and revegetation from 2006 through to 2010. These areas were identified as Cultivated Areas, Surface Spread Areas or Stockpiles of the Off-Specification Mulch used and stored within the site. The Penrith Lakes Development Corporation and Waste Asset Management Corporation (WAMC) commissioned the works. It is understood that the vast proportion of the organic material was delivered to the site by WAMC.

JBS Environmental investigated the entirety of the Penrith Lakes scheme and the report sought to conduct an investigation of asbestos contamination in zones where asbestos contaminated organic material had been placed, in conjunction with an evaluation of the nature and extent of such contamination.

The assessment was generally carried out in accordance with a Sampling, Analysis and Quality Plan (SAQP) that was reviewed by Graeme Nyland, the NSW EPA accredited Auditor engaged by PLDC and WAMC to review the assessment undertaken by JBS Environmental.

The objective of the baseline assessment was to identify the location, quantity, and type of asbestos present in imported organic material located on the site in the areas nominated by PLDC. Information was provided to the consultant by PLDC that Asbestos Containing Material (ACM) had been identified in imported organic (shredded vegetation) materials, which were both stockpiled and spread out across parts of the site as follows:

- 224,170m³ of organics cultivated into the surface (approximately 149ha with average depth 0.15 m);
- 40,029m³ of organics spread on the ground surface (approximately 67ha with average depth 0.06m); and
- Approximately 75,000m³ of stockpiled organic material in 36 stockpiles.

A plan of the locations of the imported organic material is provided in **Appendix D**. It is noted that three areas of cultivated organics (CA01, CA02 and CA03), five surface spread areas (SA01, SA03, SA04, SA05, SA43) and three stockpiles (SP3, SP33, SP30) are located within the Southern Wetlands Dedication Area.

6.3.1 Sampling Analytical and Quality Program

The Site Auditor did not cite the SAQP prepared for the asbestos assessment, however the consultant (JBS Environmental, April 2011) provided a comprehensive discussion of the sampling analytical and quality program implemented.

In summary the program consisted of using a Geographic Information System (GIS) 'base map' provided by PLDC, a Global Positioning System (GPS) coordinate grid was digitally overlaid for the proposed sampling locations in cultivated and surface spread areas and a Trimble Geo XT GPS unit (typically 0.2 to <1m accuracy, post processing) was used in the field to navigate to the sample locations.

Field works were completed in February and March 2011 and consisted of excavating shallow testpits at every location. Each testpit in the surface spread and cultivated organics areas involved scraping back the top 0.03m to 0.10m surface cover over a 6 x 6m area with an excavator or backhoe. The 6x6m areas were then walked over and inspected by JBS Environmental. Labourers then used rakes to till the surface of the organics to assist in identifying the presence of ACM. The spoil generated by scraping back the ground cover was also inspected for ACM. All visible ACM was recovered and bagged.

The testpit dimensions were logged to allow for the calculation of the approximate volume of material inspected and a 500mL sample of the organic material was collected for laboratory assessment for the presence of free asbestos fibres.

Stockpiles were also sampled but this is not relevant to the assessment of the area addressed in this Site Audit and will not be discussed further, as the stockpiles have been managed separately to the areas where the organics material was placed.

All ACM identified in testpits in surface spread and cultivated organics areas was collected, bagged and weighed using an independently calibrated scale with an accuracy of 0.1 g.

JBS Environmental contracted Envirolab Services Pty Ltd (Envirolab) as the primary laboratory for the required analyses to which primary and duplicate samples were submitted. Triplicate samples were submitted to the secondary laboratory, SGS. Both laboratories are NATA accredited for asbestos analyses. The limit of reporting adopted for this investigation was 0.1g/kg or 0.01%. Laboratory analysis of samples was conducted as summarised in the following table.

Table 6-1 JBS Environmental (2011) Analytical Schedule

Sampling Location	No. of Sampling Locations	No. of Analyses (including QA/QC Samples)
Cultivated Areas	412	Asbestos – 476 soil samples
Surface Spread Areas	164	Asbestos – 193 soil samples
Stockpiles	400	Asbestos – 462 soil samples

Included in the above number of analyses, for QA/QC purposes field duplicates were analysed at a rate of 1/10 primary samples, with field triplicate samples analysed at a rate of 1/20 primary samples.

6.3.2 Assessment Criteria

The calculation of ACM concentration was stated by the consultant (JBS Environmental, April 2011), to be based on the enHealth (2005) guideline, however this reference is not correct, as the enHealth document does not include a calculation of asbestos in soil. The calculation appears to be derived from the Western Australia Department of Health (Western Australian Department of Health, 2009) Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia, which as a criterion for ACM in soil was to be used instead of asbestos, the asbestos calculation revised to:

$$SOIL\ ACM\ (\%w/w) = \frac{ACM\ (kg)}{Soil\ Volume\ (m^3) \times Soil\ Density\ (kg/m^3)}$$

A classification system was adopted by JBS Environmental to classify areas and stockpiles based on the observed/reported presence or otherwise of asbestos contamination. For the purposes of the assessment, contamination was defined as the presence in, on or under the land of a substance at a concentration above background levels that presents a risk of harm to human health or any other aspect of the environment.

A tiered approach was used to classify cultivated and surface spread areas for the potential presence of asbestos, where first, each inspection/sampling area is assigned a classification based on asbestos contamination, and second, the overall area is assigned the highest classification within the area asset out in the following table.

Table 6-2 System for the classification of investigated areas

Classification	Definition
No known asbestos contamination	No ACM observed and no fibres above LOR in any of the inspection/sampling locations
ACM fragment contamination	ACM observed in at least one inspection/sampling location and no fibres detected above LOR in any inspection/sampling locations
Fibre contamination	Asbestos fibres detected in at least one inspection/sampling location, and no ACM identified
ACM fragment and asbestos fibre contamination	ACM observed in at least one inspection/sampling location and fibres detected in at least one inspection/sampling location

As stated previously the limit of reporting for asbestos fibres adopted for this investigation was 0.1g/kg or 0.01% and ACM concentrations would be presented soil ACM (%w/w), however no specific criterion was for Soil ACM was provided although the data was tabulated and presented.

6.3.3 Quality Assurance / Quality Control (QA/QC)

The consultant developed pre-determined data quality indicators following those indicated in the reported seven-step process referred to in DEC 2006 and a discussion on DQOs. Both a field and laboratory quality assurance/quality control (QA/QC) program was conducted during the site investigation works. Field QA/QC for the investigation consisted of the following procedures:

- Collection and analysis of duplicate samples at a rate of one in every ten primary soil samples;
- Collection and analysis of triplicate soil samples at a rate of one in every twenty primary soil samples;

Laboratory QA/QC consisted of the following procedures:

- Analysis and reporting of as per standard procedures (as per *Australian Standard 4964 – Method for the qualitative identification of asbestos in bulk samples*, Standards Australia, 2004;

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

Table 6-3 Investigation QA/QC summary

Quality Indicator	Frequency & Acceptable Quality Parameter	Auditor Review of Quality Parameter Acceptance
Precision		
Intra-laboratory duplicates	Greater than 10% for COPC analytes Results <30-50% RPD	Yes –some variation discussed in comments*
Inter-laboratory duplicates	Greater than 5% for COPC analytes Results <30-50% RPD	Yes –some variation discussed in comments*
Accuracy		
Matrix spikes	70-130%	Not conducted for Asbestos
Certified reference material or Laboratory Control Sample	70-130%	Not conducted for Asbestos
Surrogate Spikes	70-130%	Not conducted for Asbestos
Representativeness		
Sampling appropriate for media and analytes	As per NEPM and AS 4482.1	Yes
Rinsate blanks	Nil collected by consultant	Not conducted for Asbestos
Trip spikes/trip blanks	1 per cooler <LOR	Not conducted for Asbestos
Laboratory blanks	1 per 20 or 1 per batch <LOR	Not conducted for Asbestos
Samples extracted and analysed within holding times.	Extracted within holding times	Yes
Comparability		
Standard operating procedures used for sample collection and handling	Suitable description of sampling procedures	Yes
Standard analytical methods used for all analyses	Analytical methods are referenced and NATA Accredited	Yes
Consistent field conditions, sampling staff and laboratory analysis	Consistent field work team, single primary laboratory used	Yes
Limits of reporting appropriate and consistent	Reporting limits less than the appropriate site criteria	Yes
Completeness		
Appropriate and complete COC documentation	Provided	Yes
Satisfactory frequency and result for QC samples	As per NEPM and AS 4482.1	Yes
Data from critical samples is considered valid	COC	Yes

Table Notes: * specifically discussed in Auditor comments

The consultant (JBS Environmental, April 2011) reported that general, primary and duplicate pairs were in agreement however duplicates for a small number of samples had asbestos detected in the duplicate sample and not in the primary. The consultant attributed this to the heterogeneity of the material in question, i.e. organics and soil, and the random distribution of ACM and was either below the limit of reporting of the primary laboratory (secondary laboratories reported to a lower limit) or found to be in a bonded matrix. Triplicates (inter-laboratory) were also reported to be generally in agreement, however, as with the duplicates a small number of primary/triplicate sample pairs had asbestos detected

in the triplicate sample and not in the primary sample, again this was found to be either below the limit of reporting for the primary laboratory or in a bonded matrix.

The consultant discussed the comparability of the primary (Envirolab) and secondary (SGS) laboratories, which was an issue raised in correspondence relating to the review of the document by the NSW OREH. They stated that both used standard analytical methods outlined in Australian Standard AS4964 200410, and that both laboratories were contracted to detect asbestos with reference to WA DoH methods (Western Australian Department of Health, 2009). However the secondary laboratory (SGS) employed an additional technique termed 'ashing' and is not wholly appropriate with consideration to the objective of the assessment. It was concluded that this additional analytical method might have produced the greater frequency of asbestos detections below the limit of reporting.

The inconsistency between laboratory analytical methods was not considered to affect the quality of data obtained for the investigation. Further, the limit of reporting adopted for this investigation by the primary laboratory (Envirolab) was 0.1g/kg. The secondary laboratory (SGS) applied the initial LOR of 0.01 g/kg, although it is noted that AS4964 methodology has a detection limit of 0.1 g/kg. This discrepancy is not considered to compromise the quality of the results obtained for this investigation because the reporting limits used by each laboratory were either at or below the current standard acceptable level of detection for asbestos of 0.1 g/kg but again also explains the variation in the duplicate samples collected for QA/QC purposes.

On the basis of the results of the field and laboratory QA/QC program, the consultant concluded that the soil data was of an acceptable quality for the assessment.

6.3.4 Field Observations

Cultivated and surface spread areas investigated during the assessment are presented in the consultant's figures provided in **Appendix E**.

The vertical extent of organic material in cultivated areas was observed to range between depths of 0m and 0.10 m. The material in these areas generally comprised fine to coarse sized organics cultivated into brown silty/sandy clay with a range of building and household waste including brick, concrete, tile, metal, glass, plastic, crockery, and the target contaminant - ACM. It is noted that the amount of organics and inclusions in these areas was much less (observed to be approximately $\leq 10\%$ of material inspected) than the surface spread areas or stockpiles due to the dilution with soil. In general, cultivated organics area sampling locations were covered with grass prior to scraping.

The vertical extent of organic material in surface spread areas was observed to range between depths of 0 m and 0.06 m. The material in these areas generally comprised fine to coarse sized organics with a range of building and household waste including brick, concrete, metal, tile, glass, plastic, crockery, and the target contaminant - ACM. In general, surface spread area sampling locations were covered with grass prior to scraping.

At the request of PLDC some area initially identified for assessment were not investigated and include:

- surface spread areas along the western side of New Castlereagh Road, located within Roads and Maritime Services owned land;

- surface spread areas located within tree clusters within the Duralia Lake area because of limited access; and
- cultivated areas along the eastern side of New Castlereagh Road because of limited access to the areas due to the presence of water bodies, the proximity of New Castlereagh Road, or drainage channels.

Several additional areas were investigated. They were:

- a surface spread area comprising a drainage swale near Hadley's Paddock area; and
- a surface spread area at the top of the river bank near what is identified as SP30;

6.3.5 Soil Investigation Results

The consultant provided results tables in addition to detailed laboratory reports as well as figures showing where asbestos was identified in testpit locations from cultivated and surface spread areas. These are presented in plans provided in **Appendix E**. ACM in soil (in %w/w) are presented in the consultants Table B in **Appendix F**, which also provides other information relating to asbestos quantification, such as weight of ACM in samples, and number and size of fragments collected.

A summary of the number of locations sampled and the number of locations where ACM and fibres were identified is included in Table C for cultivated areas (Table C.1), surface spread areas (Table C.2) in **Appendix F**.

ACM fragments were observed at the following incidence:

- Cultivated areas: 141 out of 412 (34 %) testpit locations in the nominated areas; and
- Surface spread areas 92 out of 164 (56 %) testpit locations in the nominated

No ACM fragments uncovered by the field works were considered by field inspection to be friable, i.e. they could not be crushed by hand.

The consultant presented summarised laboratory results, detailed laboratory reports and chain of custody documentation and reported that respirable fibres were not detected in any of the soil/organics samples submitted for laboratory analysis.

However loose asbestos fibre bundles, i.e. fibres not embedded within a matrix, varying between 1-3 mm in length, were detected by the secondary laboratory (SGS) in ten inter-laboratory duplicate samples. Loose asbestos fibres were not detected in any other sample submitted for laboratory analysis as part of this investigation.

The consultant presented the results of the asbestos contamination classification discussed previously for all areas investigated and presented the results in Tables that are provided in **Appendix F**.

Most areas investigated (42 of 54) had classifications of 'ACM fragment contamination'. It was noted that where asbestos fibres were reported at less than LOR, these have not been classified as 'ACM fibre' or 'ACM fragment and fibre' contamination. Locations where this occurred were classified as 'ACM fragment' contamination. The classification of 'No known asbestos contamination' was given to 17 of 91 areas and stockpiles, where ACM was not observed during inspection and asbestos was not reported above LOR in samples analysed.

One stockpile (SP11) and one surface spread area (SA02) were classified as 'ACM fragment and fibre' contamination (neither of these in the current Site Audit area boundary).

No areas or stockpiles were classified as 'Asbestos fibre' contamination, i.e. no areas had fibres reported above Limit of reporting but no ACM observed.

For the Southern Wetlands Dedication Area, the assessment by JBS Environmental encompassed four surface spread areas (SA01, SA03, SA04 and SA43), three cultivated areas (CA01, CA02 and CA03) and three stockpiles (SP30, SP31 and SP33) within the Site Audit site boundary. All of these areas were classified as 'Asbestos fragment' contamination.

6.4 Audit Discussion of JBS Environmental Investigation

The number and location of areas assessed across the Penrith Lakes scheme for the assessment by JBS Environmental (JBS Environmental, April 2011) was determined by the PLDC presumably based on the history of application of the off-specification mulch to the various areas of the site. No specific documentation was provided to support those areas identified. It can only be assumed that as it is in the best interests of the PLDC to identify all areas potentially affected and that they would have good records of the areas undergoing rehabilitation at the various stages of the quarry that all areas have been adequately identified.

The test pitting approach was considered to provide a reasonably representative sample of those areas and the consistency of the results across all the areas sampled supports this. The methods for the collection of samples, analysis and the reporting are acceptable.

The purpose of calculating soil ACM is not clear as no assessment criterion in this regard was proposed and it did not have a bearing on the classification of the areas. The inconsistency observed between primary and duplicate/triplicate samples could have been avoided with consistency in the limits of reporting.

The use of the typical QA/QC program for the quantification of asbestos is acknowledged as difficult, asbestos fibres are a discrete contaminant, not subject to the usual extraction methods typical of other contaminants. Additional QA/QC approaches could have been considered to improve the assessment of the laboratory performance including assessment of proficiency programs and preparing spike samples. However, all laboratories are NATA accredited for the analysis undertaken which does ensure a minimum level of competency in the laboratories for fibre identification and quantification.

Groundwater was not investigated during the assessment and with consideration to the specific nature of the assessment being for asbestos the absence of a groundwater assessment is not considered to be unacceptable.

7 Off Specification Mulch Management Plan

David Lane Associates (DLA) were commissioned by PLDC to review the Asbestos Assessment Report (JBS Environmental, April 2011) and prepare the Off Specification Mulch Management Plan (DLA Environmental, December 2011) for the site taking into consideration the findings of the previous report and the history of the site.

7.1 Remediation Objectives

With reference to the NSW EPA Contaminated Sites guidelines (NSW OEH, 2011) the consultant stated that the objective of the plan should be to:

- Set remediation options and methodologies that ensure the remediated site will be suitable for the proposed use and will pose no unacceptable risk to the human health or the environment; and,
- Document the procedures and plans to be implemented to reduce the risk of significant harm to an acceptable level.

The consultant noted that all areas on the site will be validated at the time of dedication to the State Government and a Site Audit Statement completed for the full area confirming suitability for nominated end land uses, presumably following the implementation of the plan as has been the case on the Site Audit subject site.

7.2 Remediation Options and Proposed Approach

The review by the consultant of the previous works identified that approximately 216Ha of the Penrith Lakes Site was identified as impacted by the off specification mulch through the rehabilitation works plans, onsite inspections, GIS records and contractor works completed records and that these areas formed the basis of the JBS Environmental investigation.

The remainder of the site (approximately 1,719 hectares) was not investigated, as there was no Off-Specification Mulch spread or stockpiled in these areas.

The development of the Plan was to provide strategies that addressed the following points:

- Develop remediation strategies for the site that does not present any unacceptable risk to human health or the environment.
- The strategies must also be the most cost-effective solution, which does not bring about unacceptable long-term liabilities, impose unreasonable constraints on future site developments or restrict present operations.
- To develop strategies that involve the removal of the asbestos from the Organic/Soil materials or where appropriate off-site disposal.

With consideration to these points the consultant proposed a number of remediation scenarios based on the characteristics of the placement of the off specification mulch (surface spread or cultivated) and classification from the JBS Environmental assessment.

The remediation scenarios identified for the site are as follows:

- 1. Off specification mulch identified as containing excess volumes of plastics, building material, or any asbestos fibres will be disposed of at an off-site location.**

The material will be removed under the supervision of an AS1 Asbestos Removal Contractor with all material disposed of at a landfill facility licensed to accept the waste. Given the friable content is related to the presence of asbestos fragments (damage) and not associated with limpet asbestos or other highly friable forms of asbestos the localised areas of friable content will be removed and validation conducted. The areas of friable impaction are extremely low compared to the overall asbestos fragment impaction.

2. Surface Spread Areas assessed as suitable for proposed land use (containing <0.01% asbestos) will be:

Remediated using onsite manual collection of ACM (hand-picking, emu-bob), mechanical raking and visual inspection to ensure the ACM within the mulch is reduced to a lesser or more acceptable level (that is less than 0.01%). All surface spread areas will then be covered with 100mm of clean validated topsoil.

Where visual inspections are hindered by ground vegetation cover, the remediation may additionally involve vegetation spraying to allow adequate visual inspection. All works are to be completed by an AS2 Licensed Asbestos Removal Contractor.

3. Cultivated Areas assessed as suitable for proposed land use (containing <0.01% asbestos) will be:

Remediated through several cycles of manual collection of ACM (hand-picking, emu-bob) and tilling to ensure the ACM within the mulch has been reduced to a lesser or more acceptable level (that is less than 0.01%), and where topsoil is not being emplaced that the surface 100mm is visually free of ACM.

Where future landform design requires additional topsoil or overburden emplacement or rework, these Cultivated areas will be buried at depth >100mm.

Where visual inspections are hindered by ground vegetation cover, the remediation may additionally involve vegetation spraying to allow adequate visual inspection. If it is undesirable to destroy ground cover, 100mm clean validated topsoil will be placed over the entire area negating the need to conduct surface remedial work.

All works are to be completed by an AS2 Licensed Asbestos Removal Contractor.

4. Cultivated Areas assessed as not suitable for proposed land use (containing >0.01% asbestos) will be:

Remediated through several cycles of manual collection of ACM (hand-picking, emu-bob) and tilling to ensure the Cultivated Areas contain <0.01% asbestos.

The iterative manual collection will also achieve the surface 100mm is visually free of ACM.

Where future landform design requires additional overburden emplacement or rework, these Cultivated areas will be buried at depth >100mm.

Where visual inspections are hindered by ground cover, the remediation may additionally involve vegetation spraying to allow adequate remediation and visual inspection.

All works are to be completed by an AS2 Licensed Asbestos Removal Contractor.

5. The Wildlife Lake Area (all areas have <0.01% asbestos) will be subject to a Park Management Plan - Wildlife Lake Area.

The intentions of this document are to provide for controlled and limited access to the entire area whilst being cognizant of the history of the WL and placement of the OSM on landforms.

It is intended that the Wildlife Lake area will be:

Remediated using onsite manual collection of ACM (hand-picking, emu-bob), and visual inspection to ensure the surface 100mm is free of ACM.

Where visual inspections are hindered by ground vegetation cover, the remediation may additionally involve vegetation spraying to allow adequate visual inspection.

Where access for maintenance and other management activities are identified within the Park Management Plan for the Wildlife Lake, it will be the intention of the document to require all contractors who undertake these works to include the Unexpected Finds Protocol (UFP) in their safe work method statement and obtain approval to access the area through the park management authority.

The UFP will address the future uncertainty of the removal of all ACM from the surface 100mm by hand picking and visual inspections.

6. Stockpiled material identified with OSM containing asbestos

To be encapsulated at depth in an appropriately engineered landform and will not be reused or recycled (in accordance with clause 42(5) of the Protection of the Environment Operations (Waste) Regulation 2005).

The consultant noted that a combination of the above could be adopted, depending on cost, time and sequencing constraints and planning requirements.

A subsequent addendum to the plan (DLA Environmental, February 2014) makes changes to the proposed scenarios, specifically with regard to the surface spread and cultivated areas with less than 0.01% (w/w) ACM.

7.3 Remediation Validation Criteria

The consultant noted that at the time of preparing the management plan there was no national or NSW EPA endorsed guidelines for asbestos in soil relating to human health (with the amendment to the 2009 NEPM this is not the current situation). The plan states that the validation process will require a systematic approach to demonstrate that the risk associated with the presence of asbestos has been remediated and managed to an acceptable level.

The plan cites various references in relation to what would be considered appropriate validation criteria, including the draft of the amended NEPM (NEPC, 1999, Amended 2013) and the WA DoH guidelines (Western Australian Department of Health, 2009). Using the later the consultant proposed the following criteria for asbestos in fibres and in ACM:

- <0.001% weight for weight (w/w) asbestos of fibre form;
- <0.01% weight for weight (w/w) asbestos of fragment form – Residential Use;

- <0.04% weight for weight (w/w) asbestos of fragment form – Residential minimal soil access;
- <0.02% weight for weight (w/w) asbestos of fragment form – Open Space areas;
- <0.05% weight for weight (w/w) asbestos of fragment form – Industrial Commercial Use.

The validation criteria recommended for the site by the consultant is the most sensitive criterion of <0.01% asbestos fragments present in soil (soil ACM). Further the consultant proposed a secondary criterion for the top 100mm of soil being free of all visible asbestos fragments.

In addition, the NSW OEH 2009 Waste Classification Guidelines would be applied as the basis of technical review for the waste disposal options most applicable to the site. In consideration of the above the strategy for the identified material it must comply with both the regulatory requirements of WorkCover Authority and the NSW EPA.

The asbestos of the identified areas would include three stages:

- Visual Asbestos Clearance Inspection
- Asbestos Clearance Soil Sampling
- Airborne Asbestos Fibre Monitoring

The following sections outline the plan requirements for each stage of the validation. Key to the requirements was the development of a separate SAQP (DLA Environmental, December 2011).

7.3.1 Visual Clearance Inspection

Visual Clearance Inspection was to be undertaken for all surface spread and cultivated areas to ensure complete removal of ACM within the 100mm surface zone. The materials were required to be visually inspected in a thorough fashion following the mechanical raking or tilling process for the presence of visual surface fragments of asbestos containing materials.

Upon completion of the thorough Visual Clearance Inspection, appropriate organic/soil sampling will be conducted.

7.3.2 Organic/Soil Sampling

Following the removal of identified asbestos contaminated material from the areas identified, asbestos clearance investigations of the area were to be undertaken by the collection of soil samples in accordance with the WA DoH Guidelines (Western Australian Department of Health, 2009). Upon completion of soil sampling, each sample was required to be sent to a NATA registered laboratory for asbestos fibre in soil analysis.

Sampling and analysis was to be conducted in general accordance with AS4964 Method for the Qualitative identification of Asbestos in Bulk samples and the requirements set out in a separate SAQP (DLA Environmental, December 2011).

The SAQP noted that the WA DoH Guidelines (Western Australian Department of Health, 2009) recommend a minimum sampling density of two times the NSW EPA (NSW EPA, 1995) minimum sampling density for areas where asbestos has been identified but the extent is

unknown. Two times the minimum sampling density for 5 hectares, the largest area for which sampling guidance is provided in the guidance, equates to 22 samples per hectare.

The consultant determined that based on a number of factors the assessment conducted by JBS Environmental (JBS Environmental, April 2011) had exceeded 11m² area required to be inspected based on the excavation of twenty two test pits per hectare as such the SAQP required the validation to only sample an two additional sample locations per hectare to supplement the JBS Environmental samples and would be used to increase confidence in the findings of the JBS Assessment, based on the evaluation that the validation criteria has been meet in all surface and cultivated areas across the Penrith Lakes scheme, based on the soil ACM (%w/w) calculated by JBS Environmental. Where friable asbestos had been detected, these contaminated testpits will be excavated to an area of approximately 100m² and removed to a licensed landfill facility. The areas surrounding the friable testpits would be validated by collection of 4 samples per 100m². The resulting samples will be analysed for fibre content before clearance is given for further works to commence on that spread surface or cultivated area.

7.3.3 Airborne Asbestos Fibre Monitoring

All airborne asbestos fibre monitoring and analysis will be conducted in accordance with the Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003 (2005)].

The Airborne Asbestos Fibre Monitoring will be conducted at the boundary of all exclusion zones put in place for the asbestos works, along haul routes for all material, and within the loading and disposal areas. Monitoring will be conducted at all times when asbestos remedial works are being undertaken.

7.4 Contingency Plans

The consultant presented protocols for dealing with unexpected finds of asbestos for the future management of the site. However no contingency was provided for the unexpected finds of other contaminants during remediation. As no intrusive works was being planned this was not required.

7.5 Site Management

The consultant included site management provisions to reduce the impact of the remediation works on the remediation workforce and surrounding environment.

7.6 Regulatory Compliance

The consultant did make considerations to a number of regulatory requirements with regard to the proposed works, specifically the requirements of the Protection of the Environment Operations Regulation 2005, Clause 42(5) "A person must not cause or permit asbestos waste in any form to be re-used or recycled."

The WorkCover Authority requirements being in accordance with the National Occupational Health and Safety Commissions Asbestos Codes of Practice and Guidance Notes:

- Code of Practice for the Safe Removal of Asbestos [NOHSC:2002 (2005)];

- Code of Practice for the Management and Control; of Asbestos in Work places [NOHSC:2018] (2005);
- Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres [NOHSC: 3003 (2005)]; and
- Working with Asbestos 2008 NSW WorkCover Authority.

The consultant made observations that the NSW WorkCover Authority has clarified the definition with regard to friable asbestos in soils in the documentation in Your Guide to Working with Asbestos Workcover (Workcover Authority, 2008).

The Working with Asbestos guide concludes the following with respect to asbestos in soils (contaminated sites):

- Asbestos cement fragments on or in the surface layer should be removed as bonded asbestos material. Where there has been damage to the bonded material so that it has been crushed and become friable this material should be treated as friable asbestos and removed by a friable asbestos removal contractor (AS1).
- Where the condition of the asbestos material or the extent of contamination has not been established, competent Occupational Hygienists should assess the site and determine safe work procedures for the remediation of the site. The assessment and safe work procedure should reflect the level of hazard and the proposed use of the land. Environmental and planning legislative requirements will also need to be in compliance.
- Buried limpet, lagging or other friable asbestos material is to be treated as friable and removed by a friable asbestos removal contractor.

7.7 Long Term Site Management

Due to the nature of material it is never possible to guarantee every fragment of asbestos containing material has been identified, especially within mixed material. In the event that soil disturbance uncovers a fragment of an asbestos containing material in the future, given its bonded matrix and isolated nature; this event would not pose an unacceptable health risk to the property (<0.01%). However all asbestos events should be addressed and for this reason an Unexpected Finds Protocol was included for future construction activities in this documentation.

7.8 Off Specification Mulch Management Plan Addendum (February 2014)

DLA Environmental was commissioned by the PLDC to issue an Addendum to the Off Specification Mulch (OSM) Management Plan, which was currently in operation at the site. The Addendum was considered necessary due to recent changes in the National Environment Protection (Assessment of Site Contamination) Measure (NEPM) (NEPC, 1999, Amended 2013) that included the introduction of land use suitability criteria for asbestos contaminated soils.

The amended NEPM, 2013 has incorporated the Western Australian Department of Health (DOH) Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia, (Western Australian Department of Health, 2009) to provide for greater detail on sampling techniques and a more refined approach to risk

based assessment to determine a Sites land use suitability. This information has been reviewed to develop refinements in the OSM Management Plan.

Specifically, the Addendum addresses the required changes to remediation scenarios and validation methodology within the OSM Management Plan.

7.8.1 Amended Remediation Scenarios

The consultant set out the amended remediation scenarios as follows:

1. OSM (surface, cultivated or stockpiled material) identified as containing asbestos fibres (FA or AF) will be disposed of at an off-site location.

The material will be removed under the supervision of a Class A Asbestos Removal Contractor with all material disposed of at a facility licensed to accept the waste. Given the friable content is related to the presence of asbestos fragments (damage) and not associated with limpet asbestos or other highly friable forms of asbestos, the localised areas of friable content will be removed and validation conducted. The number of locations containing asbestos fibres is extremely low compared to the occurrence of bonded asbestos.

Assessment and Validation is to be in accordance with NEPM, 2013 and WA DOH guidelines, 2009.

2. Surface Spread and Cultivated Areas assessed as suitable for proposed land use (OSM containing <0.01% asbestos) will be:

- a. Slashed, raked and baled to facilitate inspection,
- b. Hand-picked as required to remove visible surface asbestos if present in accordance with NEPM 2013 methodology;
- c. Systematic Walkover to enable visual inspections of surface soils for validation in accordance with NEPM 2013 methodology.

All works are to be completed by a Class B Licensed Asbestos Removal Contractor. Where an area requires landform rework, the first two steps above will be completed to allow a handling clearance to be issued with the materials respread over the same or lesser area prior to completion of the final step.

3. Surface Spread Areas assessed as not suitable for the proposed land use (OSM containing >0.01% asbestos) based on either JBS Assessment or DLA Validation will be:

- a. Test Pit locations identified by GPS survey (<1m Accuracy);
- b. Non-compliant locations of Surface Areas will be raked and hand-picked to comply with land use suitability in accordance with NEPM 2013 methodology;

Or,

- c. Area will be scraped to remove top 50mm and removed from site or encapsulated at depth in an appropriately engineered landform;
- d. Surface Area will be visually inspected for validation in accordance with NEPM 2013 methodology;

All works are to be completed by a Class B Licensed Asbestos Removal Contractor.

4. Locations within Cultivated Areas assessed as not suitable for the proposed land use (OSM containing >0.01% asbestos) based on either JBS Assessment or DLA Validation will be:

- a. Locations identified by GPS survey (<1m Accuracy);
- b. 50m x 50m area around test pit location will be scraped to remove top 100mm and relocated to temporary storage area for later disposal to licensed landfill;
- c. The footprint area will be validated as will each side with soil analysis of test pits and visual assessment; and,
- d. Certified virgin soil (VENM) will be placed to a depth of 100mm in footprint area.

5. Any OSM containing excess non-putrescible rubbish, including plastic or building materials will be removed to a suitably licensed facility.

In accordance with the NEPM, (NEPC, 1999, Amended 2013) guidelines, hand picking will consist of 2 passes with a 90° direction change to be separated by 10m on parallel transects. Hand picking will continue in this manner until validation is achieved.

A combination of the above scenarios could be adopted for each area, depending on cost, time and sequencing constraints and planning requirements. All materials removed due to land use unsuitability will be placed as a stockpile in a temporary storage area to be either removed from site or placed into an appropriately engineered landform area, dependent on the outcome of stakeholder negotiations.

7.8.2 Amended Validation Program

As previously required, Interim Validation Certification is to be issued for each area to form the basis of the Final Validation Report. The final Validation will include all chemical and asbestos validation to ensure each area complies with the land use suitability as defined by NEPM (NEPC, 1999, Amended 2013).

The Asbestos component of the Interim Validation Certification for the OSM areas will include three aspects:

- Visual Asbestos Clearance Inspection;
- Asbestos Clearance Soil Sampling, where required, and;
- Airborne Asbestos Fibre Monitoring.

Outlined below is the Asbestos Validation procedures and methodology to be utilised by DLA Environmental following the completion of each remedial strategy.

Cultivated and Surface Spread Areas

Surface spread and cultivated areas are to be inspected by a hygienist slowly walking 2 passes with a 90° direction change across each area. Each transect will be separated by approximately 20m to enable a representative inspection. If any surface contamination is encountered, another 2 passes of hand picking with a 90° direction change will be undertaken.

To allow for confirmation of Soil asbestos concentrations, validation sampling will be undertaken in accordance with the NEPM, 2013 – Schedule B2. The cultivated and surface spread areas will be sampled at a rate of two (2) per Hectare. Specifically the process will involve:

Validation will consist of samples from representative locations of cultivated and surface spread areas, which will:

- Cover 5mx5m to a depth of 50mm in surface spread areas; and,
- Cover 2mx1m to a depth of 100mm in cultivated areas;
- Provide ten (10) litres of the scraped material for sieving with a 7mm x 7mm stainless steel mesh sieve. All fragments retained on the sieve will be forwarded to the laboratory to be weighed and have their asbestos content quantified;
- Provide a 500ml sample, which will be collected from the fines of the sieving process and sent to a NATA Certified Laboratory for analysis.

Sample analysis will be conducted in general accordance with AS4964 Method for the Qualitative identification of Asbestos in Bulk samples.

Stockpile Validation

Visual inspections are undertaken on stockpile footprint areas following the removal of the stockpile to the level of the pre-placement surface. This is performed by walking in a meandering pattern back and forth along the length of the stockpile footprint looking for Asbestos containing materials or indicators of remnant stockpile material. Where remnants are identified, closer inspection by disturbing the surface will be carried out. Stockpile footprint areas will be sampled at a rate of approximately 1 sample per 250m² to confirm the absence of asbestos fines.

7.9 Audit Discussion of the Off Specification Management Plan and Addendum

Based on the information contained in the consultant's Remedial Action Plan, the Site Auditor finds that the proposed management plan:

- is technically feasible (although the Site Auditor has some concerns in this regard following the implantation of the works on the site;
- is environmentally justifiable; and
- the proposed validation sampling and contingency plans are suitably comprehensive to ensure contamination above the remediation criteria is appropriately managed.

The validation-sampling programme is based on a systematic sampling programme to evaluate the sufficiency of the works and is consistent with the requirements of the WA DoH guidelines (Western Australian Department of Health, 2009) and therefore the (NEPC, 1999, Amended 2013).

The Site Auditor was concerned about the feasibility of the following attributes of the plan:

- Cultivated areas require mechanical assistance to undertake the assessment; and
- Requirement for 100mm of 'clean fill' to be placed across all surface spread areas.

From observations made during the site visit the mechanical disturbance of the top 100mm in the cultivated areas will be very difficult to achieve, with consideration to the compaction of the site surface. With consideration that all these areas have been assessed at an appropriate frequency and found to not exceed the nominated criterion for the most sensitive site land use this work is unnecessary and very difficult to do. Likewise with the requirement for surface spread areas to receive an addition 100mm of fill is also impractical with consideration to what is being achieved. A review of the assessment work conducted by JBS Environmental (JBS Environmental, April 2011) shows that although fragments of asbestos are consistent in those identified areas the incidence is considered very low.

The addendum to the OSM Plan addresses the above concerns and more rigorously follows the requirements set out in the NEPM (NEPC, 1999, Amended 2013) with regards to the validation of the surface.

8 Remedial Activities and Validation

The following sections describe the reported remedial works, the sampling and analysis program for the site validation and additional investigation works as reported DLA Environmental Final Validation Report (DLA Environmental, January 2016).

The objectives of these validation works as stated by DLA Environmental “are to satisfy the stated OEH requirements in accordance with NSW EPA Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites, 2011. Specifically, this investigation will consider the potential for suspected historical activities to have caused contamination at the Site and to demonstrate the suitability of the land for future land use consistent with Residential A in the National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1)”.

To achieve this objective, DLA Environmental listed the following works carried out:

- Inspection of each comprising area and the surrounding land;
- Desktop study including a review of available current and historical information and previous validation work;
- Intrusive investigations involving the collection of 89 samples for asbestos analysis from three cultivated areas, five surface spread areas, three stockpiles and ACM pipe clearances;
- Intrusive investigations including the collection of 83 primary soil samples for BTEX, TRH, PAH, OP/OC Pesticides, PCBs and heavy metals analysis;
- Review of previous remediation works; and
- Preparation of a validation report.

Areas of environmental concern within the Southern Wetlands dedication area that were the subject of the Final Validation Report are listed below.

- Amgrow Interim Validation Report;
- East Cell Tailings Interim Validation Report;
- Gemhawke Compound Validation;
- Leaky Dam Interim Validation Report;
- Riverbank Validation;
- SGS Compound 1 Validation;
- SGS Compound 2 Validation;
- Purcell’s Lane Asphalt Clearance;
- Lee’s Cottage Remediation;
- Upper Castlereagh School Inspection; and
- Asbestos pipe removal areas.

The areas of environmental concern are depicted in the consultants Figure 3 provided in **Appendix G**. The Asbestos pipe removal areas are provided in Figure 4 in **Appendix G**.

The remaining areas of environmental concern within the Southern Wetlands dedication areas, being the Residual Material Consolidation Area and Holcim area, were the subject of a separate validation report and sign-off by the previous Site Auditor and are discussed further in Section 8.7.

The following sections provide details of the remediation and validation works undertaken as reported by the consultant.

8.1 Remediation of Off-Specification Mulch

Off-Specification Mulch (OSM) identified during the JBS Environmental report (JBS Environmental, April 2011) was further investigated and remediated by DLA Environmental in 2013 and 2014. DLA Environmental supervised the asbestos contractor - Pure Contracting during the hand-picking of surface ACM and conducted the final visual inspections and clearance sampling for the Lake B Precinct.

The investigation encompassed the excavation of sixty (60) validation test pits across the three cultivated areas (23.48ha) and five surface spread areas (6.002ha) and collected twenty-nine (29) stockpile footprint clearance samples from the three stockpiles (0.7032ha). The remediation works resulted in concentrations of <0.01%w/w of bonded asbestos in soil, which is less than the criterion for residential land use. No instances of asbestos fines were recorded.

The consultants figure showing the sample locations is provided in **Appendix G**.

8.2 Additional Validation Sampling Program

A total of 83 primary soil samples were collected from within the areas of environmental concern.

The rationale behind the sampling strategy was that the majority of soils had been excavated during product extraction within the Penrith Lakes Scheme. Natural soils were then reinstated to complete land forming operations, meaning that no fill materials were imported to the Scheme. The areas of environmental concern were due to operational and remnant land use on the Site.

Validation comprised of the following:

- Collection of 83 primary soil samples from areas of environmental concern including OSM areas;
- Quality assurance samples including testing of one inter laboratory duplicate soil samples and six intra laboratory duplicate soil samples; and
- Collection of asbestos samples as detailed in individual validation reports.

The consultants figure showing the sample locations is provided in **Appendix G**.

8.3 Analytical Strategy

Samples were analysed for a range of contaminant indicators that may be associated with past and present land uses. Soil samples were analysed by Envirolab Services Pty Ltd of Chatswood and SGS Australia Pty Ltd of Alexandria for the following analytes:

- arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), mercury (Hg), nickel (Ni), and zinc (Zn);
- Total Recoverable Hydrocarbons (TRH);
- Monocyclic Aromatic Hydrocarbons (BTEX);
- Volatile TRH (vTRH);
- Organochlorine Pesticides (OCs), Organophosphorus Pesticides (OPs);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Polychlorinated Biphenyls (PCBs); and,
- Asbestos.

No Photo Ionisation Detection (PID) assessments were undertaken as TRH analyses were performed on all samples. Samples were analysed for all listed chemicals based on potential contamination in the area.

8.4 Site Validation Criteria

The criteria selected have been chosen in accordance with current Australian and NSW EPA guidelines. Criteria for assessing the site were derived from the following publications:

- Schedule B1 Guideline on the Investigation Levels for Soil and Groundwater from the National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013; and,
- Friebel and Nadebaum 2011, Health Screening Levels for petroleum Hydrocarbons in Soil and Groundwater, Part 1: Technical Development Document; and,
- NSW EPA Guidelines for the NSW Site Auditor Scheme, second edition (NSW DEC, 2006).

The respective soil HILs are provided in the following tables:

Table 8-1 Soil Remediation Criteria (mg/kg)

Analytes	Residential A	Recreational C	Source
Arsenic	100	300	NEPM 2013, Table 1A(1)
Cadmium	20	90	
Chromium	100	300	
Copper	6000	17000	
Lead	300	600	
Mercury	40	80	
Nickel	400	1200	
Zinc	7400	30000	

BaP TEQ	3	3	NEPM 2013, Table 1A(1)
Total PAHs	300	300	
PCB	1	1	NEPM 2013, Table 1A(1)
Pesticides: (Aldrin/Dieldrin)	6	10	NEPM 2013, Table 1A(1)
Chlordane	50	70	
DDT+DDE+DDD	240	400	
Asbestos: Bonded ACM Friable	0.01%	0.2%	NEPM 2013, Table 7
Asbestos/Asbestos	0.001%	0.001%	
Fines			
Surface Asbestos (0.1m)	No Visible	No Visible	
Aesthetic: Upper 1m of soil	No Odours No Staining <5% Anthropogenic Material		

The National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1) to the NEPM 1999 Guidelines provides Health Screening Levels (HSLs), Ecological Screening Levels (ESLs) and Management Limits for TRH fractions in soil and groundwater based on concerns regarding ecological impacts, inhalation of vapours and direct contact with contaminant sources. The Fraction Number (i.e. hydrocarbon compound range) is identified and compared against the prescribed HSL, ESL and Management Limit values. HSLs, ESLs and Management Limits take into consideration:

- Carbon number range, indicated by a Fraction Number (F1, F2, F3 or F4);
- Type of soil (sand, silt or clay);
- Depth to the source of contamination; and,
- Intended land-use (High density residential [HSL A & HSL B], Recreational/Open Space [HSL C] or Commercial/Industrial [HSL D]).

For this site, the intended land use is both HSL Residential A – Residential with garden/accessible soil and HSL Recreational C – Public Open Space. The soil type is sand within a depth range of 0-0.7m. The criteria are summarised in the following tables:

Table 8-2 TRH Criteria – HSL Criteria for 0-1.0m

Analytes	HSL-A ₁ (Sand) 0-1.0m (mg/kg)	HSL-C ₁ (Sand) 0-1.0m (mg/kg)
Benzene	0.5	NL
Toluene	160	NL
Ethylbenzene	55	NL
Xylene	40	NL
Naphthalene	3	NL
F1: C₆-C₁₀	45	NL
F2: C₁₀-C₁₆	110	NL
F3: C₁₆-C₃₄	NL	NL
F4: C₃₄-C₄₀	NL	NL

Table 8-3 TRH Criteria – Environmental Screening Levels and Management Levels Criteria

Analytes	NEPM 2013 Amendment TRH Criteria (0-0.10m) (mg/kg dry wt)	
	ESL ₁ (Coarse*)	ML ₂ (Coarse*)
Benzene	10	-
Toluene	10	-
Ethylbenzene	1.5	-
Xylenes	10	-

* 'Coarse' refers to the soil texture grading as per NEPM 1999.

1 NEPM 2013 Amendment Table 1B(6) – ESLs for TPH fractions, BTEX and benzo(a)pyrene in soil.

2 NEPM 2013 Amendment Table 1B(7) – Management Limits for TPH fractions F1-F4 in soil.

8.5 Additional Validation Analytical Results

The results of the soil validation undertaken are discussed in the following sections.

8.5.1 Field Observations

The consultant noted that there were no odours or visible staining observed at the surface of soils across the Southern Wetlands Dedication Area or within the sampling locations. Soils were brown to orange brown natural silty sands and loamy silts.

Also the consultant did not observe activities that could potentially contaminate the Site in the area directly surrounding the site.

8.5.2 Soil Analytical Results

A total of 83 soil samples were submitted to EnviroLab Pty Ltd and SGS Australia Pty Ltd undergoing a range of laboratory analyses. The results of the validation conducted at the site are summarised below.

Organics

All chemical samples were analysed for Monocyclic Aromatic Hydrocarbons (BTEX fractions), Volatile Total Recoverable Hydrocarbons (vTRH) and Semi Volatile Total Recoverable Hydrocarbons (TRH). There were no concentrations of BTEX fractions, or vTRH recorded above the Laboratory Limit of Reporting (LOR). Concentrations of TRH were detected above the laboratory LOR in 18 of the samples analysed and reported TRH concentrations ranged from 110 mg/kg to 350 mg/kg. The detections were limited to the F3 fraction and F4 fraction and were below the adopted remediation criteria.

All samples were analysed for Polycyclic Aromatic Hydrocarbons (PAH). Two samples were reported to contain concentrations of Benzo(a)pyrene TEQ (BaP) above the LOR (Riverbank validation sample point #58c, 1.0 mg/kg and SGS hardstand sample point 22, 3.0 mg/kg) however reported concentrations were below the adopted validation criteria. Total PAH

concentration were calculable for seven samples, however all concentrations were below the adopted validation criteria.

Fifty-four samples were analysed for Organochlorine (OC) and Organophosphate (OP) pesticides with no samples reported to concentrations above the LOR.

Fifty-four samples were analysed for PCBs and three samples from the riverbank validation area reported concentrations above the laboratory LOR. All reported concentrations were below the adopted criteria.

Metals

All 83 samples were analysed for the heavy metals listed in the previous section. One sample (Riverbank point #64d) exceeded the HILs for Residential Landuse with access to soil (300 mg/kg) with a reported concentration of 310 mg/kg. The following table is extracted from the consultant’s report of metal results.

Table 8-4 Soil Metals Results (mg/kg) (DLA Environmental, 2016)

	As	Cd	Cr VI	Cu	Pb	Hg	Ni	Zn
No. of Samples	83	83	83	83	83	83	83	83
Minimum Concentration	ND	ND	4.0	3.0	3.0	ND	3.0	11.0
Maximum Concentration	10.0	0.9	29.0	430.0	310.0	0.2	15.0	560.0
Standard Deviation	2.2	0.2	4.2	46.8	39.8	0.0	2.4	83.0
95% Upper Confidence Limit	4.107	0.281	12.12	26.9	33.45	0.103	8.315	89.19
NEPM 2013 HIL Residential A	100	20	100	6000	300	40	400	7400
NEPM 2013 HIL Recreational C	300	90	300	17000	600	80	1200	30000
No. of HIL Exceedances	0	0	0	0	1	0	0	0

ND – Not Detected above Laboratory LOR

8.5.3 QA/QC Comments

Laboratory QA/QC on all samples analysed included calculation of %RPD, matrix spike recovery and blank determinations. All matrix spike recovery and blank determinations were within acceptable limits. Therefore, it is considered that sampling techniques and transportation of samples were appropriate.

An intra-laboratory duplicate rate of 7.2% was achieved, less than the 10% required by the Field Quality Plan. An inter-laboratory duplicate rate of 1.2% was achieved, less than the 5% required by the Field Quality Plan. Laboratory Duplicates are tested to ensure the results meet the requirements of QA/QC.

Exceedances of the %RPD criteria were reported for inter laboratory duplicate pairs CA02-1/CA02-1A (Chromium and copper) and S1/S1A (lead). Based on the majority of duplicate pairs reporting acceptable %RPDs, the reported concentrations being below the adopted validation criteria and the effect of confidence intervals on low concentrations, the consultant did not consider the results to diminish the confidence in the sampling technique and laboratory results.

Further, the consultant stated that the duplicate results and reduced duplicate rate did not detract from the validity of the data because:

- The validation results were extracted from site wide validation sampling where previous duplication requirements had been achieved;
- Soil results were compliant with the HILs; and
- Soils were homogenous and results were relatively consistent, frequently reporting duplicated soil concentrations.

8.6 Additional Site Assessment

With reference to the DQOs for the validation the consultant set out to determine, from a contamination point of view, if the land is suitable to be developed for a residential land use.

To achieve this, the consultant conducted a number of additional investigations at specific locations, materials or areas within the Southern Wetlands Dedication Area for a range of possible contaminants of soil based on the past history.

Those works were as follows:

- Amgrow Interim Validation Report;
- East Cell Tailings Interim Validation Report;
- Gemhawke Compound Validation;
- Leaky Dam Interim Validation Report;
- Riverbank Validation;
- SGS Compound 1 Validation;
- SGS Compound 2 Validation;
- Purcell's Lane Asphalt Clearance;
- Lee's Cottage Remediation;
- Upper Castlereagh School Inspection; and
- Asbestos pipe removal areas.

The additional works were reported in several sub-reports to the DLA Environmental final validation report for the Southern Wetlands Dedication Area.

The remaining areas of environmental concern within the Southern Wetlands dedication area, being the Residual Material Consolidation Area and Holcim Area, were the subject of a separate validation report and sign-off by a previous Site Auditor and are discussed further in Section 8.7.

In summary the additional works reported the following:

OSM Stockpile Assessment

The additional assessment found that the mulch material demonstrated slightly elevated concentrations of TRH. The TRH levels were linked to naturally occurring eucalyptus oils

within the OSM material and not indicative of petroleum contamination and did not exceed the site criteria. All other potential chemical contamination complied within the relevant site acceptance criteria.

Former Gemhawke Compound

DLA Environmental conducted assessment and validation works in the former Gemhawke Compound which was formally utilised for onsite parking or water carts and short-term maintenance and oil storage for quarry vehicles.

Elevated concentrations of TPH were identified at some locations and a total of 45m³ of soils were identified as requiring remediation. This material was isolated from the validation area and the remaining footprint of the compound was deemed to have met the acceptance criteria.

The isolated material was remediated by landfarming and subsequently validated.

Contamination Investigation at Leaky Dam Holcim East

DLA Environmental undertook an investigation of the Leaky Dam/Holcim East site which previously contained a screening and crushing facility. As a result of screening and crushing operations, tailings ponds were created to handle slurry waste products. When the quarry and concrete plant ceased operations, the tailing ponds and adjoining areas were filled with a range of materials.

A total of 38 test pits were excavated within the Site to assess the extent of buried waste materials. The study area covered approximately 11.7 ha. The investigation identified four areas of environmental concern, being:

- Wetland Corner (Eastern)
- Topsoil Stockpile (Central)
- Leaky Dam (Southern)
- Holcim Area (Northwest)

Waste materials were identified, screening and removed and samples were collected from the residual soil underlying the stockpiles to ensure it met the end use criteria.

Samples were analysed for TRH, BTEX, OCP, OPP, PAHs, PCBs and metals. Organic contaminants were not detected above the laboratory LOR and metals concentrations were considered indicative of natural background conditions.

Southern Wetlands Riverbank Validation

DLA Environmental conducted validation of the riverbank within the Southern Wetlands Dedication boundary to assess its suitability for open space use.

The works comprised a range of visual inspections, air monitoring, footprint assessments and chemical analysis at identified locations containing rubbish along the surface of the riverbank.

Following the disposal of 225 tonnes of material offsite and remediation of the remaining material, 18 samples were collected for chemical analysis and 24 soil samples were collected for asbestos analysis to validate the riverbank footprint.

The consultant concluded that the Southern Wetlands riverbank site had been successfully remediated and deemed suitable for the future intended land use as open space.

Former Shepherd Group Services (SGS) Compound 1

DLA Environmental conducted an assessment of the former SGS Compound, formally utilised for on-site parking of graders trucks and the short-term maintenance of quarry vehicles.

The purpose of the assessment was to determine if the site met the requirements for open space land use following the decommissioning and removal of contamination associated with the past use of the compound.

Soil sampling was conducted following the removal of impacted soils, concrete slabs, asphalt road/parking areas and completion of general demolition works.

A total of twenty-six (26) targeted surface soils (0.1m) were sampled from the parking areas, building/hardstand footprints, carpark footprint and generally across the remainder of the Site. All samples were analysed for BTEX, TRH, PAH and heavy metals.

Concentrations of TRH were reported either below the laboratory limit of reporting or below the validation criteria.

There were no detections of BTEX compounds or volatile vTRH above the laboratory LOR within the former SGS Compound 1.

The consultant concluded that the surface material was suitable for reuse within the Penrith Lakes Scheme in areas designated for Open Space Land Use.

Former Shepherd Group Services (SGS) Compound 2

DLA Environmental conducted a Land Use Suitability Assessment of the SGS Hardstand area within the Southern Wetlands Validation Boundary and referred to a SGS Compound 2. The Site is to north of the Lee's Cottage remediation area and occupies an area of approximately 2.7ha. The temporary facility was used for on-site parking, refuelling of heavy machinery, site office, amenities and general storage.

Visual inspection of the area did not identify any odours or indications of potential contamination.

Soil samples were collected at 11 targeted locations, including the refuelling area, minor grease/oil staining within the general access area, heavy vehicle parking area, light vehicle parking area and work areas.

All samples were analysed for BTEX, TRH, PAH and heavy metals and selected samples were also analysed for OC/OP Pesticides and PCBs. All samples reported concentrations below the laboratory LOR or the site assessment criteria for residential land use with accessible soil.

Asphalt Clearance for Purcell's Lane

DLA Environmental conducted visual inspections and validation of asphalt removal at Purcell's Lane. The laneway extends approximately 500m in an east-to-west direction off Old Castlereagh Road.

Following removal of the asphalt road surface, DLA inspected the area and identified traces of remnant asphalt on the surface of

Purcell's Lane West. Re-scraping was conducted and the surface was subsequently observed to be free of visible asphalt materials. All excavated asphalt and associated soils were consolidated and relocated to the Roadbase Stockpiles within the onsite Residual Material Containment Area.

DLA Environmental completed final clearance inspections and validation sampling was conducted to confirm the absence of visible asphalt materials. Validation samples reported negligible concentrations of PAH compounds and complied with the site assessment criteria.

The consultant concluded that Purcell's Lane had been successfully remediated and validated and was deemed suitable for the future intended land use that is consistent with residential with garden / accessible soil and / or public open space in accordance with the NEPM 2013.

Asbestos Clearance Certification – Lee's Cottage

DLA Environmental Services undertook visual asbestos clearance and supervision of remediation work for the removal of ACM identified across the Lee's Cottage footprint.

A total 70 tonne of material was relocated to the onsite Residual Material Consolidation Area on the Site for further land use assessment and 42 tonne of material was disposed of offsite.

Following remediation works, visual inspections found no evidence of asbestos remaining within the Lee's Cottage area. The consultant concluded that Lee's Cottage has been remediated in a safe and effective manner and normal activities are no longer impeded by the presence of identifiable asbestos containing materials.

Soil Inspection – Upper Castlereagh School

DLA Environmental conducted a visual assessment of soil type in the Upper Castlereagh School area comprising the inspection of five (5) locations along the western area of the Old Castlereagh Road known as the Upper Castlereagh School.

The soils were excavated by hand using a mattock to a depth of 400mm. The soils type was noted at surface and depth.

At all locations inspected the soils were consistent with the appearance and texture of overburden materials at both surface and depth. The soils in the areas comprised reddish orange silty/clay sands. The surface vegetation cover was thinly spread and not typical of topsoil vegetation cover elsewhere within Penrith Lakes.

Asbestos Clearance for Pipework Removal

Approximately 270 meters of Asbestos pipe was identified within the Southern Wetlands Dedication area during earthworks and remediation activities. DLA Environmental conducted clearance certifications for the asbestos pipe removal. The sites where asbestos pipes were identified, removed and certified include:

- SGS Compound Pipe Clearance
- Purcell's Lane Asbestos Clearance
- Birdseye Corner/Purcell's Lane
- Former Readymix Site

- Sheers Lane

The location of the pipes is identified in the figure provided in **Appendix G**.

8.7 Holcim Validation

The Site Auditor has reviewed documentation prepared by the former Site Auditor (Mr Graeme Nyland) and the consultant relating to the assessment, remediation and validation of the the Penrith Quarry area within the Southern Wetlands Dedication Area formally occupied by Holcim.

A Site Audit Report or Site Audit Statement was not prepared for the Holcim area, however the former Site Auditor did present his findings from review of relevant documentation in several Interim Advice letters. The conclusions reached by the former Site Auditor in relation to individual areas within the Holcim Area is summarised below.

- Areas 1A and 1B - The former Site Auditor reviewed the contamination and validation assessments for Areas 1A and 1B within the Penrith Quarry site to provide an independent review of the suitability of the soil from Areas 1A and 1B to be used elsewhere within the PLDC site, with no restrictions on future usage.

The Auditor agreed with the consultants conclusions that “overburden” material within Areas 1A and 1B was acceptable for use elsewhere in the PLDC site for a variety of land uses including “residential with gardens and accessible soil”, provided appropriate supervision, screening and materials tracking is in place to exclude hydrocarbon- or asbestos-impacted material, and remove any building rubble, concrete or metal wastes prior to reuse.

One outstanding item was that removal of asbestos-containing building materials from P1 control rooms (AEC 1N) and contamination investigations were required in this area when the facility was demolished and operations ceased.

- AEC 1N – The former Site Auditor reviewed the assessment and validation report (Douglas Partners, April 2011) for the area AEC 1N (within Area 1B). The objective was to provide an independent review of the suitability of the soil from AEC 1N within Area 1B to be used anywhere within the PLDC site, with no restrictions on future usage.

The Auditor concluded that “overburden” material within AEC 1N of the Holcim Penrith Quarry was acceptable for use elsewhere in the PLDC site for a variety of land uses including “residential with gardens and accessible soil”, provided appropriate supervision, screening and materials tracking is in place to exclude hydrocarbon- or asbestos-impacted material, and remove any building rubble, concrete or metal wastes prior to reuse.

- Area 4A – The former Site Auditor reviewed several assessment and validation reports which covered the areas of concern within Area 4A with the objective to provide an independent review of the suitability of the soil from Area 4A within to be used anywhere within the PLDC site, with no restrictions on future usage.

The Site Auditor concluded that the anthropogenic materials observed within the fill in Area 4A were not a significant aesthetic issue requiring remediation. Further, it

was concluded by the Auditor that “overburden” material within Area 4A of the Holcim Penrith Quarry was acceptable for use elsewhere in the PLDC site for a variety of land uses including “residential with gardens and accessible soil”, provided appropriate supervision, screening and materials tracking is in place to exclude hydrocarbon- or asbestos-impacted material, and remove any building rubble, concrete or metal wastes prior to reuse.

- Area 2A (South) - The former Site Auditor reviewed relevant reports and prepared an Interim Advice letter with the objective to provide an independent review of the contamination assessment, remediation and validation to be able to conclude the suitability of the soil (overburden) from Area 2A (south) to be used within recreational open space areas within the PLDC site.

The Site Auditor agreed with the consultants conclusions that based on the results, the overburden within defined Area 2A (south) was suitable for reuse as fill within recreational areas of the PLDC site.

- Area 2A (North) - The former Site Auditor reviewed relevant reports and prepared an Interim Advice letter with the objective to provide an independent review of the contamination assessment, remediation and validation to be able to conclude the suitability of the soil (overburden) from Area 2A (north) to be used within recreational open space areas within the PLDC site.

The Site Auditor agreed with the consultants conclusions that based on the results, the overburden within defined Area 2A (north) was suitable for reuse as fill within recreational areas of the PLDC site, with the exception of material within the embargo zone in Area 2C.

- Stage 3 (Area 3) – The former Site Auditor reviewed relevant reports and prepared an interim advice letter with the objective to conclude the suitability of the Stage 3 site for recreational open space land use.

The Auditor agreed with the consultant’s conclusions that based on the site observations and analytical results, the Stage 3 (Area 3) site was compatible with a recreational/ open space land use.

The unexpected finds protocol provided was considered appropriate for the management of asbestos materials or stained or odorous soils encountered during development. It was noted that anthropogenic waste materials (concrete, charcoal) was present within the bund materials and would need to be managed appropriately based on the intended future location of the bund materials, however, retention onsite for recreational usage was considered acceptable.

The Site Auditor has undertaken a summary review of documentation that was the subject of the Interim Advice Letters and is satisfied that the conclusions reached by the former Site Auditor have been substantiated.

8.8 Consultant Interpretation of Validation Results

The consultant concluded that the analytes assessed; BTEX fractions, vTRH, OC and OP pesticides were not detected above the LOR in any sample from the site. Analytical results for PCBs, PAH and TRH reported concentrations were less than the Site Acceptance Criteria based on the NEPM 2013 Residential A HILs. Previous investigation of TRH concentrations identified associated with the OSM stockpiles have indicated that the TRH concentrations were sourced from naturally occurring eucalyptus oils within the OSM material.

Analysis for heavy metals reported one sample that exceeded the site assessment criteria of 300 mg/kg for lead (310 mg/kg). However the reported concentration was less than 250% of the HIL, the 95% upper confidence limit complied with the HIL criteria and the standard deviation was less than half the HIL criteria. As such, the consultant considered the lead result complied with the acceptance criteria. All other heavy metals concentrations were below the site acceptance criteria.

8.9 Consultant's Conclusions

The consultant (NEPC, 1999, Amended 2013) concluded that the sampling regime and subsequent validation and reporting of the site is considered to be adequate to determine the future land use suitability of the subject site in accordance with NSW EPA Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites (NSW OEH, 2011). No evidence can be found to infer chemical contamination by petroleum hydrocarbons, PAH, pesticides, PCBs or heavy metals at the site. Chemical validation of surface and subsurface soils complies with the NEPM 2013 Residential criteria with access to soil.

The site is suitable with regards to off-specification mulch related asbestos contamination. All samples recorded concentrations of asbestos below the NEPM Residential criteria.

On this basis the consultant concluded that the site validation objectives had been achieved in accordance with NSW EPA guidelines and made the final statement that all chemical and asbestos validation samples collected from the Southern Wetlands Dedication Area of the Penrith Lakes Scheme were compliant with the NEPM 2013 Residential A criteria and as such the site was considered suitable for the intended land use as an urban residential area.

9 Audit Evaluation of Remedial Validation Reporting

The following sections provide discussion of the Site Audit findings of the remediation and validation works reported.

9.1.1 Remediation and Validation Work Program

The remediation work program, as documented in the off specification organics management plan (DLA Environmental, December 2011) and addendum (DLA Environmental, February 2014) and as described in the final remedial validation report prepared by DLA Environmental (DLA Environmental, January 2016) is considered appropriate for the site and the proposed land use.

The remediation works and validation samples did not locate any asbestos in the form of ACM above the site criterion, and as such would not be at levels that would be considered to present a health risk. In addition there was no evidence of other potential contaminants on the site identified in the preliminary assessment by Coffey Geosciences (Coffey Geosciences, June 2001), however the additional validation work conducted by the consultant has provided confirmation of this.

It is therefore appropriate to conclude that remediation works and validation sampling has demonstrated that the site is suitable for the proposed land uses.

9.1.2 Validation Data Quality Assurance and Quality Control

A QA/QC program is implemented to provide data of an appropriate quality and validity to meet the objectives. The program consisted of field QA/QC measures and laboratory QA/QC procedures.

The QA/QC undertaken during the soil sampling has been reviewed and summarised in the table below with reference to the parameters of precision, accuracy, representativeness, comparability and completeness (the PARCC parameters).

Table 9-1 Validation QA/QC Summary

Quality Indicator	Frequency & Acceptable Quality Parameter	Auditor Review of Quality Parameter Acceptance
Precision		
Intra-laboratory duplicates	Greater than 10% for COPC analytes Results <30-50% RPD	No*
Inter-laboratory duplicates	Greater than 5% for COPC analytes Results <30-50% RPD	No*
Laboratory duplicates	As per NEPM laboratory standards	Acceptable
Accuracy		
Matrix spikes	70-130%	Acceptable
Certified reference material or Laboratory Control Sample	70-130%	Acceptable
Surrogate Spikes	70-130%	Acceptable
Representativeness		
Sampling appropriate for media and analytes	As per NEPM and AS 4482.1	Yes

Quality Indicator	Frequency & Acceptable Quality Parameter	Auditor Review of Quality Parameter Acceptance
Rinsate blanks	Nil collected by consultant	Acceptable, disposable sampling equipment utilized
Trip spikes/trip blanks	Collected irregularly throughout the validation works	Yes
Laboratory blanks	1 per 20 or 1 per batch <LOR	<LOR – Yes
Samples extracted and analysed within holding times.	Extracted within holding times	Yes
Comparability		
Standard operating procedures used for sample collection and handling	Suitable description of sampling procedures	Yes
Standard analytical methods used for all analyses	Analytical methods are referenced and NATA Accredited	Yes
Consistent field conditions, sampling staff and laboratory analysis	Consistent field work team, single primary laboratory used	Yes
Limits of reporting appropriate and consistent	Reporting limits less than the appropriate site criteria	Yes
Completeness		
Appropriate and complete COC documentation	Supplied in report	Yes
Satisfactory frequency and result for QC samples	As per NEPM and AS 4482.1	Yes
Data from critical samples is considered valid	COC	Yes

Table Notes: * specifically discussed in Auditor comments

The QA/QC program implemented by the consultant generally demonstrated sufficient assessment of the data quality in regard to the PARCC parameters. Despite inadequate numbers of intra- and inter- laboratory samples being collected, when considered in the context of the site wide validation program, the duplicate requirements have been achieved and were found to adequately comply with the requirements outlined in relevant guidelines (NEPC, 1999, Amended 2013) (NSW DEC, 2006).

9.1.3 Site Validation Criteria

The Site remediation validation criteria has been derived from sources approved by the NSW DECCW under s.105 of the *Contaminated Land Management Act 1997*, and are considered appropriate for the protection of human health and the environment at the Site with consideration to the Site land use. Site-specific Ecological Investigation Levels (EILs) were not used in the assessment of results. Whilst the consultant did not present a reason for not applying EILs for metals it is the opinion of the Site Auditor that this omission should not limit the use of the site in an urban context. Metals concentrations were found to be generally low and representative of natural background concentrations.

9.1.4 Validation Results

The consultant discussed the results and provided tables that adequately presented the analytical results from the laboratory reports. The reported concentrations of contaminants by the consultant were reviewed and found to be consistent with those reported by the laboratory. The laboratory procedures were appropriate for the identified potential contaminants of concern and the adopted site remediation criteria against which the results were compared.

The conclusions reached by the consultant in relation to the validation of the remediation conducted and required in order to render the site suitable for the proposed land use (i.e., residential with access to soils) are considered appropriate.

10 Evaluation of Site Land Use Suitability

The NSW DEC (2006) *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition)* prescribe that during an assessment of the suitability of a site for an existing or proposed land use in an urban context, site auditors must follow the decision process and checklist for assessing urban redevelopment sites (page 50-51) of the Site Audit Guidelines (NSW DEC, 2006).

For the purposes of this Site Audit the objective is to determine whether the Site **is suitable residential land use with access to soil** as the more sensitive of the proposed land uses.

The findings of the Site Audit are presented for each requirement of the decision process:

All site assessment, remediation and validation reports follow NSW EPA (1997) Contaminated sites: Guidelines for consultants reporting on contaminated sites.

The documents provided by the consultant meet the requirements of the Site Audit in relation to the Guidelines for consultants reporting on contaminated sites (NSW OEH, 2011).

Any aesthetic issues have been addressed.

No aesthetic issues including odour have been identified and are not likely with consideration to the contaminants at the Site.

Soils have been assessed against the lower of the health-based investigation levels and provisional phytotoxicity-based investigation levels (see columns 2 and 5 in Appendix II)².

Soils were not assessed against the above referenced guidelines in all instances; more recent works (conducted since May 2013) has been compared to guidelines that effectively supersede those referenced. The site criteria used for the validation and assessment in that instance were derived from the NEPM for the assessment of contaminated land (NEPC, 1999, Amended 2013), and are approved by the NSW EPA under s.105 of the *Contaminated Land Management Act 1997*.

Any issues relating to local area background soil concentrations that exceed appropriate site soil criteria have been adequately addressed in the site assessments report(s).

No local background soil concentrations above the appropriate criteria were identified as an issue.

All impacts of chemical mixtures have been assessed.

No issues relating to chemical mixtures in relation to the identified contaminants of concern are expected with regard to the potential contaminants of concern.

The site management strategy is appropriate.

It is considered that all contamination has been addressed with the completed remediation and validation works at the Site and further management will not be required.

² Column 5 in Appendix II refers to the provisional phytotoxicity investigation levels presented in the Guidelines for the NSW Site Auditor Scheme (2nd edition) (NSW DEC, 2006)

Due to the potential for the presence of materials containing asbestos in the form of fragments of fibre cement in the soil at the Site and the known identification of a buried asbestos irrigation pipe, it is recommended that an unexpected finds protocol consistent with the objective of the unexpected finds protocol Appendix 1 of the Off Specification Mulch Management Plan (DLA Environmental, December 2011) is maintained in relation to the future management of excavation or earthworks at the Site. This will not form a condition of the Site land use as the suitability of the Site is not contingent on the protocol being followed, however it is appropriate of any Site where Asbestos may be present in Soils.

Any evidence of, or potential for, migration of contaminants from the site has been appropriately addressed and reported to the site owner or occupier.

There is not any evidence of, or considered potential for, off-site migration of contaminants identified at the Site.

The remediation and validation works that have been reviewed as part of this Site Audit are considered to have met the requirements of NSW EPA (2006) *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition)*. Therefore, the Site is considered suitable for residential land use with access to soil.

11 Conclusions

The investigation, remedial planning, remediation, and validation works reported and reviewed are considered to have met the requirements of NSW DEC (2006) *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition)* and other guidelines endorsed under s.105 of the *Contaminated Land Management Act 1997* and the objectives of the Site Audit.

The Site Auditor is satisfied that the remediation and validation works have been appropriately implemented and in conjunction with the investigation works that were previously conducted, considers that the Site is suitable for residential land use with access to soil, including less sensitive land uses such as recreational, park and open space.

In conclusion, a Site Audit Statement will be issued certifying that, in the opinion of the Site Auditor that the Site is suitable for residential land use with access to soil. The site does not include the area identified as the Residual Materials Consolidation Area (RMCA) that is located wholly within the Southern Wetlands Dedication Boundary. This area will be the subject of a separate Site Audit with regard to the suitability of the Site for a particular purpose.

Due to the potential for the presence of materials containing asbestos in the form of fragments of fibre cement in the soil at the Site, it is recommended that an unexpected finds protocol consistent with the objective of the unexpected finds protocol Appendix 1 of the Off Specification Mulch Management Plan (DLA Environmental, December 2011) is maintained in relation to the future management of excavation or earthworks at the Site. This will not form a condition of the Site land use as the suitability of the Site is not contingent on the protocol being followed, however it is appropriate of any Site where asbestos may be present in soils. A copy of the abovementioned protocol is attached in **Appendix H**.

12 Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties. Enviroview Pty Ltd or the Site Auditor accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by the Site Auditor, and should not be relied upon by other parties, who should make their own enquires other than regulatory and planning authorities as required under the *Contaminated Land Management Act 1997* and *State Environmental Planning Policy 55*.

The data used to support the conclusions reached in this report have been obtained by other consultants and have been audited with a reasonable level of scrutiny, care and diligence. 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 analyses selected are based on the information detailed in the Site history. Further chemicals or categories of chemicals may exist at the Site that was 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 report 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, Enviroview Pty Ltd and the Site Auditor reserves the right to review the report in the context of the additional information.

13 References

- ANZECC/NHMRC. (1992). *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites*. Australian and New Zealand Environment and Conservation Council (ANZECC) and the National Health and Medical Research Council (NHMRC).
- ANZECC/ARMCANZ. (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. Australian and New Zealand Environmental Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand.
- Coffey Geosciences. (June 2001). *Preliminary Contamination Assessment Penrith Lakes Scheme Cranebrook, NSW*.
- Department of Urban Affairs and Planning. (1998). *State Environmental Planning Policy No. 55 Managing Land Contamination and Remediation of Land*.
- DLA Environmental. (February 2014). *Addendum–Off-Specification Mulch (OSM) Management Plan. Revision 4.4*.
- DLA Environmental. (January 2016). *Final Validation Report Southern Wetlands Dedication Area Penrith Lakes Scheme. 21 January 2016. DLA Environmental Report Reference DL2591_PJ0653*.
- DLA Environmental. (December 2011). *Off Specification Mulch Management Plan, Penrith Lakes, 89-151 Old Castlereagh Road, Castlereagh, NSW (Revision 6.0 ed.)*.
- DLA Environmental. (December 2011). *Sampling, Analysis and Quality Plan, Validation of Off-Specification Mulched Areas, Penrith Lakes Development Corporation, 85-151 Old Castlereagh Road, Castlereagh, NSW (Revision 4.0 ed.)*.
- EnHealth. (2012). *Environmental Health Risk Assessment: Guidelines for assessing human health risks from environmental hazards*. Department of Health and Ageing and EnHealth Council Commonwealth of Australia.
- JBS Environmental. (April 2011). *Draft Asbestos Assessment Penrith Lakes Development Corporation Limited (PLDC) & Waste Assets Management Corporation (WAMC)*.
- NEHF. (1996). *Composite Sampling*. Adelaide, SA: National Environmental Health Forum South Australian Health Commission.
- NEPC. (1999, Amended 2013). *National Environment Protection (Assessment of Site Contamination) Measure*. National Environment Protection Council.
- NHRMC/NRMMC. (2011). *Australian Drinking Water Guidelines*. National Health and Medical Research Council and Natural Resource Management Ministerial Council.
- NSW Agr. (1996). *Guidelines for the Assessment and Clean Up of Cattle Tick Dip Sites for Residential Purposes*. NSW Agriculture and CMPS&F Environmental.
- NSW DEC. (2005). *Contaminated Sites: Guidelines for Assessing Former Orchards and Market Gardens*.
- NSW DEC. (2007). *Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination*.

-
- NSW DEC. (2006). *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition)* (2nd ed.).
- NSW DECC. (2009). *Contaminated Sites: Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997*.
- NSW DECC. (2008). *Waste Classification Guidelines Part 1 Classifying Waste*. NSW Department of Environment and Climate Change.
- NSW EPA. (1997). *Contaminated Sites: Guidelines for Assessing Banana Plantation Sites*.
- NSW EPA. (1994). *Contaminated Sites: Guidelines for Assessing Service Station Sites*.
- NSW EPA. (1995). *Contaminated Sites: Guidelines for the vertical mixing of soil on former broad-acre agricultural land*.
- NSW EPA. (1995). *Contaminated Sites: Sampling Design Guidelines*.
- NSW EPA. (2014). *Technical Note: Investigation of Service Station Sites*.
- NSW OEH. (2011). *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*.
- Western Australian Department of Health. (2009). *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*.

**Appendix A:
Audit Interim Advice**

18 December 2015

Ref: IA 0301-1319-13-01

Mr Mick O'Brien
Project Director
Penrith Lakes Development Corporation
PO Box 457
CRANEBROOK NSW 2749

(Via email: Mick.O'Brien@pldc.com.au)

Dear Mr O'Brien,

RE: Interim Site Audit Advice – Review of Final Validation Report Southern Wetlands, Penrith Lakes Scheme.

James Davis of Enviroview Pty Ltd has been engaged to provide the services of a NSW EPA Contaminated Land Accredited Site Auditor, to conduct a Site Audit in relation to the land within the Penrith Lakes Scheme, Castlereagh NSW.

The purpose of this interim advice is to provide comments from the Site Auditor with regard to the site audit objectives and the review of the Southern Wetlands Final Validation Report prepared by DLA Environmental of the abovementioned Site that are required to be addressed before the Site Audit can be finalised

This interim advice does not constitute a Site Audit Statement or a Site Audit Report, but is provided to assist in the 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. A Site Audit Report and Site Audit Statement will be prepared at the conclusion of the site audit.

Site Auditor comments from the review of the Final Validation Report.

1. Section 3.10/Appendix N: Please provide the Purcell's Lane Asphalt Validation report. The report included as Appendix N is a repeat of Appendix S and relates to asbestos clearance.
2. Section 4.3: Please revise this section to include the appropriate criteria. Reference is made in the text to the criteria being applicable for Residential with garden/accessible soils (HIL/HSL A), however the criteria provided in the tables relates to Residential with minimal opportunities for soil access (HIL/HSL B). Please correct and ensure the data summary tables and discussion relate to the appropriate criteria.

3. Figure 3. Based on the plans provided in the Amgrove IVR (Appendix D), the outline of Area of Environmental Concern #7 for the Amgrove IVR does not appear to encompass the area of investigation. Please review and amend if appropriate.
4. Please provide the Site Audit Report which relates to the Holcim Area, previously prepared by the former Site Auditor.

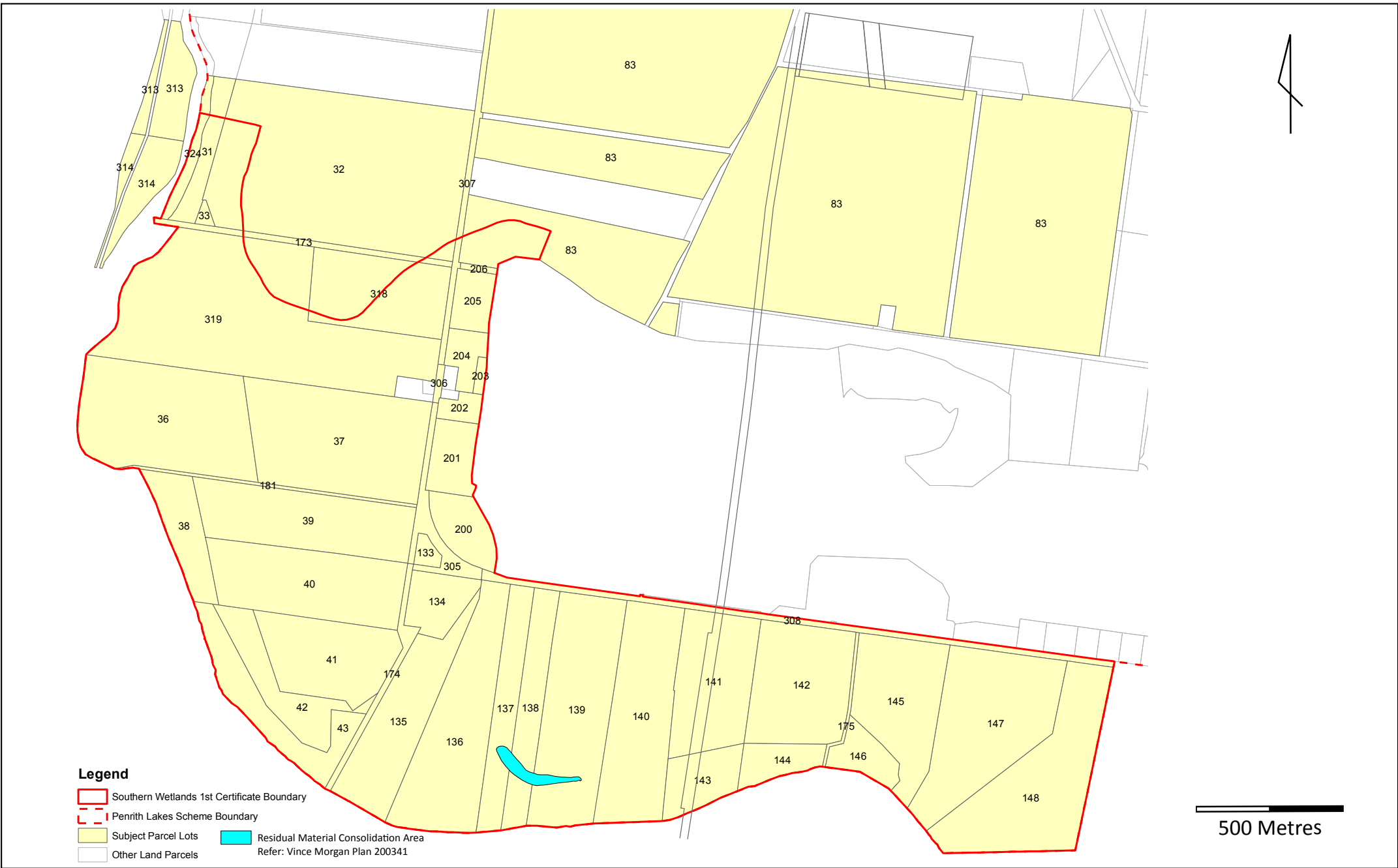
Thank you for your time in regard to this matter. If you require additional information or clarification, please do not hesitate to contact me.

Yours sincerely



James Davis
NSW EPA Contaminated Land Site Auditor
Enviroview Pty Ltd

**Appendix B:
Site Plans**



Legend

- Southern Wetlands 1st Certificate Boundary
- Penrith Lakes Scheme Boundary
- Subject Parcel Lots
- Residual Material Consolidation Area
Refer: Vince Morgan Plan 200341
- Other Land Parcels



Site Audit Site - Site Audit Statement 0301-1319-13
 Southern Wetlands Dedication Area Penrith Lakes Scheme

Date: 19 February 2016
 Drawn By: JRAD
 Checked: JRAD
 ENVIROVIEW PTY LTD



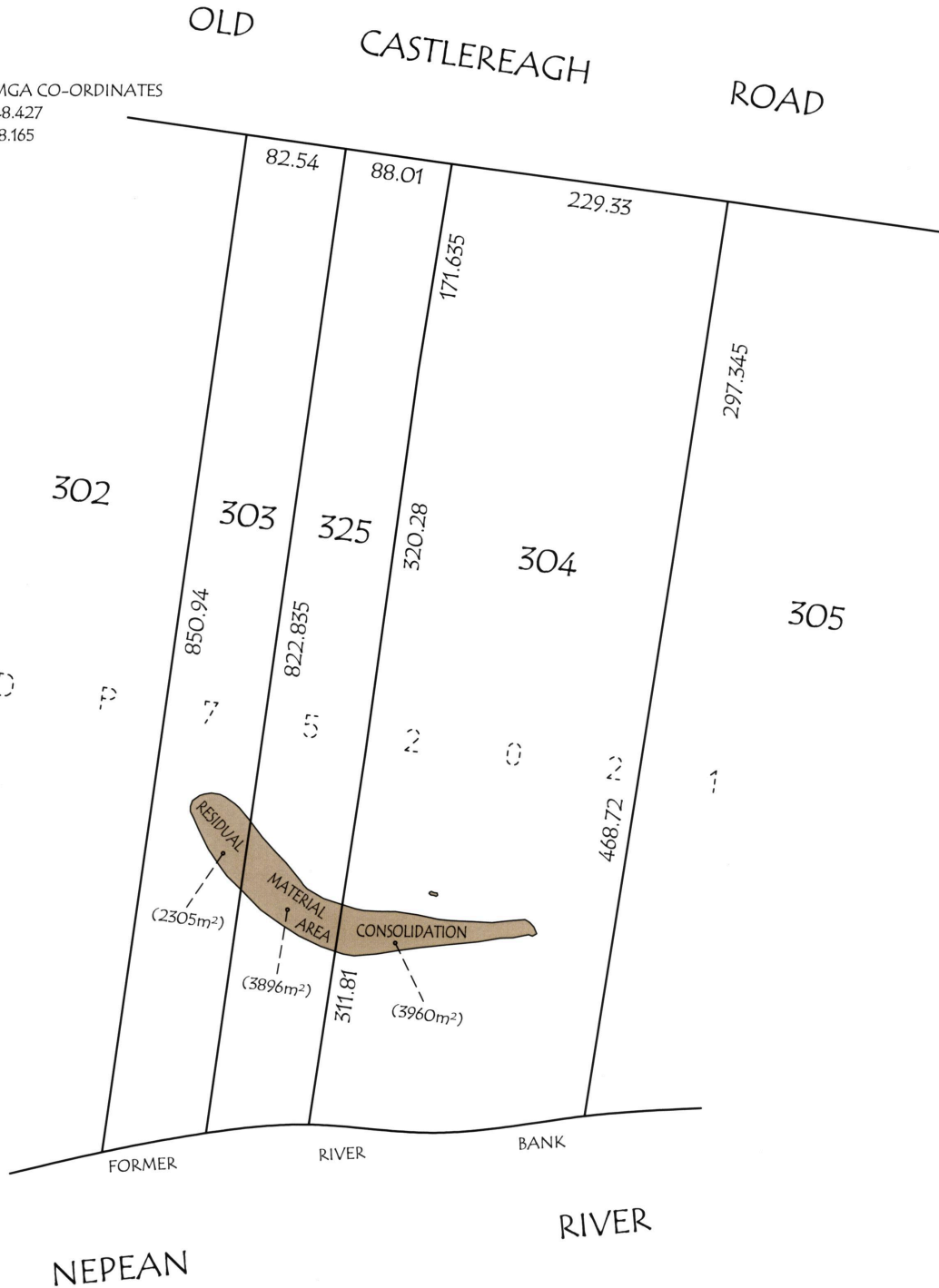
COPYRIGHT © VINCE MORGAN SURVEYORS

NO PART OF THIS DRAWING MAY BE REPRODUCED, COMMUNICATED, STORED IN A RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM, WITHOUT THE WRITTEN PERMISSION OF THE COPYRIGHT OWNER EXCEPT AS PERMITTED BY THE COPYRIGHT ACT 1968.

ANY PERMITTED DOWNLOADING, ELECTRONIC STORAGE, DISPLAY, PRINT, COPY, REPRODUCTION, COMMUNICATION OF THIS DRAWING SHOULD CONTAIN NO ALTERATION OR ADDITION TO THE ORIGINAL DRAWING.

THIS NOTICE MUST NOT BE ERASED

PM53833 MGA CO-ORDINATES
E: 283 748.427
N: 6 265 718.165
ORIGIN



P.R.
 PETER ROBERT WARWICK
 Registered Land Surveyor

	Vince Morgan (Surveyors) Pty Ltd 77 UNION ROAD PENRITH PO BOX 4156 PENRITH 2750 Ph 47215295 Fax 47312821 email mail@vmsurvey.com.au www.vincemorgansurveyors.com.au	A.C.N. 065 060 808	DATE: 16.12.15	ORIGIN:	CLIENT: PENRITH LAKES DEVELOPMENT CORPORATION	SKETCH SHOWING LOCATION OF RESIDUAL MATERIAL ON LOTS 303, 304 & 325 D.P.752021 OLD CASTLEREAGH ROAD, PENRITH.	PLAN No. 20034i
			SCALE: 1:4000@A3	FILENAME:			
			DRAWN: MP				
			DATUM: A.H.D.				



Legend
 [Yellow Outline] Southern Wetlands Validation Area

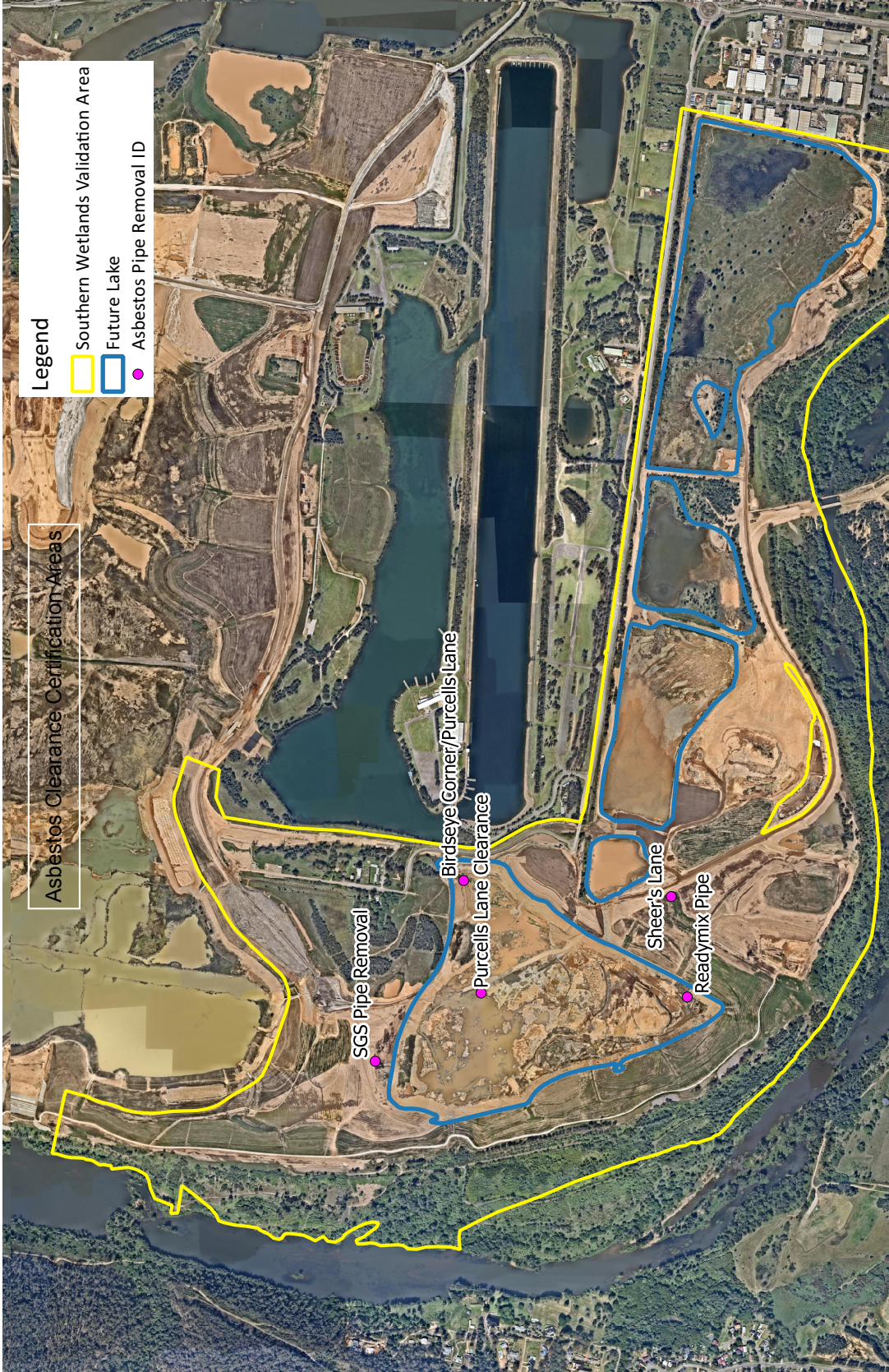
Disclaimer:
 The information contained in this map has been compiled from various sources and may contain errors or omissions. No warranty or representation, expressed or implied, is made with respect to the accuracy of this information or its suitability for any purpose.

0 500 1000 m



Project: DL2591_PJ0644
 Client: Penrith Lakes Development Corporation
 Location: Southern Wetlands Validation Report

Figure: 1
 Date: 15/07/2015
 Compiled: RJ



Asbestos Clearance Certification Areas

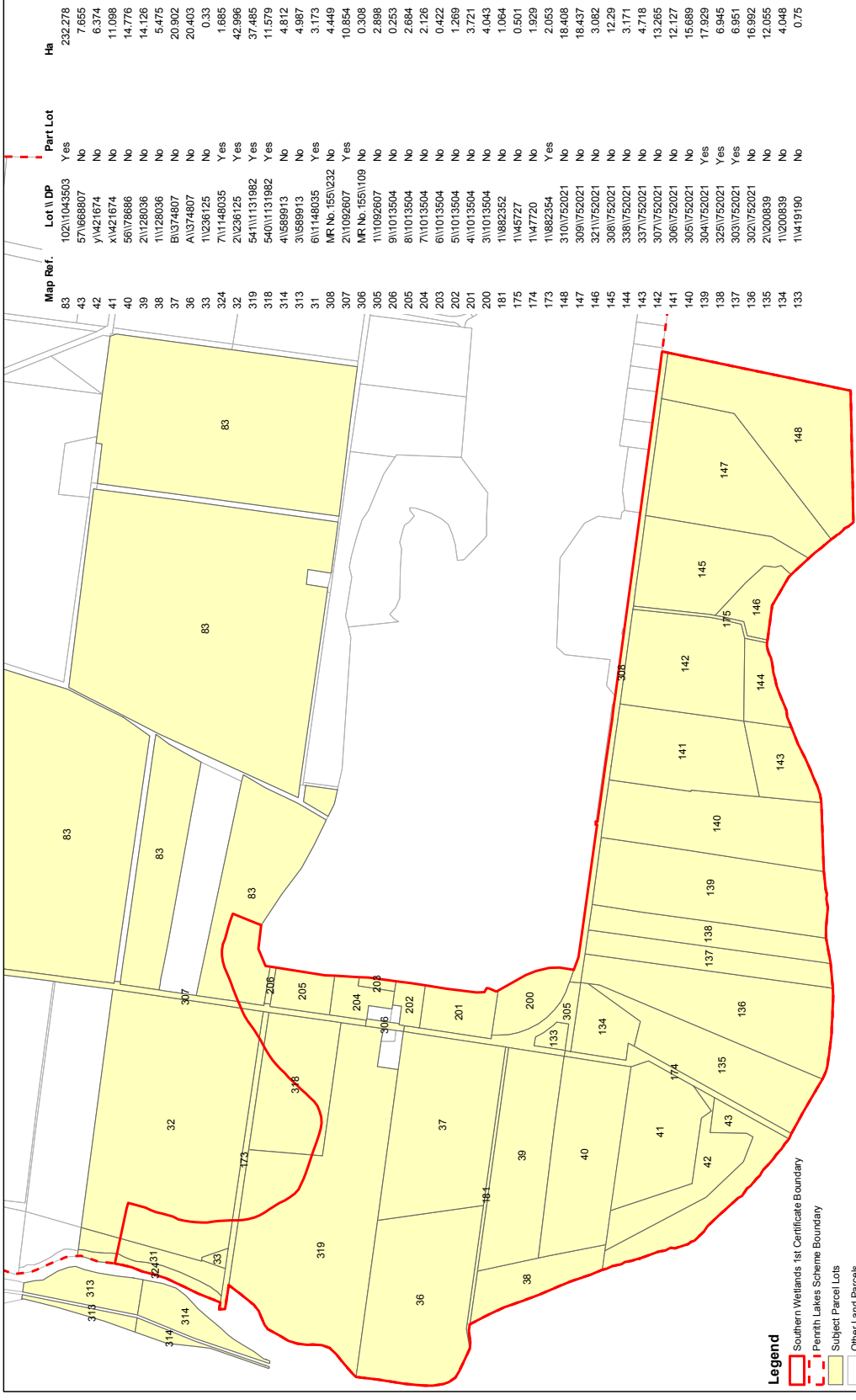
- Legend**
- Southern Wetlands Validation Area
 - Future Lake
 - Asbestos Pipe Removal ID

Disclaimer:
 The information contained in this map has been compiled from various sources and may contain errors or omissions. No warranty or representation, expressed or implied, is made with respect to the accuracy of this information or its suitability for any purpose.

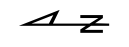


Project: DL2591_PJ0644
 Client: Penrith Lakes Development Corporation
 Location: Southern Wetlands Validation Report

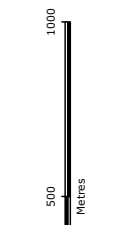
Figure: 4
 Date: 17/11/2015
 Compiled: RJ



Map Ref.	Lot \ DP	Part Lot	Ha
83	102\11043503	Yes	232.278
43	57\168807	No	7.655
42	Y\421674	No	6.374
41	X\421674	No	11.098
40	56\176686	No	14.776
39	2\1129036	No	14.126
38	1\1129036	No	5.475
37	B\374807	No	20.902
36	A\374807	No	20.403
33	1\236125	No	0.33
324	7\1148035	Yes	1.685
32	2\236125	Yes	42.986
319	54\11131982	Yes	37.485
318	54\01131982	Yes	11.579
314	4\569913	No	4.812
313	3\569913	No	4.987
31	6\1148035	Yes	3.173
308	MR No. 165\232	No	4.449
307	2\1092607	Yes	10.854
306	MR No. 165\109	No	0.308
305	1\1092607	No	2.898
206	9\1013504	No	0.253
205	8\1013504	No	2.684
204	7\1013504	No	2.126
203	6\1013504	No	0.422
202	5\1013504	No	1.269
201	4\1013504	No	3.721
200	3\1013504	No	4.043
181	1\882352	No	1.064
175	1\45727	No	0.501
174	1\47720	No	1.929
173	1\882354	Yes	2.053
148	310\1752021	No	18.408
147	309\1752021	No	18.437
146	321\1752021	No	3.082
145	308\1752021	No	12.29
144	338\1752021	No	3.171
143	337\1752021	No	4.718
142	307\1752021	No	13.265
141	306\1752021	No	12.127
140	305\1752021	No	15.689
139	304\1752021	Yes	17.929
138	325\1752021	Yes	6.945
137	303\1752021	Yes	6.951
136	302\1752021	No	16.992
135	2\200839	No	12.055
134	1\200839	No	4.048
133	1\419190	No	0.75



Affected Lands Southern Wetlands First Certificate Extent
 PLDC Ref - 11997
 21 October 2015
 For Legal Review



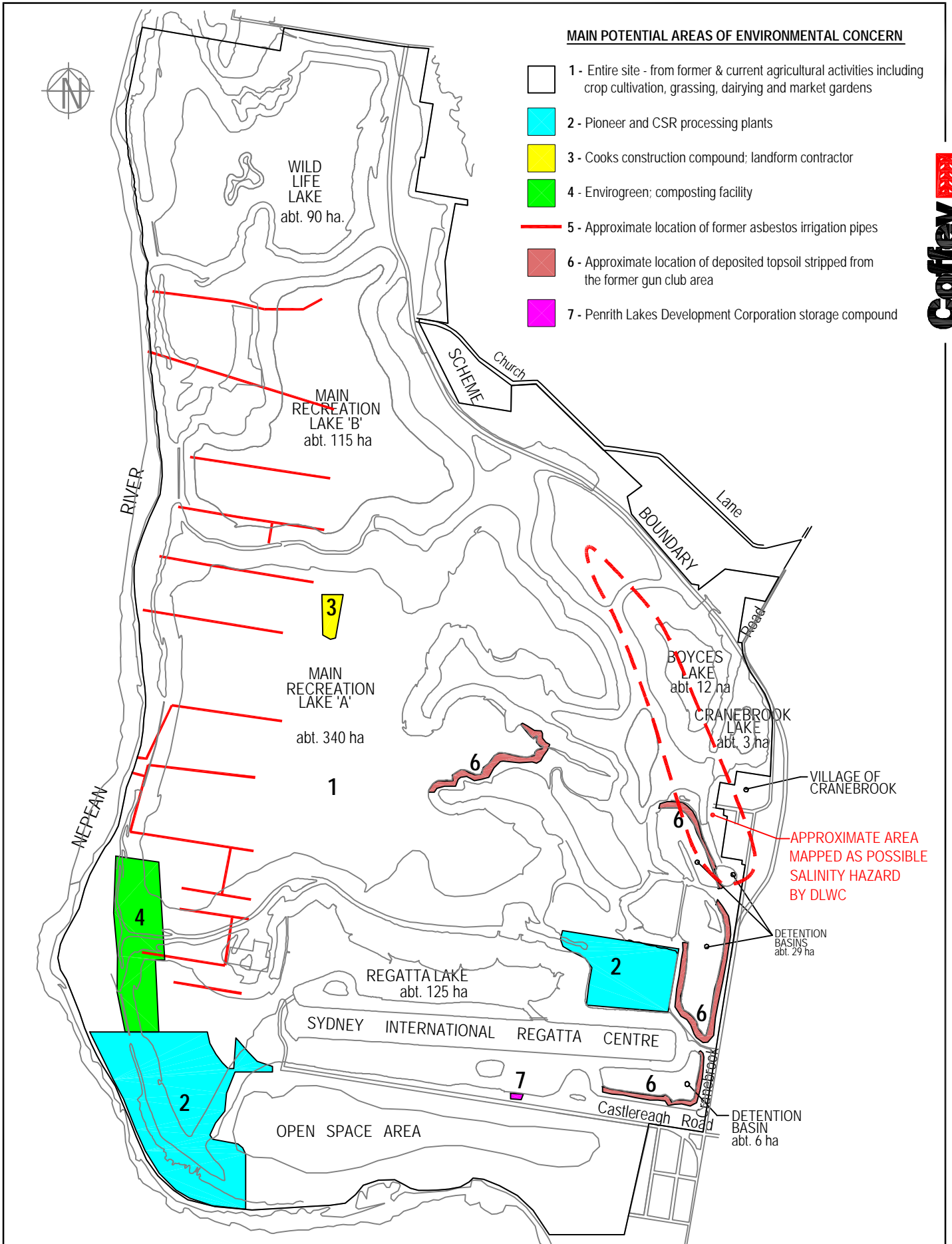
Disclaimer
 The information contained in and by this map has been compiled from various sources and is provided as a guide only. No warranty or representation, expressed or implied, is made with respect to the accuracy of this information or its suitability for any purpose.

- Legend**
- Southern Wetlands 1st Certificate Boundary
 - Penrith Lakes Scheme Boundary
 - Subject Parcel Lots
 - Other Land Parcels

Appendix C:
Coffey Geosciences Plan of Areas of Environmental Concern

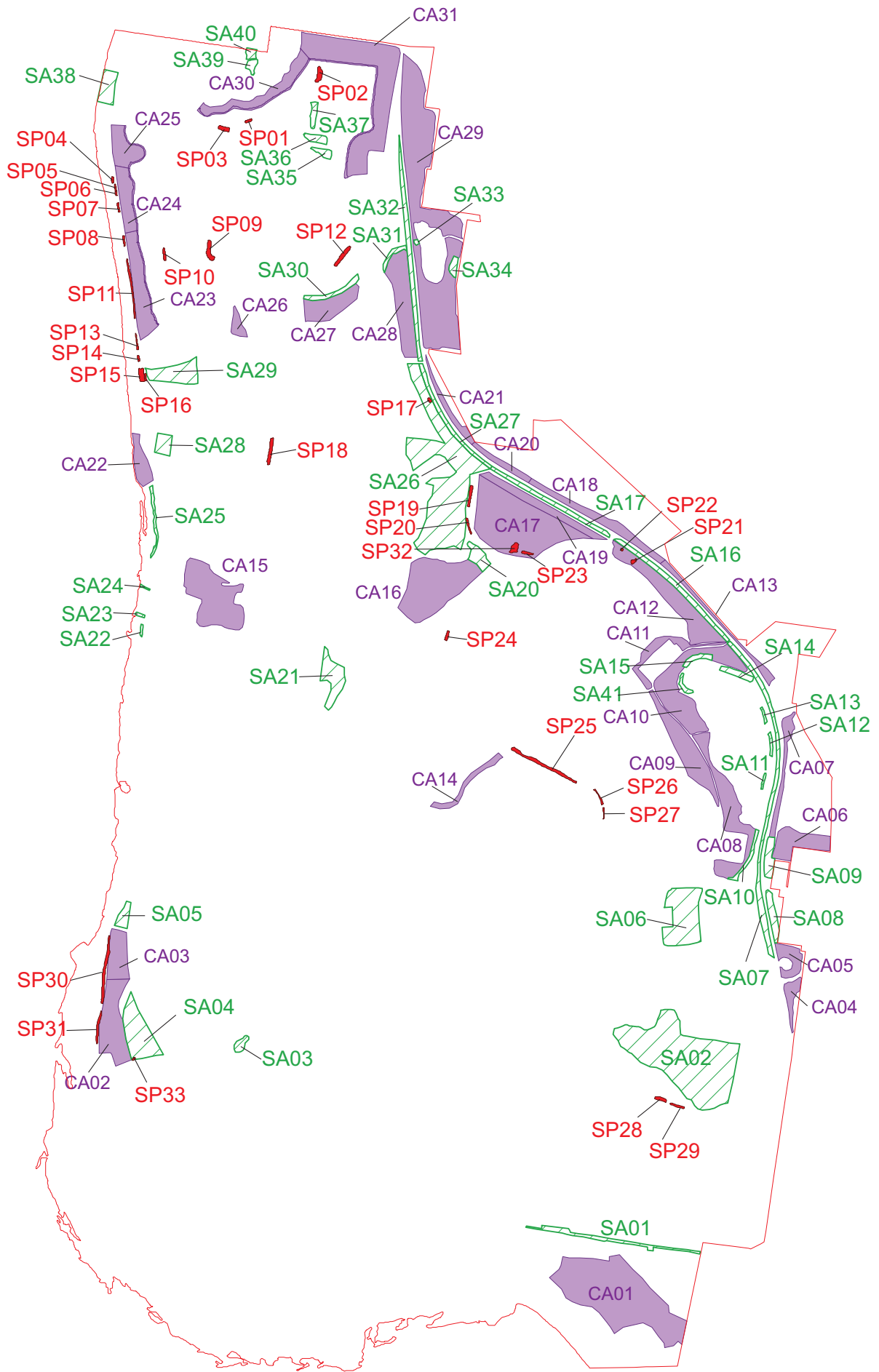
MAIN POTENTIAL AREAS OF ENVIRONMENTAL CONCERN

- 1 - Entire site - from former & current agricultural activities including crop cultivation, grassing, dairying and market gardens
- 2 - Pioneer and CSR processing plants
- 3 - Cooks construction compound; landform contractor
- 4 - Envirogreen; composting facility
- 5 - Approximate location of former asbestos irrigation pipes
- 6 - Approximate location of deposited topsoil stripped from the former gun club area
- 7 - Penrith Lakes Development Corporation storage compound



Coffey Geosciences Pty Ltd		ACN 056 335 516	Geotechnical Resources Environmental Technical Project Management
Drawn	KME/SW	URBAN PACIFIC LTD PENRITH LAKES DEVELOPMENT CRANEBROOK, NSW IDENTIFIED AREAS OF ENVIRONMENTAL CONCERN	
Approved			
Date	1/2/01		
Scale	1:10000 @ A1		
			FIGURE 9 Job no: S20418/7

Appendix D:
JBS Environmental Asbestos Areas



Source : Boundary - SREP11_SchemeBoundary_101006.dwg ; Zones - PDLC_MGA_Zone56 - Compost Stockpiles 101028 / Organic Usage 101117

©2011 JBS Environmental Pty Ltd

0	187.5	375	750
Scale: 1:20,000			
Datum: MGA94 Zone 56		Doc. No. 41511_16823	
A3			
R02	Original Issue	RF	29-03-2011
Rev	Description	Dm.	Date

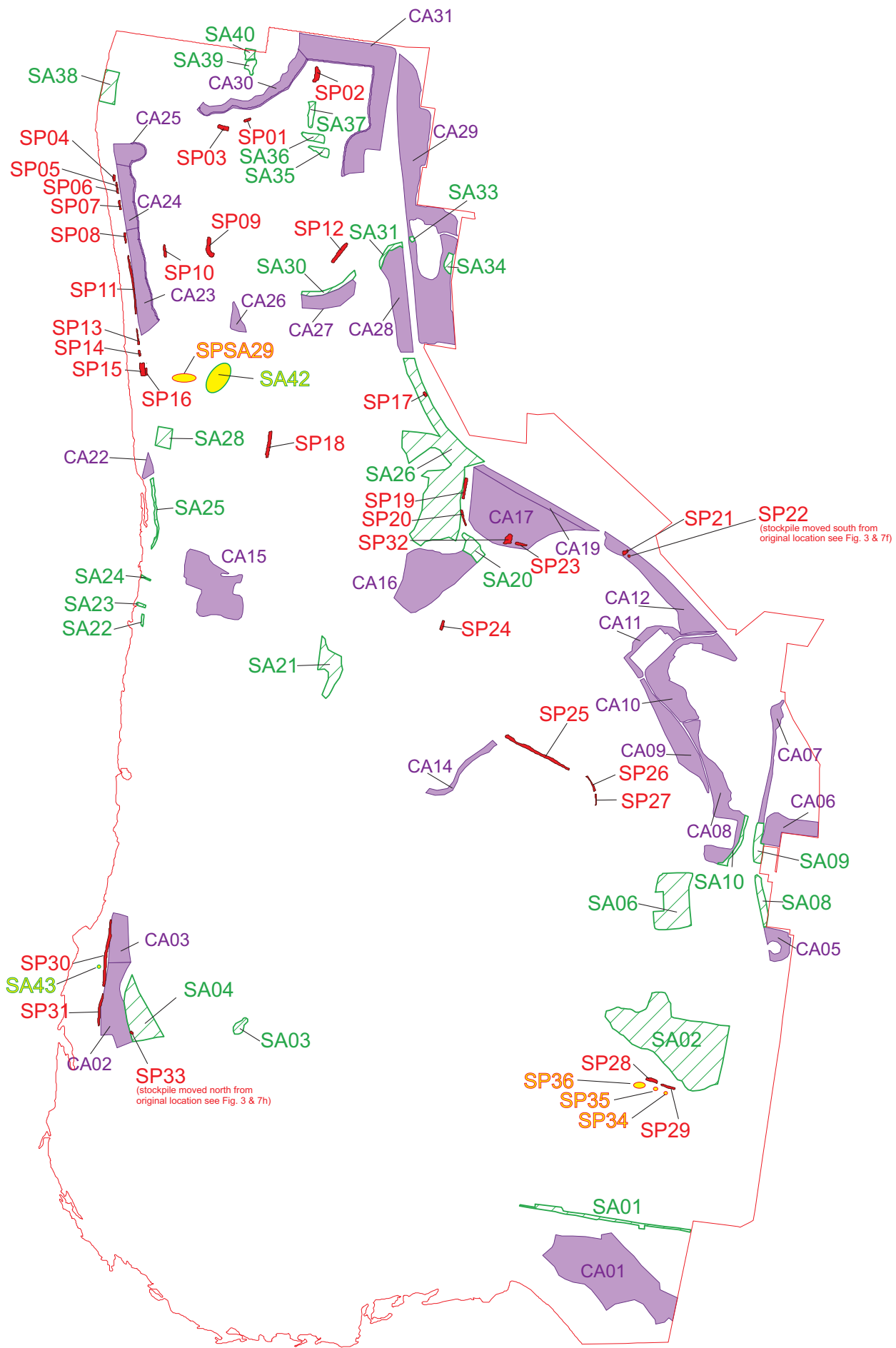
- Legend:**
- Site Boundary
 - Organics Cultivated into Surface (CA)
 - Surface Spread Organics (SA)
 - Compost Stockpiles (SP)



Figure 3: Proposed Zones - Asbestos Assessment

Client: Penrith Lakes
 Project: Asbestos Assessment
 Job No: 41511

File Name: 41511_03.cdr



Source : Boundary - SREP11_SchemeBoundary_101006.dwg ; Zones - PDLC_MGA_Zone56 - Compost Stockpiles 101028 / Organic Usage 101117

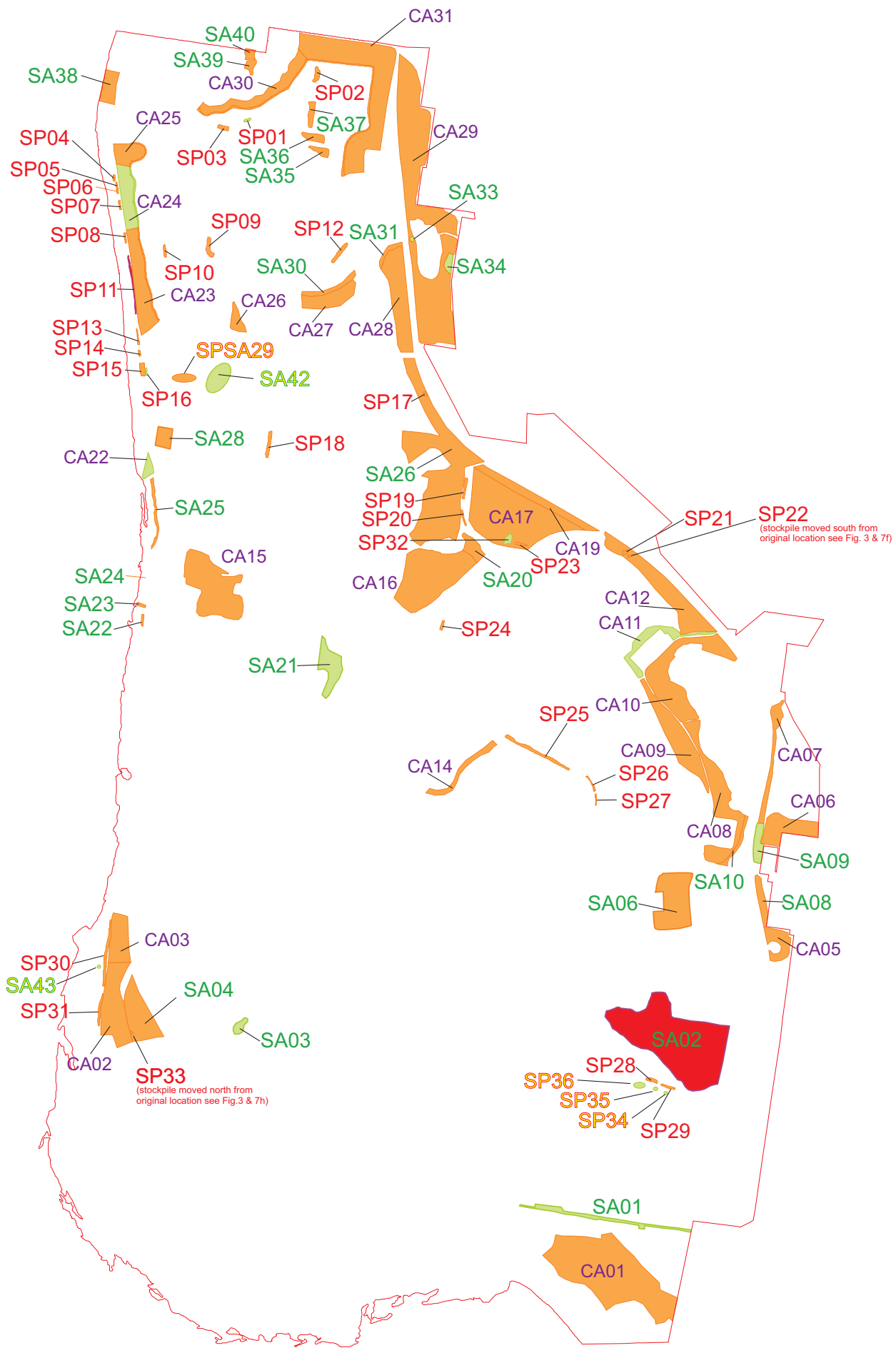
©2011 JBS Environmental Pty Ltd

0	187.5	375	750
Scale: 1:20,000			
Datum: MGA94 Zone 56			
Doc. No. 41511_16823			
A3			
R02	Original Issue	RF	29-03-2011
Rev	Description	Dm.	Date

Legend:			
	Site Boundary		Organics Cultivated into Surface (CA)
	Surface Spread Organics (SA)		Surface Spread Organics - Locations identified during fieldwork
	Compost Stockpiles (SP)		Compost Stockpiles - Locations identified during fieldwork

JBS ENVIRONMENTAL **Figure 4: Investigated Zones - Asbestos Assessment**

Client: Penrith Lakes
Project: Asbestos Assessment
Job No: 41511
File Name: 41511_04.cdr



Source : Boundary - SREP11_SchemeBoundary_101006.dwg ; Zones - PDLC_MGA_Zone56 - Compost Stockpiles 101028 / Organic Usage 101117

©2011 JBS Environmental Pty Ltd

0	187.5	375	750
Scale: 1:20,000			
Datum: MGA94 Zone 56		Doc. No. 41511_16823	
A3			
R02	Original Issue	RF	29-03-2011
	Description	Dm.	Date

Legend:

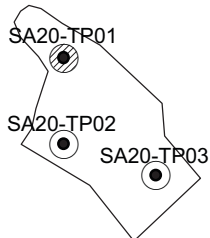
- Site Boundary
- No known asbestos contamination
- ACM fragment contamination
- ACM fibre contamination
- ACM fragment / fibre contamination

Figure 8: Extent of Asbestos Contamination by Classification

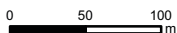
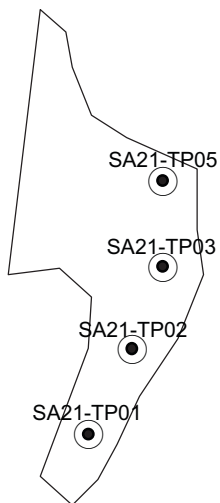
Client: Penrith Lakes	
Project: Asbestos Assessment	
Job No: 41511	File Name: 41511_08.cdr

**Appendix E:
JBS Environmental Test Pit Locations**

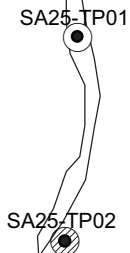
SA20



SA21



SA25



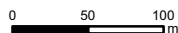
SA24



SA23



SA22



Source: Base Image - PDLC_MGA_Zone 56 - Organic Usage 101117

©2011 JBS Environmental Pty Ltd

0 50 100 200 m			
Scale: 1:5,000			
Datum: MGA94 Zone 56		Doc. No.41511_16823	
A4			
B	Update Format/Notation	RF	20-04-2011
R02	Original Issue	RF	29-03-2011
Rev	Description	Drn.	Date

Legend:

- Surface Spread Area
- Sample Location - No Asbestos Identified
- Sample Location - Asbestos Fragment(s) Identified
- Sample Location - Asbestos Fibre(s) Identified
- Sample Location - Asbestos Fragment(s) and Asbestos Fibre(s) Identified

NOTE: The symbol identifying the sample location and the circle summarising the presence / absence of asbestos around each sampling location are not representative of the actual area (6m x 6m) assessed at each location



Figure 6c: Surface Spread Test Pit Locations - SA20, SA21, SA22, SA23, SA24, SA25

Client: Penrith Lakes

Project: Asbestos Assessment

Job No: 41511

File Name: 41511_06c.cdr



**Appendix F:
JBS Environmental Tables of Results**

41511 - Penrith Lakes Asbestos Assessment

Table B - Asbestos Quantification

Test Pit Information															
ID	Area	Length (m)	Width (m)	Depth (m)	Volume (cu. m)	mass of soil sample	Density	Mass Spoil (kg)	ACM (g)	[ACM] (%w/w)	Fibre bundle identified by lab	No. of ACM fragments	Classification	Size of ACM fragments (cm)	Fill Description
SA06-TP05	SA06	6.00	6.00	0.02	0.72	189	0.38	272.16	7.2	0.0026	-	3	ACM fragment contamination	1.5x1.5x0.5(2), 2.5x2x0.5	Mulch and soil
SA06-TP06	SA06	6.00	6.00	0.02	0.72	286	0.57	411.84	2.1	0.0005	-	1	ACM fragment contamination	3x1.5x0.5	Mulch and soil
SA06-TP07	SA06	6.00	6.00	0.02	0.72	203	0.41	292.32	3.5	0.0012	-	1	ACM fragment contamination	4x1.5x0.5	Mulch and soil
SA06-TP08	SA06	6.00	6.00	0.02	0.72	342	0.68	492.48	13.1	0.0027	-	1	ACM fragment contamination	5x2x0.5	Mulch and soil
SA06-TP09	SA06	6.00	6.00	0.02	0.72	284	0.57	408.96	-	-	-	-	No known asbestos contamination	-	Mulch and soil
SA06-TP10	SA06	6.00	6.00	0.02	0.72	236	0.47	339.84	2.4	0.0007	-	1	ACM fragment contamination	2x1.5x0.5	Mulch and soil
SA06-TP11	SA06	6.00	6.00	0.02	0.72	270	0.54	388.80	0.5	0.0001	Fibres below LOR	2	ACM fragment contamination	Fragments identified in QC soil sample by lab	Mulch and soil
SA06-TP12	SA06	6.00	6.00	0.02	0.72	361	0.72	519.84	12.9	0.0025	-	3	ACM fragment contamination	2.5x2.5x0.5, 4.5x2x0.5, one fragment identified in soils sample by lab	Mulch and soil
SA06-TP13	SA06	6.00	6.00	0.02	0.72	266	0.53	383.04	-	-	-	-	No known asbestos contamination	-	Mulch and soil
SA06-TP14	SA06	6.00	6.00	0.02	0.72	408	0.82	587.52	0.7	0.0001	-	1	ACM fragment contamination	1x1x0.5	Mulch and soil
SA06-TP15	SA06	6.00	6.00	0.02	0.72	278	0.56	400.32	7.7	0.0019	-	2	ACM fragment contamination	3x3x0.5, 2x1.5x0.5	Mulch and soil
SA08-TP01	SA08	6.00	6.00	0.03	1.08	199	0.40	429.84	10.7	0.0025	-	3	ACM fragment contamination	3x2x0.5, 2x1.5x0.5(2)	Mulch and soil
SA08-TP02	SA08	6.00	6.00	0.03	1.08	235	0.47	507.60	1.9	0.0004	-	1	ACM fragment contamination	2x1x0.5	Mulch and soil
SA08-TP03	SA08	6.00	6.00	0.02	0.72	390	0.78	561.60	6.7	0.0012	-	2	ACM fragment contamination	2.5x2.5x0.5, 1.5x1x0.5	Mulch and soil
SA09-TP01	SA09	6.00	6.00	0.02	0.72	382	0.76	550.08	-	-	-	-	No known asbestos contamination	-	Mulch and soil
SA09-TP02	SA09	6.00	6.00	0.03	1.08	461	0.92	995.76	-	-	-	-	No known asbestos contamination	-	Mulch and soil
SA09-TP03	SA09	6.00	6.00	0.01	0.36	298	0.60	214.56	-	-	-	-	No known asbestos contamination	-	Mulch and soil
SA10-TP01	SA10	6.00	6.00	0.02	0.72	314	0.63	452.16	16.9	0.0037	-	2	ACM fragment contamination	5x2.5x0.5, 4x3x0.5	Mulch and soil
SA20-TP01	SA20	6.00	6.00	0.01	0.36	340	0.68	244.80	12.1	0.0049	-	2	ACM fragment contamination	4x1.5x0.5, one fragment found in soil sample by lab	Mulch and soil
SA20-TP02	SA20	6.00	6.00	0.02	0.72	466	0.93	671.04	-	-	-	-	No known asbestos contamination	-	Mulch and soil
SA20-TP03	SA20	6.00	6.00	0.02	0.72	406	0.81	584.64	-	-	-	-	No known asbestos contamination	-	Mulch and soil
SA21-TP01	SA21	6.00	6.00	0.03	1.08	135	0.27	291.60	-	-	-	-	No known asbestos contamination	-	Mulch and soil
SA21-TP02	SA21	6.00	6.00	0.03	1.08	101	0.20	218.16	-	-	-	-	No known asbestos contamination	-	Mulch and soil
SA21-TP03	SA21	6.00	6.00	0.03	1.08	183	0.37	395.28	-	-	-	-	No known asbestos contamination	-	Mulch and soil
SA21-TP05	SA21	6.00	6.00	0.04	1.44	87	0.17	250.56	-	-	-	-	No known asbestos contamination	-	Mulch and soil
SA22-TP01	SA22	6.00	6.00	0.02	0.72	337	0.67	485.28	102.9	0.0212	-	10	ACM fragment contamination	6x3.5x0.5(2), 3x2.5x0.5(3), 2x1.5x0.5(3), 4x2.5x0.5, 4.5x2x0.5	Mulch and soil
SA23-TP01	SA23	6.00	6.00	0.02	0.72	220	0.44	316.80	22.6	0.0071	-	4	ACM fragment contamination	4x3.5x0.5, 2.5x1.5x0.5, 2x1.5x0.5(2)	Mulch and soil
SA24-TP01	SA24	6.00	6.00	0.02	0.72	315	0.63	453.60	12.8	0.0028	-	2	ACM fragment contamination	4x3x0.5, 3x2x0.5	Mulch and soil
SA25-TP01	SA25	6.00	6.00	0.03	1.08	264	0.53	570.24	-	-	-	-	No known asbestos contamination	-	Mulch and soil
SA25-TP02	SA25	6.00	6.00	0.02	0.72	301	0.60	433.44	3.5	0.0008	-	2	ACM fragment contamination	2x1x0.5, 2.5x2x0.2	Mulch and soil
SA26-TP01	SA26	6.00	6.00	0.02	0.72	226	0.45	325.44	8.9	0.0027	-	3	ACM fragment contamination	3x2.5x0.5, 2x1.5x0.5, 1.5x1x0.5	Mulch and soil
SA26-TP02	SA26	6.00	6.00	0.01	0.36	434	0.87	312.48	-	-	-	-	No known asbestos contamination	-	Mulch and soil
SA26-TP03	SA26	6.00	6.00	0.02	0.72	364	0.73	524.16	-	-	-	-	No known asbestos contamination	-	Mulch and soil
SA26-TP04	SA26	6.00	6.00	0.02	0.72	282	0.56	406.08	1.5	0.0004	-	1	ACM fragment contamination	1.5x1x0.5	Mulch and soil
SA26-TP05	SA26	6.00	6.00	0.01	0.36	179	0.36	128.88	-	-	-	-	No known asbestos contamination	-	Mulch and soil

Table C.2 - Surface spread areas

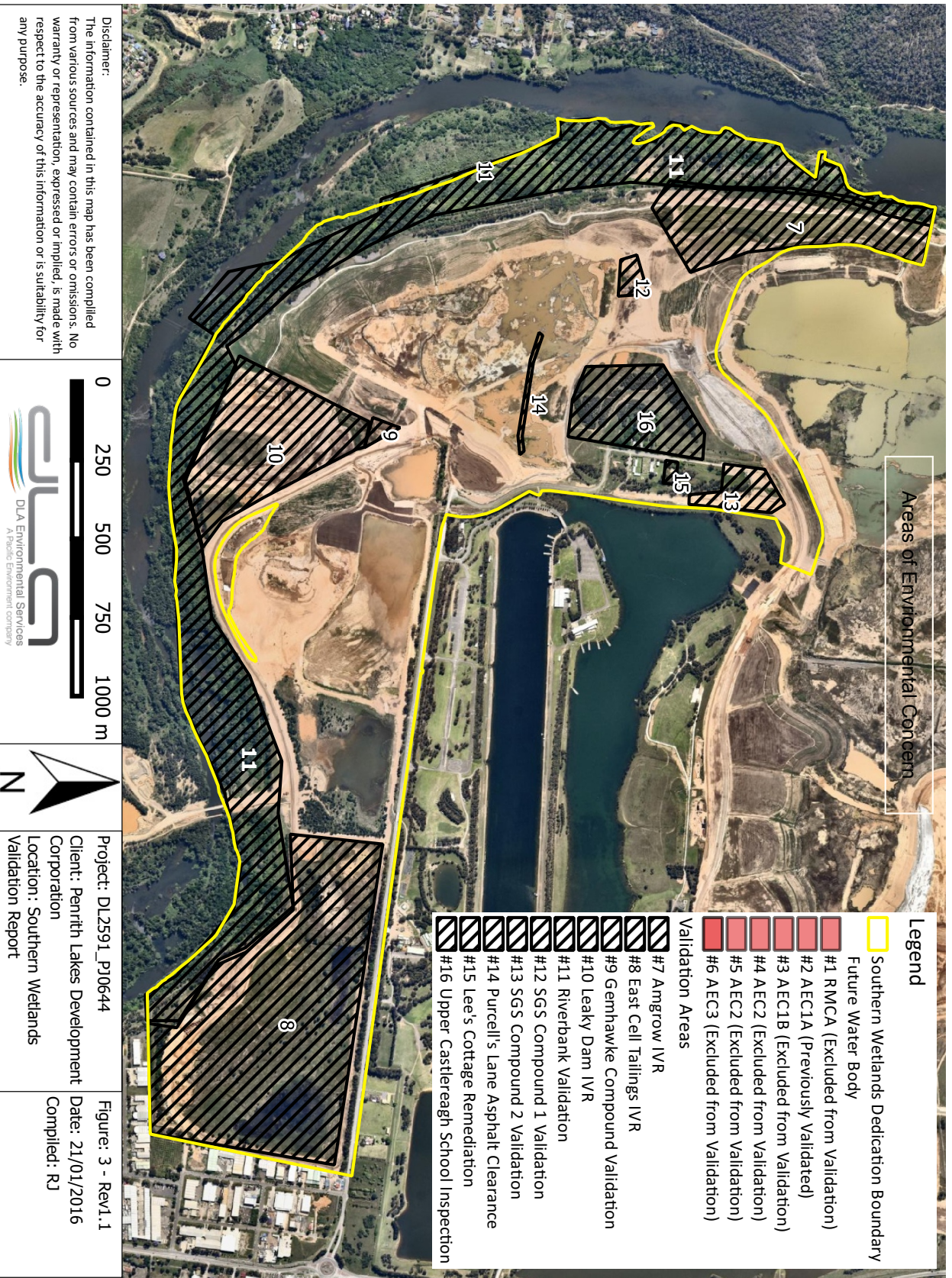
Surface Spread Area	Number of locations			Area Classification
	Test pits	ACM fragments identified	Asbestos fibres identified	
SA01	4	-		No known asbestos contamination
SA02	50	36		Asbestos fragment and fibre contamination
SA03	1	-		No known asbestos contamination
SA04	11	5		ACM fragment contamination
SA05	n.i.	n.i.		n.i.
SA06	15	9		1 [#] ACM fragment contamination
SA07	n.i.	n.i.		n.i.
SA08	3	3		ACM fragment contamination
SA09	3	-		No known asbestos contamination
SA10	1	1		ACM fragment contamination
SA11	n.i.	n.i.		n.i.
SA12	n.i.	n.i.		n.i.
SA13	n.i.	n.i.		n.i.
SA14	n.i.	n.i.		n.i.
SA15	n.i.	n.i.		n.i.
SA16	n.i.	n.i.		n.i.
SA17	n.i.	n.i.		n.i.
SA20	3	1		ACM fragment contamination
SA21	4	-		No known asbestos contamination
SA22	1	1		ACM fragment contamination
SA23	1	1		ACM fragment contamination
SA24	1	1		ACM fragment contamination
SA25	2	1		ACM fragment contamination
SA26	45	24		ACM fragment contamination
SA27	*	*		n.i.
SA28	2	1	1 [#]	ACM fragment contamination
SA30	2	1		ACM fragment contamination
SA31	1	1		ACM fragment contamination
SA32	n.i.	n.i.		n.i.
SA33	1	-		No known asbestos contamination
SA34	1	-		No known asbestos contamination
SA35	1	1		ACM fragment contamination
SA36	1	1		ACM fragment contamination
SA37	1	1		ACM fragment contamination
SA38	4	1		ACM fragment contamination
SA39	1	1		ACM fragment contamination
SA40	1	1		ACM fragment contamination
SA41	n.i.	n.i.		n.i.
SA42	2	-		No known asbestos contamination
SA43	1	-		No known asbestos contamination

n.i. Areas not investigated, as requested by PLDC

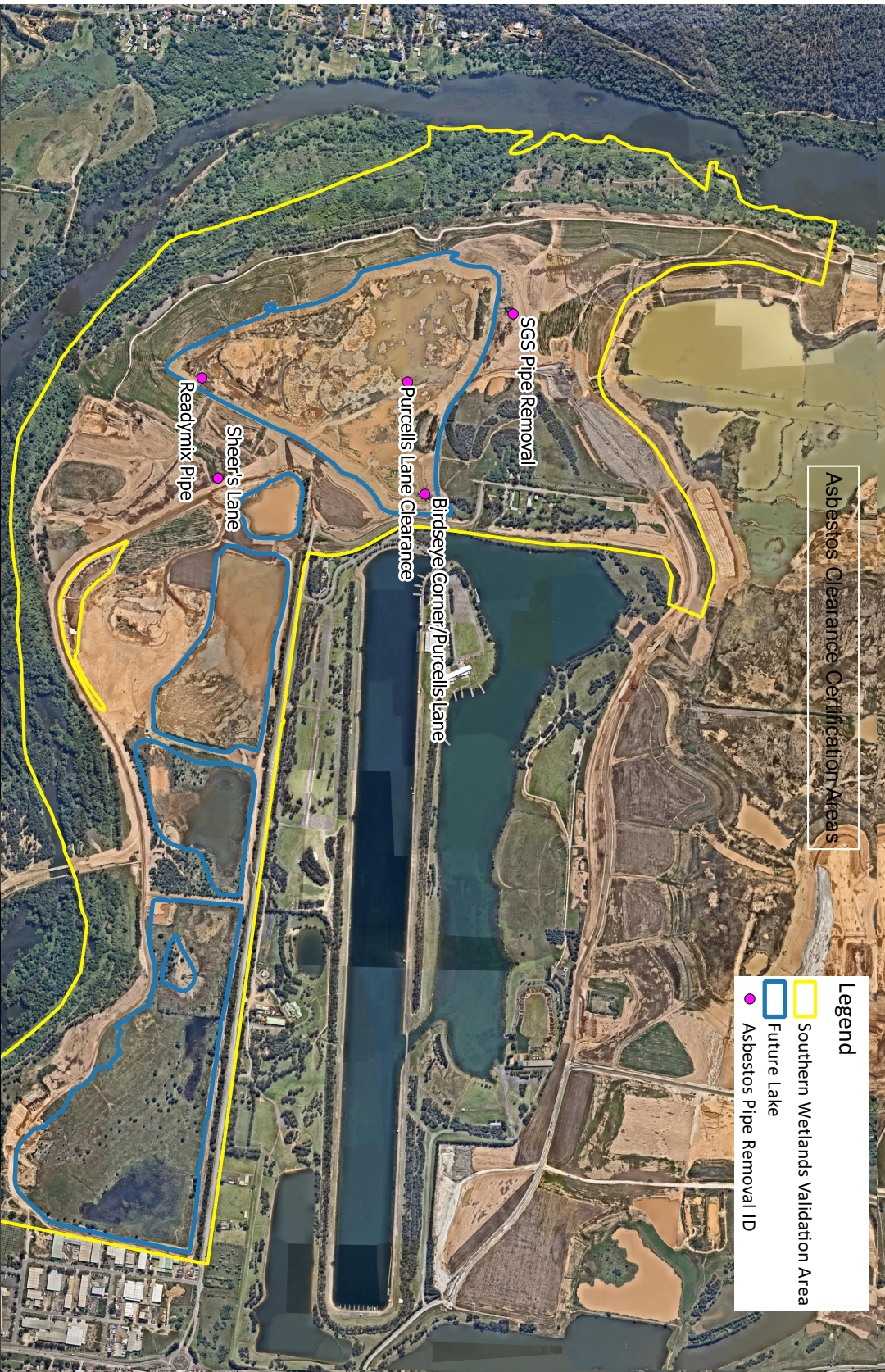
^ Loose asbestos fibre bundles detected below LOR at two out of three locations, see **Table 6.1**

Loose asbestos fibre bundles detected below LOR, see **Table 6.1**

**Appendix G:
DLA Environmental Validation Sample Location Plans**



Disclaimer:
 The information contained in this map has been compiled from various sources and may contain errors or omissions. No warranty or representation, expressed or implied, is made with respect to the accuracy of this information or its suitability for any purpose.

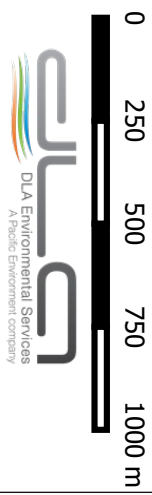


Asbestos Clearance Certification Areas

Legend

- Southern Wetlands Validation Area
- Future Lake
- Asbestos Pipe Removal ID

Disclaimer:
 The information contained in this map has been compiled from various sources and may contain errors or omissions. No warranty or representation, expressed or implied, is made with respect to the accuracy of this information or its suitability for any purpose.



Project: DL2591_PJ0644
 Client: Penrith Lakes Development Corporation
 Location: Southern Wetlands Validation Report

Figure: 4
 Date: 17/11/2015
 Compiled: RJ

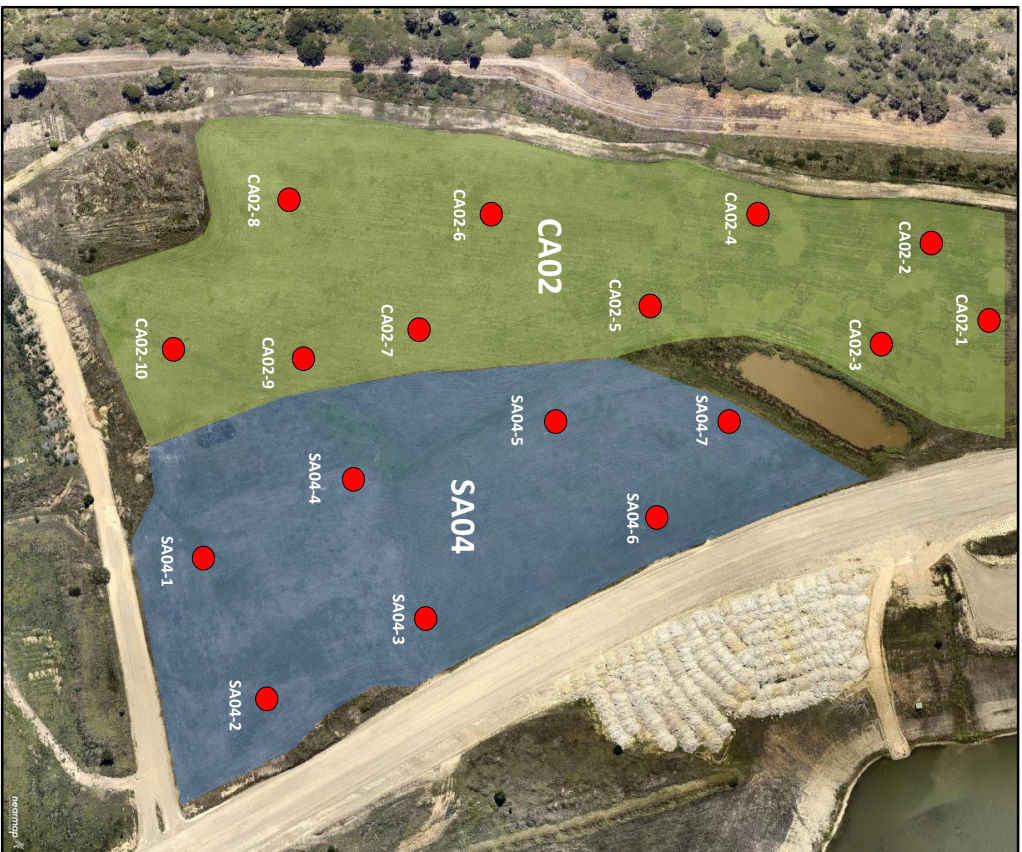


Image Modified from: Nearmap Air Photo 06.01.2014

- Legend:**
- CA02 Cultivated Area
 - SA04 Surface Spread Area
 - CA03 Cultivated Area
 - SA05 Surface Spread Area
 - Validation Sampling Location



Title: Amgrow Surface Spread and Cultivated Area Sampling Locations

Client: PLDC

Job No: DL2591

Figure No: N/A

Date: 22.07.2014

Sydney Office
 Phone (02) 9476 1765
 Fax (02) 9476 1357

Maitland Office
 Phone (02) 4949 3800
 Fax (02) 4949 3811

Scale (approx):



Revision:

R0

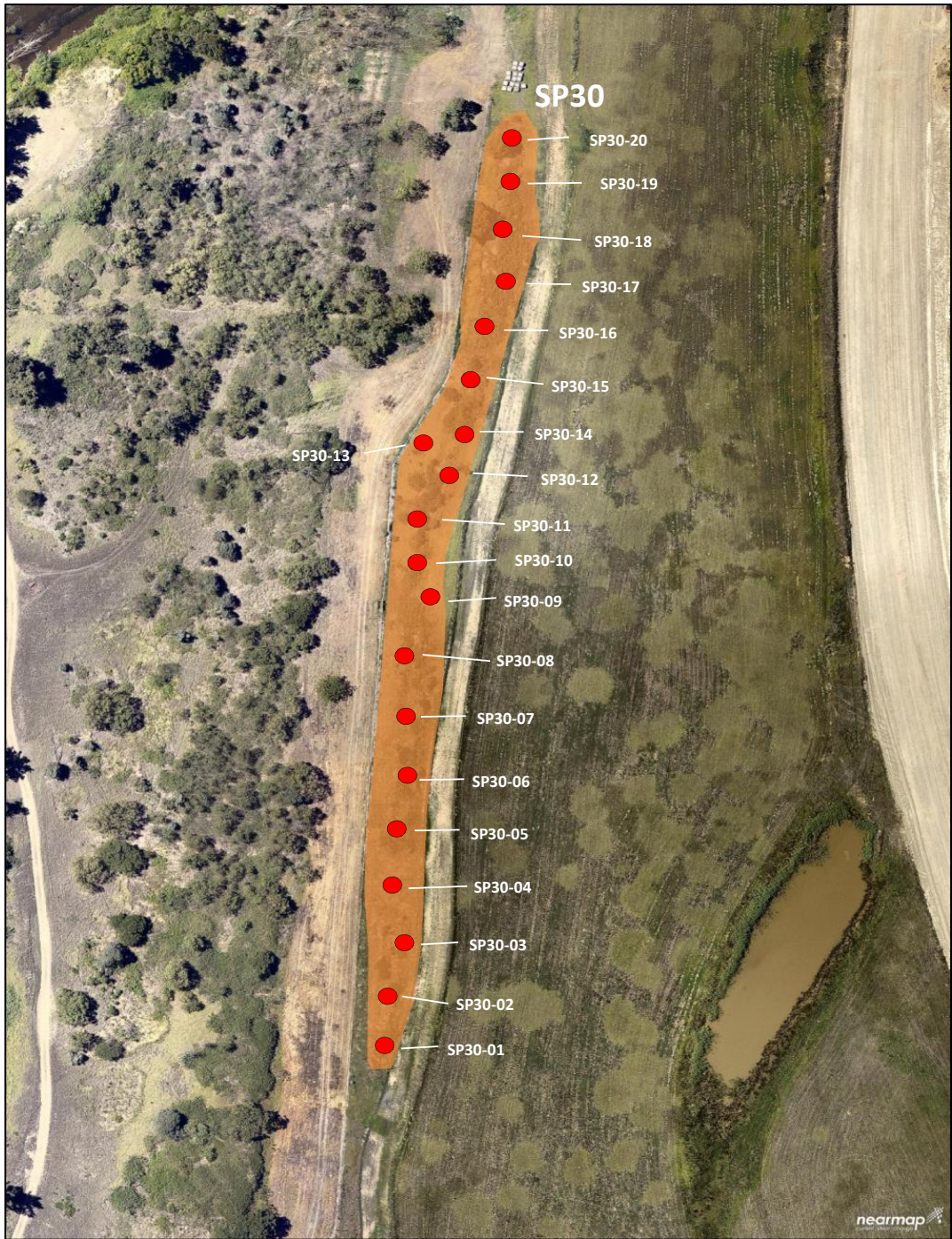


Image Modified From: Nearmap Air Photo 06.01.2014












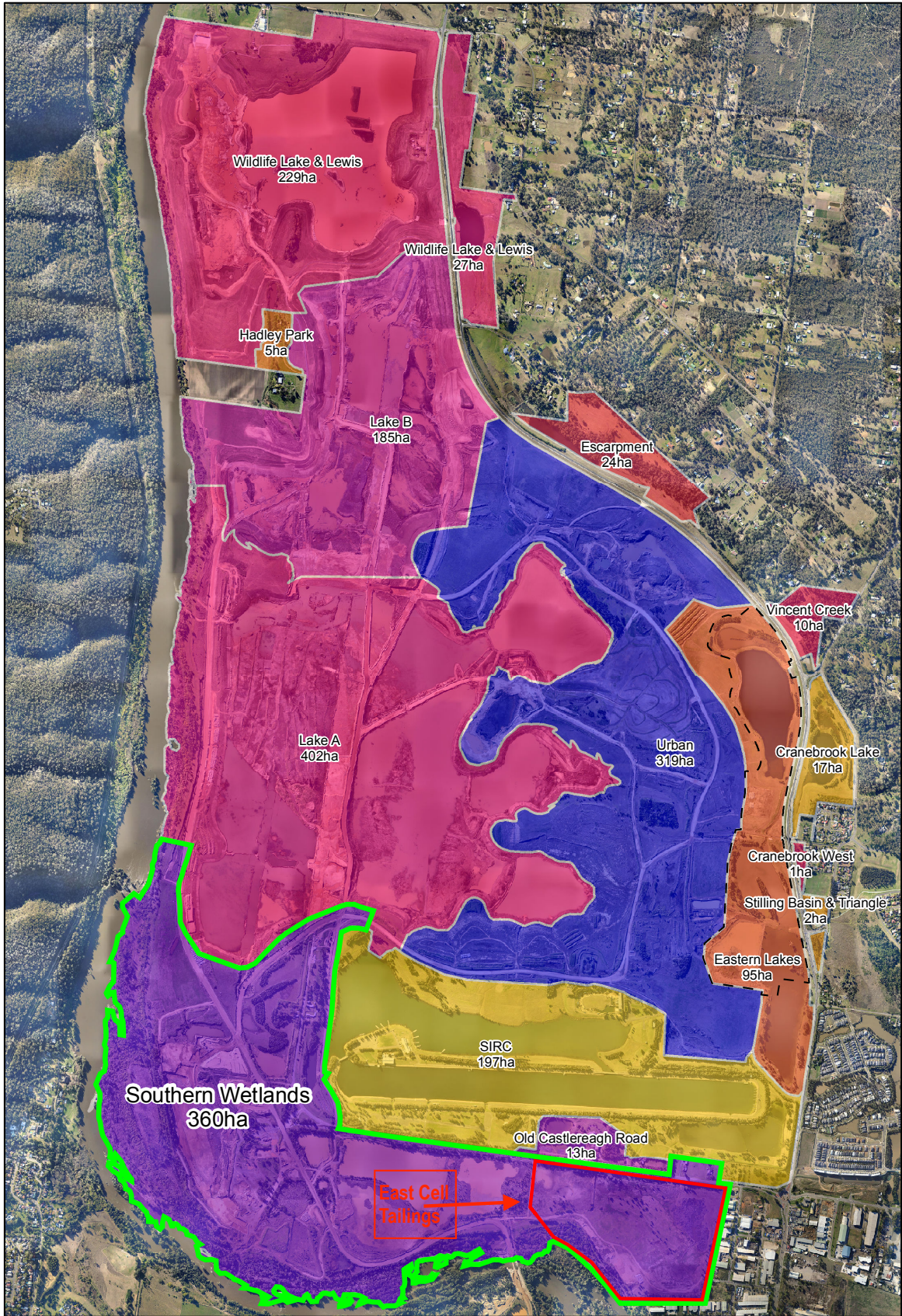
 DLA environmental Unit 2b/30 Leighton Place Hornsby, NSW 2077	N 	Legend  SP30 Footprint Area  Validation Sample Location		TITLE: Amgrow Stockpile Footprint Sampling Locations - SP30	
		CLIENT: PLDC		DRAWING: 22.07.2014	
	PROJ. No. DL2951		SCALE (approx.): 		FIGURE: N/A



Image Modified From: Nearmap Air Photo 06.01.2014

 Unit 2b/30 Leighton Place Hornsby, NSW 2077	N 	Legend  SP31 Footprint Area  SP33 Footprint Area  Validation Sample Location		TITLE: Amgrow Stockpile Footprint Sampling Locations - SP31, SP33
		CLIENT: PLDC	DRAWING: 22.07.2014	
	PROJ. No. DL2951	SCALE (approx.): 	FIGURE: N/A	



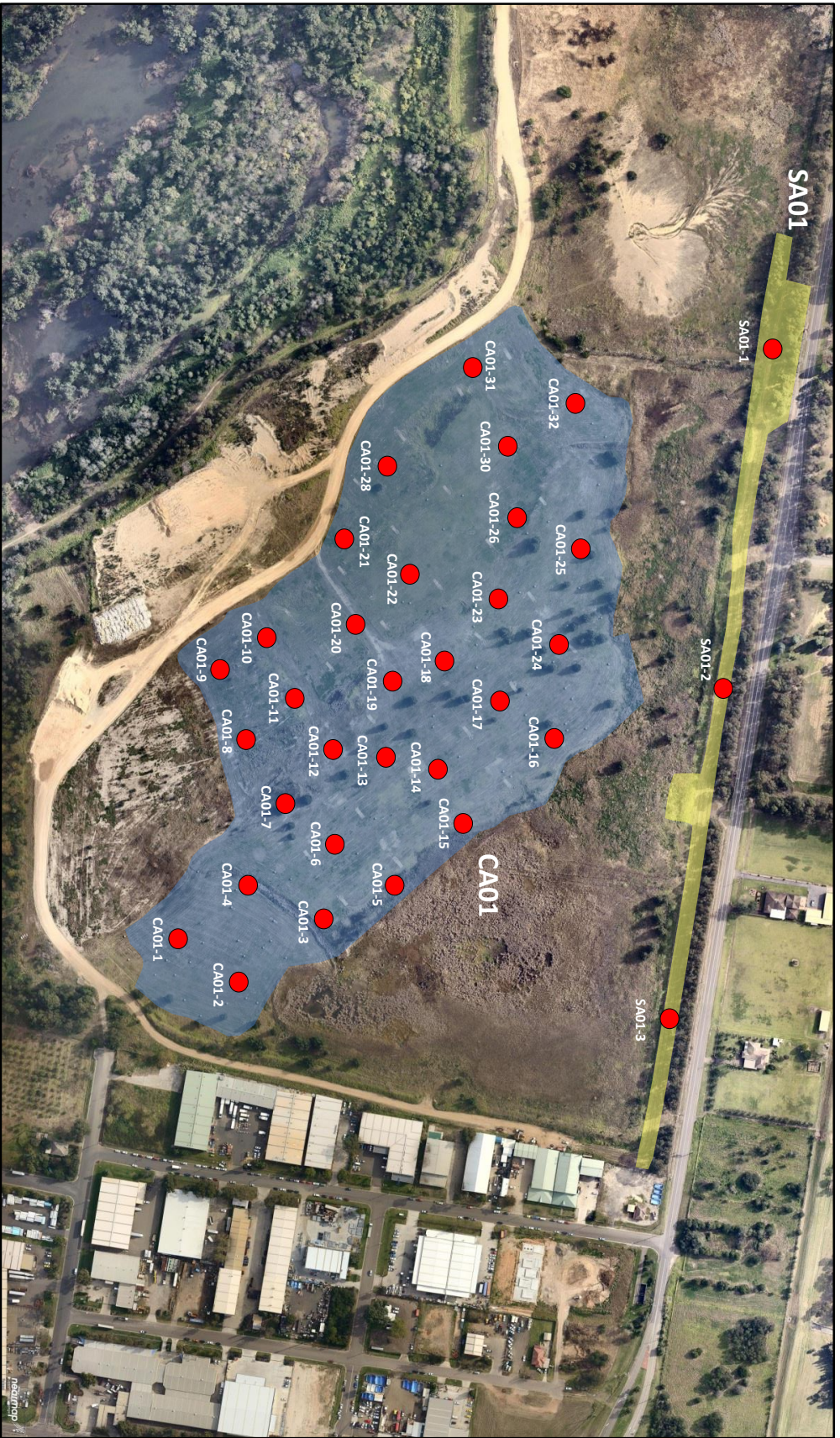






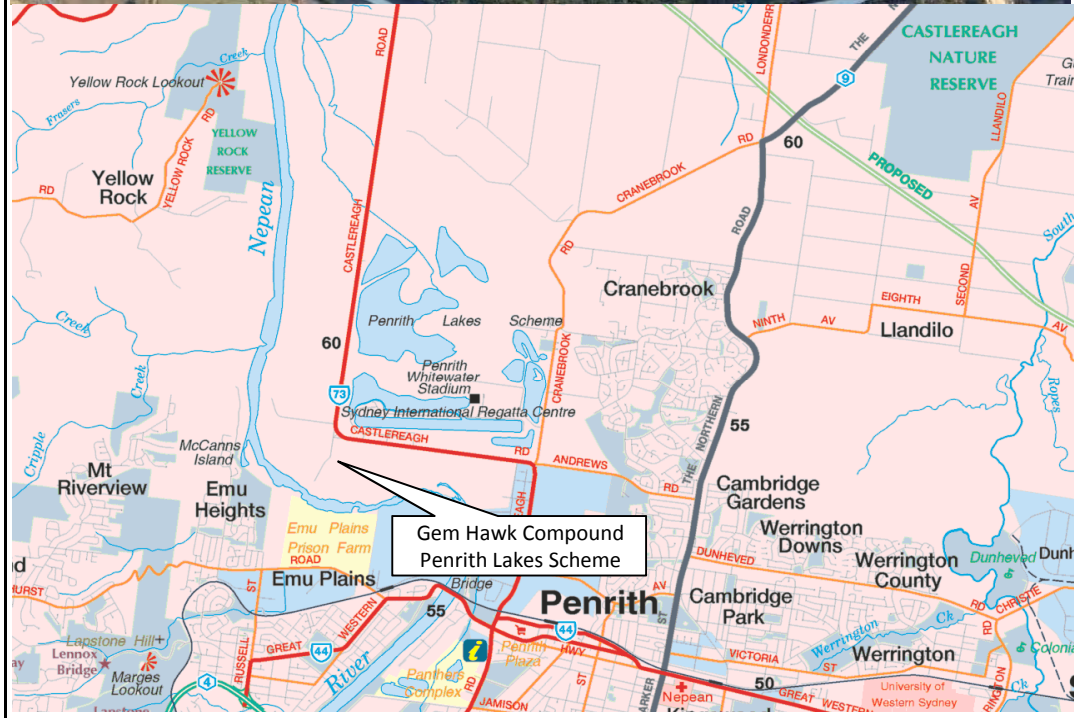



Image Modified From: Nearmap Air Photo 26.06.2014

Legend:  CA01 Cultivated Area  SA01 Surface Spread Area  Validation Sampling Location <small>*Please note that boundaries are approximate</small>		 N		 Unit 2B/30 Leighton Place Hornsby, NSW 2077	
Title: Cultivated and Surface Spread Area Sampling Locations		Client: PLDC		Sydney Office Phone (02) 9476 1765 Fax (02) 9476 1557	
Job No.: DL2591		Maitland Office Phone (02) 4949 3800 Fax (02) 4949 3811		Scale (approx.): 	
Figure No.: N/A		Date: 28.07.14		Revision: R0	




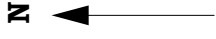
 Unit 2b/30 Leighton Place Hornsby, NSW 2077	DESIGNED: DLA	SITE LOCATION	
	COMPILED: SW	CLIENT: PLDC	DRAWING: 1/11/2011
	PROJ. No. DL:2591	LOCATION: Gem Hawk Compound Penrith Lakes Scheme	FIGURE: 1



Gem Hawk Compound Remediation Excavations




	Title: Site Layout and Sampling Locations		
	Client: Penrith Lakes (PLDC)	Figure No: 2	Date: Nov. 11
Newcastle Office Phone (02) 4945 3800 Fax (02) 4945 3811	Scale	Sheet 1 of 1	Revision 1
Sydney Office Phone (02) 9476 1765 Fax (02) 9476 1557			



Gem Hawk Land Farm Sampling Locations



	Title: Site Layout and Sampling Locations		
	Client: Penrith Lakes (PLDC)	Figure No: 1	Date: Feb. 13
Newcastle Office Phone (02) 4948 3800 Fax (02) 4948 3811	Scale	Sheet 1 of 1	Revision 1
Sydney Office Phone (02) 9476 1765 Fax (02) 9476 1557			



Legend

- Scheme Boundary
- Leaky Dam Boundary
- Cadastre

Disclaimer
 The information contained in and by this map has been compiled from various sources and may contain errors or omissions. No warranty or representation, expressed or implied, is made with respect to the accuracy of this information or its suitability for any purpose.

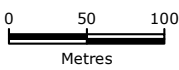
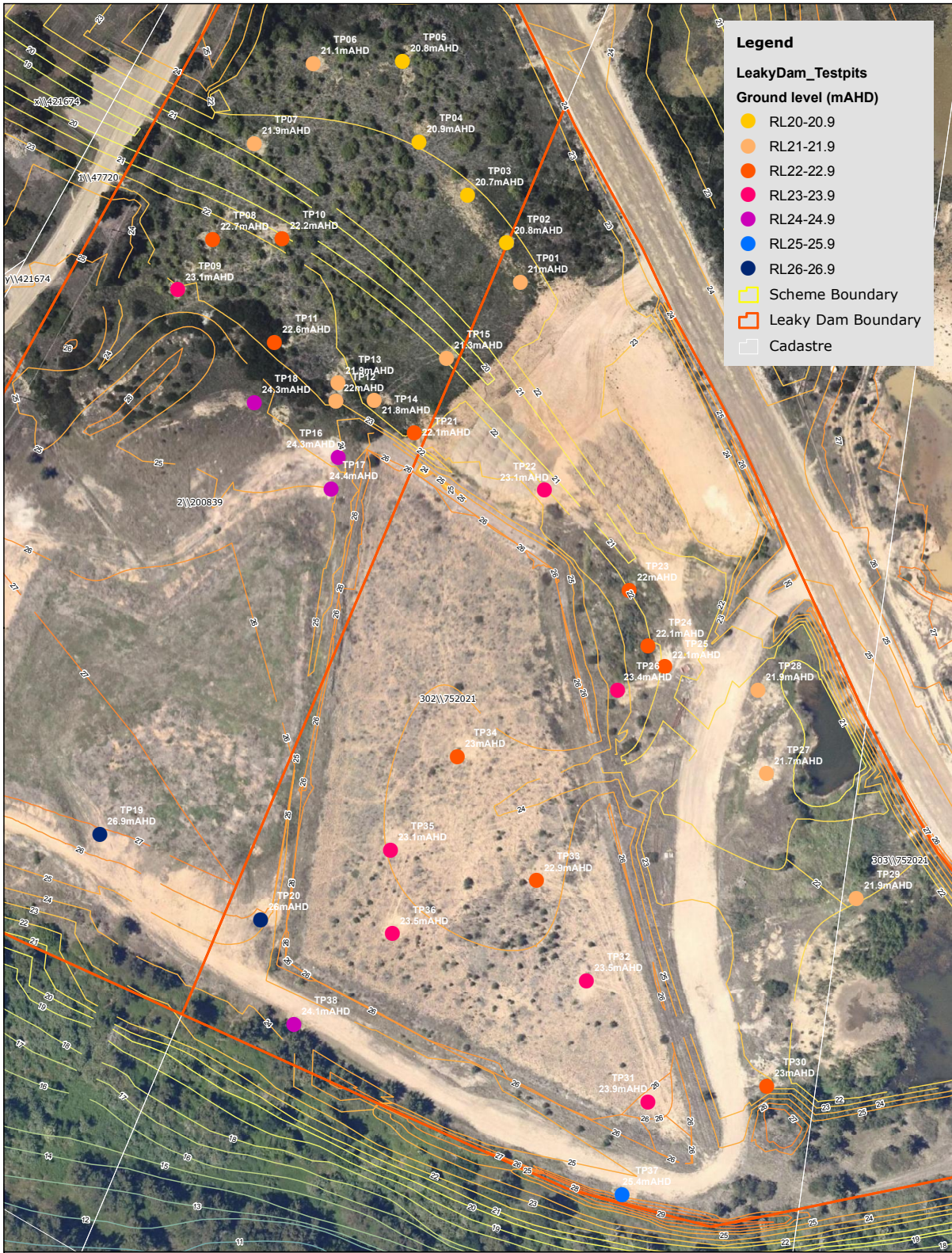


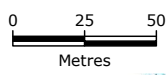
Figure 4
 Leaky Dam - Site Location Map
 PLDC Ref - 115**

19 February 2013
 For Information Only





Disclaimer
 The information contained in and by this map has been compiled from various sources and may contain errors or omissions. No warranty or representation, expressed or implied, is made with respect to the accuracy of this information or its suitability for any purpose.

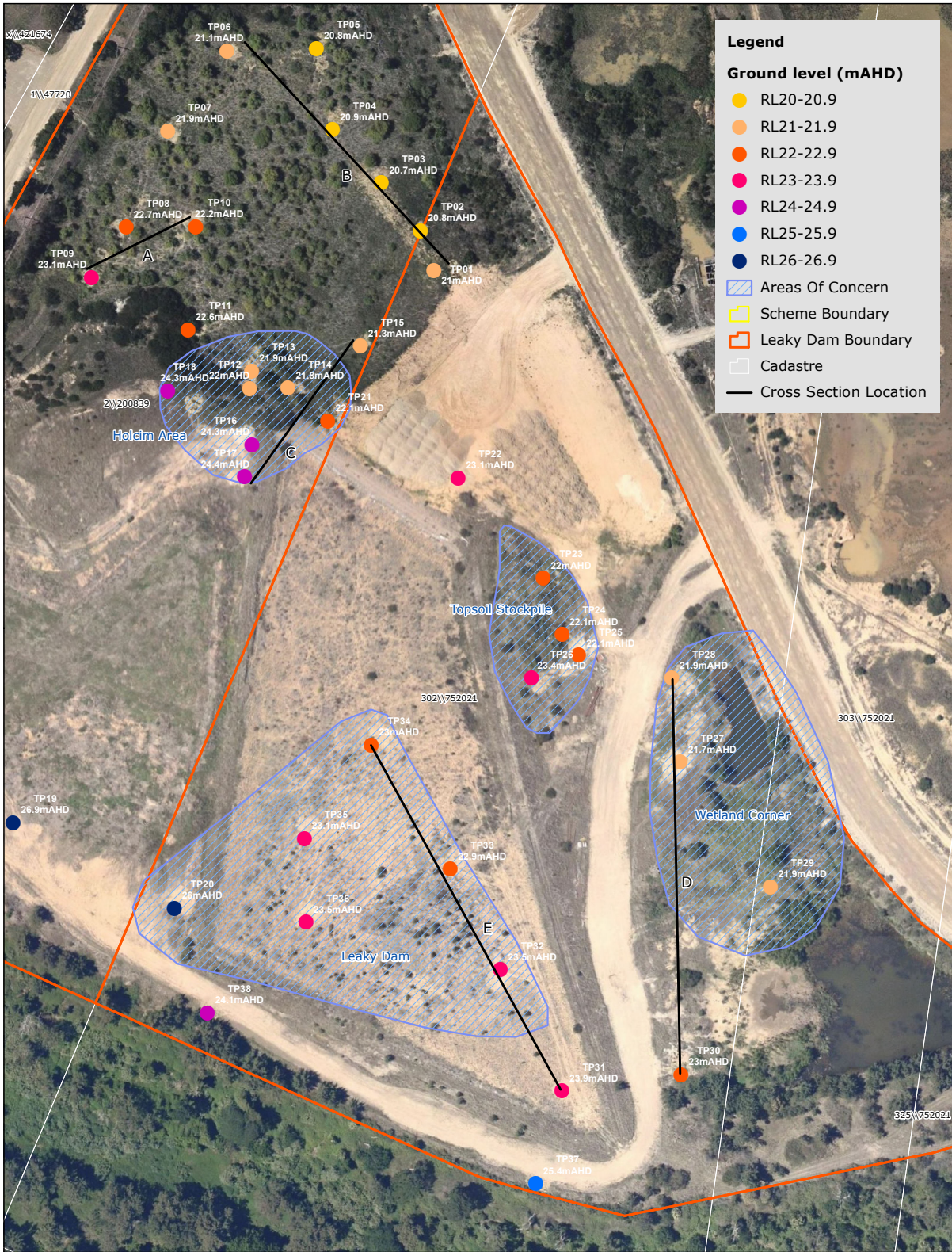


DRAFT

Figure 2 - test pits
 Leaky Dam - Site Location Map
 PLDC Ref - 115**

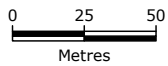
19 February 2013
 For Information Only





Disclaimer

The information contained in and by this map has been compiled from various sources and may contain errors or omissions. No warranty or representation, expressed or implied, is made with respect to the accuracy of this information or its suitability for any purpose.






Leaky Dam - Environmental Concerns
 PLDC Ref - 11566

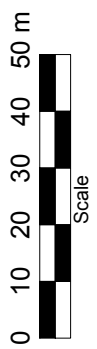
26 February 2013
 For Information Only








-  Site Boundary
-  Sample location
-  Excavation



Title: SGS Compound Sample Locations



Client:	Shepherd Group Services	Figure No:	1	Date:	May 13
Newcastle Office	Sydney Office	Scale	As shown	Sheet	1 of 1
Phone (02) 4949 3800	Phone (02) 9476 1765	Revision			1.0
Fax (02) 4949 3811	Fax (02) 9476 1557				



Legend
 Site boundary

Disclaimer:
 The information contained in this map has been compiled from various sources and may contain errors or omissions. No warranty or representation, expressed or implied, is made with respect to the accuracy of this information or its suitability for any purpose.

0 250 500 m

DLA Environmental Services
 A Pacific Environment company



Project: DL2591
 Client: Penrith Lakes
 Development Corporation
 Location: SGS Hardstand
 (J:46)

Figure: 1
 Date: 13/11/2015
 Compiled: RJ



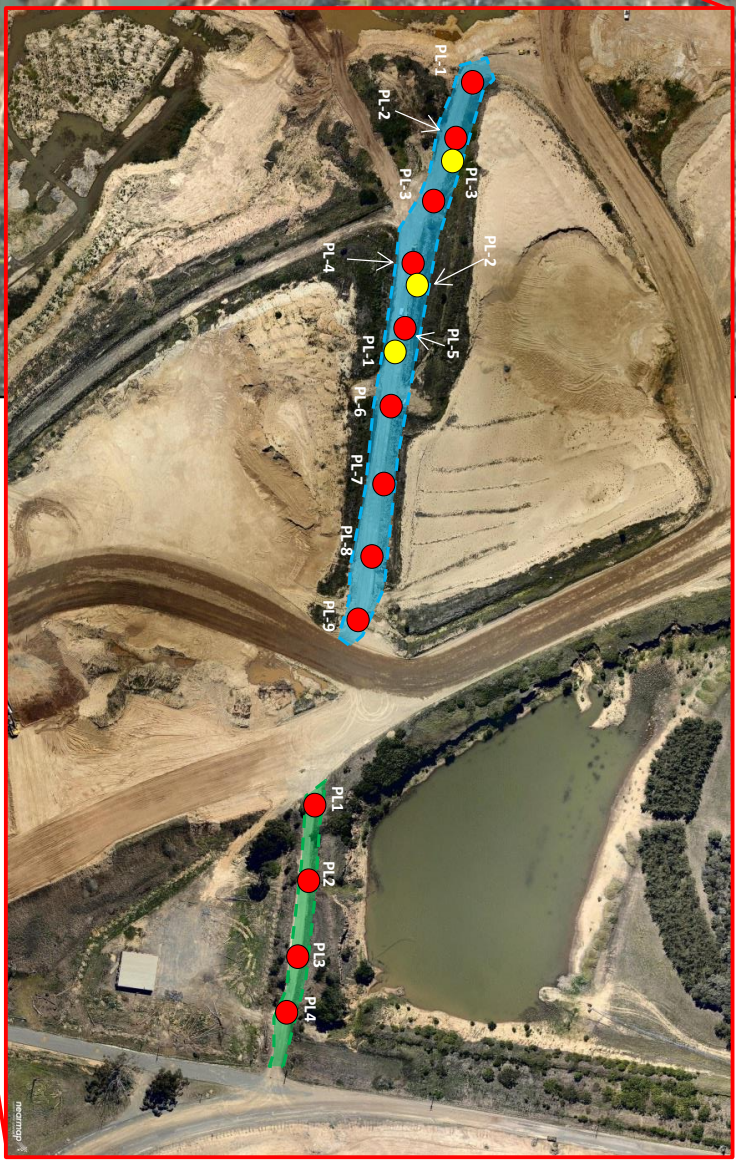
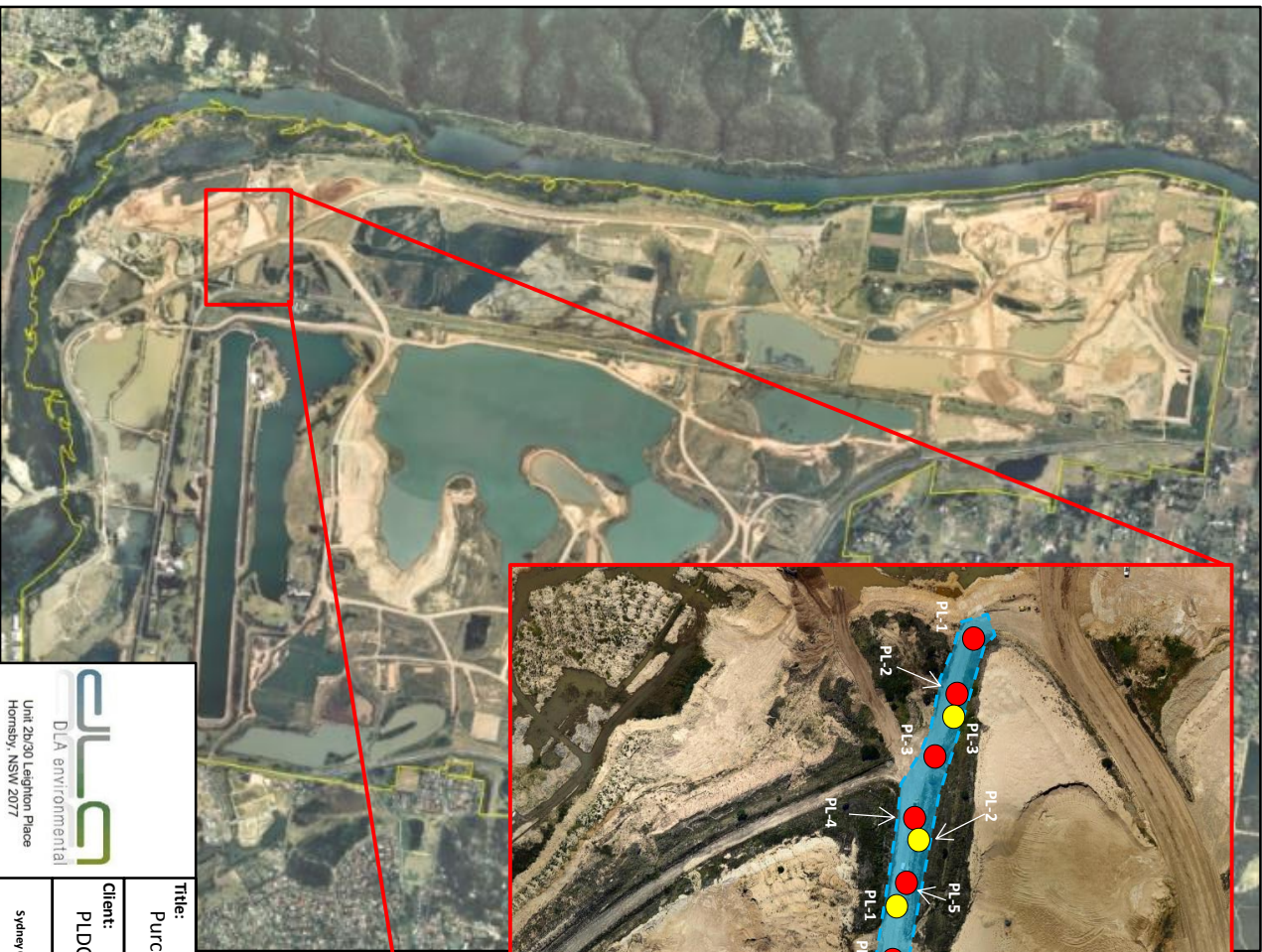
Disclaimer:
 The information contained in this map has been compiled from various sources and may contain errors or omissions. No warranty or representation, expressed or implied, is made with respect to the accuracy of this information or is suitability for any purpose.

0 10 20 30 40 m

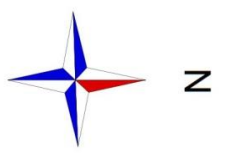


Project: DL2591
 Client: Penrith Lakes
 Development Corporation
 Location: SGS Hardstand
 (J:46)


Figure: 2
 Date: 13/11/2015
 Compiled: RJ



- Legend:**
- Asphalt Sampling Location
 - Purcell's Lane West
 - Purcell's Lane East
 - Asphalt Sampling Location after Rescrape
 - Penrith Lakes Scheme Boundary



Title: Purcell's Lane Layout with Sample Locations

 <p>DLA environmental Unit 2B/30 Leighton Place Hornsby, NSW 2077</p>		<p>Client: PLDC</p>	<p>Job No: DL2591</p>	<p>Figure No: 1</p>	<p>Date: 30.09.14</p>
<p>Sydney Office Phone (02) 9476 1765 Fax (02) 9476 1557</p>	<p>Maitland Office Phone (02) 4949 3800 Fax (02) 4949 3811</p>	<p>Scale (refers to image on right): 0m 45m 90m</p>	<p>Sheet: 1 OF 1</p>	<p>Revision: R0</p>	



Legend:

 Sampling Location

 Stockpile Area (Subject to this Assessment)

N



DLA environmental
Unit 2B/30 Leighton Place
Hornsby, NSW 2077

Title:
Site Layout with Sampling Locations

Client:
PLDC

Job No.:
DL2591

Figure No.:
1

Date:
24.03.15

Sydney Office
Phone (02) 9476 1765
Fax (02) 9476 1557

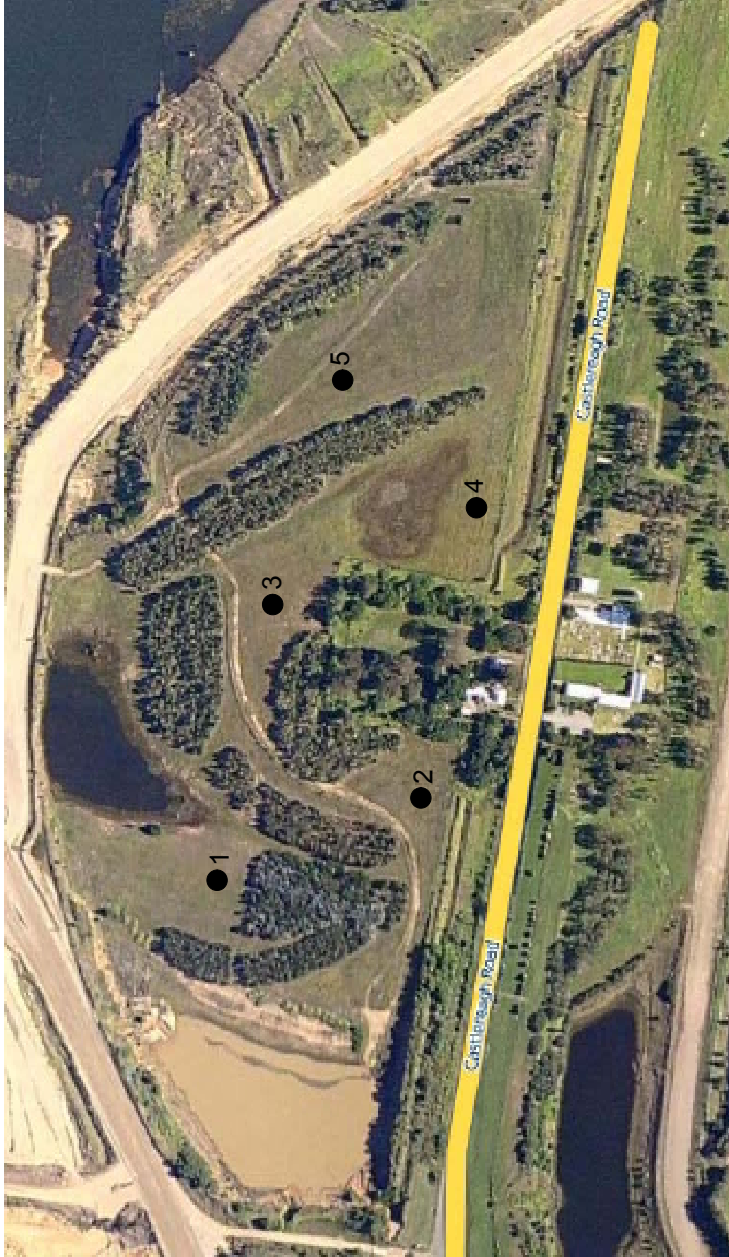
Maitland Office
Phone (02) 4949 3800
Fax (02) 4949 3811

Scale:
0m 75m 150m


Sheet:
1 OF 1

Revision:
R0

Upper Castlereagh School, Old Castlereagh Road, Penrith Lakes.

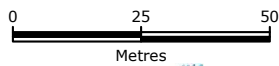


● Soil Inspection Location

	Title: Inspection Locations	
	Client: Penrith Lakes (PLDC)	Figure No: 1
Newcastle Office Phone (02) 4945 3800 Fax (02) 4945 3811	Sydney Office Phone (02) 9476 1765 Fax (02) 9476 1557	Date: March 12
Scale		Sheet: 1 of 1
		Revision: 1



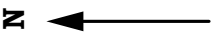
Disclaimer
 The information contained in and by this map has been compiled from various sources and may contain errors or omissions. No warranty or representation, expressed or implied, is made with respect to the accuracy of this information or its suitability for any purpose.



Asbestos Removal Location Map
 PLDC Ref - 11610

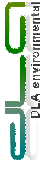
11 June 2013
 For Legal Review





- Asbestos Detected
- Asbestos trench sample








 DLA environmental	Title: Site Layout and Sampling Locations		
	Client: Penrith Lakes (PLDC)	Figure No: 1	Date: Feb 14
Newcastle Office Phone (02) 4949 3800 Fax (02) 4949 3811	Sydney Office Phone (02) 9476 1765 Fax (02) 9476 1557	Scale: AS SHOWN	Revision: 1 of 1



Asbestos Pipe Readymix Site



Image Modified From: Nearmap Air Photo 28.09.14

<p>Legend:</p> <p> Pipe Trench</p> <p> Sampling Location</p>				 <p>DLA environmental Unit 29/30 Leighton Place Hornsby, NSW 2077</p>	
<p>Title: Sheer's Lane Sampling Locations</p>					
<p>Client: PLDC</p>		<p>Sydney Office Phone (02) 9476 1765 Fax (02) 9476 1557</p>		<p>Maitland Office Phone (02) 4949 3800 Fax (02) 4949 3811</p>	
<p>Job No: DL2591</p>		<p>Scale (approx):</p> 		<p>Figure No: N/A</p>	
		<p>Date: 04.12.14</p>		<p>Revision: R0</p>	

**Appendix H:
DLA Environmental Results Tables**



DLA Environmental Services
A Pacific Environment Company

NEPM (NEPC, 2013)
Public Open Space
Land Use Criteria (mg/kg)

Asbestos

HSL: NL, ESL: 50

HSL: NL, ESL: 85

HSL: NL, ESL: 70

HSL: NL, ESL: 105

NL

C6-C10
HSL: NL, ESL: 180,
ML: 700

>C10-C16
HSL: NL, ESL: 120,
ML: 1,000

>C16-C34
HSL: NL, ESL: 300,
ML: 2,500

>C34-C40
HSL: NL, ESL: 2,800,
ML: 10,000

HIL: 3, ESL: 0.7

Sample ID	Depth (m)	Date	Chemical Report	Soil Description	Comment	BTEX - Sandy soils						TRH - Sandy soils				PAH
						Benz	Toluene	Ethylben	Xylene	Naph	F1	F2	F3	F4	BaP TEQ	
Interim Validation Report #15 - Angrow Area - Figure 3 AEC #7 - Refer to Appendix D for NATA Certified Laboratory Reports																
CA01-1	0.10	04-Jun-14	111093			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
CA01-5	0.10	04-Jun-14	111093			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
CA01-9	0.10	04-Jun-14	111093			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
CA01-13	0.10	04-Jun-14	111093			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
CA01-17	0.10	04-Jun-14	111093			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
CA01-21	0.10	04-Jun-14	111093			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
CA01-25	0.10	04-Jun-14	111093			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
CA01-29	0.10	04-Jun-14	111093			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
SA01-1		13-Jun-14	111594			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Interim Validation Report #16 - East Cell Tailings - Figure 3 AEC #8 - Refer to Appendix E for NATA Certified Laboratory Reports																
CA02-1		31-Mar-14	107472			<0.2	<0.5	<1	<2	<1	<25	<50	240.0	130.0	<0.5	
CA02-2		31-Mar-14	107472			<0.2	<0.5	<1	<2	<1	<25	<50	240.0	150.0	<0.5	
CA03-1		31-Mar-14	107472			<0.2	<0.5	<1	<2	<1	<25	<50	170.0	110.0	<0.5	
SA04-1		31-Mar-14	107472			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
SA05-1		31-Mar-14	107472			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
CA03-2		31-Mar-14	107472			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
SA03-1		31-Mar-14	107472			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
CA03-2-1		26-Aug-13	96576			<0.2	<0.5	<1	<2	<1	<25	<50	350.0	150.0	<0.5	
SA04-2-1		26-Aug-13	96576			<0.2	<0.5	<1	<2	<1	<25	<50	110.0	<100	<0.5	
SA03-1		13-Jun-14	111594			<0.2	<0.5	<1	<2	<1	<25	<50	110.0	<100	<0.5	
Interim Validation Report - Leaky Dam - Figure 3 AEC #10 - Refer to Appendix J for NATA Certified Laboratory Reports																
LD5-1-1		08-Oct-14	117345			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
LD5-1-2		08-Oct-14	117345			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
LD5-1-3		08-Oct-14	117345			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
LD5-2-1		08-Oct-14	117345			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
LD5-2-2		08-Oct-14	117345			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
LD5-2-3		08-Oct-14	117345			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
LD5-3-1		08-Oct-14	117345			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
LD5-3-2		08-Oct-14	117345			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
LD5-3-3		08-Oct-14	117345			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Southern Wetlands Riverbank Validation - Figure 3 AEC #11 - Refer to Appendix K for NATA Certified Laboratory Reports																
Te-a		04-Sep-15	133916	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-b		04-Sep-15	133916	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-c		04-Sep-15	133916	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-d		04-Sep-15	133916	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-e		04-Sep-15	133916	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-f		04-Sep-15	133916	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-g		04-Sep-15	133916	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-h		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-i		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-j		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-k		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-l		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-m		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-n		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-o		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-p		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-q		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-r		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-s		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-t		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-u		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-v		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-w		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-x		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-y		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-z		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-aa		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-ab		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-ac		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-ad		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-ae		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-af		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-ag		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-ah		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-ai		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-aj		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-ak		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-al		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-am		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-an		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-ao		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	
Te-ap		12-Aug-15	132644	Soil Validation		<0.2	<0.5	<1	<2	&						

