SITE AUDIT REPORT

Molonglo Valley Stage 3 Future Urban Area: Area A

ACT Government Environment, Planning and Sustainable Development Directorate
23 February 2017

12080SAR23_MV3AreaA

Quality Management

Document Distribution

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Signature				
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This report was prepared in accordance with the scope of services set out in the contract between Zoic Environmental Pty Ltd, ABN 23 154 745 525, and the client.

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ACT Environment Protection Authority

SITE AUDIT STATEMENT

Environment Protection Act 1997

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.

PART I: Site audit identification

Site audit statement no. SAS23_Area A

This site audit is a **~~statutory audit/~~non-statutory audit*** within the meaning of the *Environment Protection Act 1997*.

Site auditor details (approved under the *Environment Protection Act 1997*)

Name: Rebeka Hall Company: Zoic Environmental Pty Ltd

Address: Suite 4, Level 3, 105 Pitt Street Sydney NSW Postcode: 2000

Phone: 02 9231 1045 Fax ……

Site details

Address: Area A in Molonglo Valley Stage 3 Future Urban Area. The intersection of the Tuggeranong Parkway and the Bicentennial National Trail mark the south eastern corner of Area A. Postcode: 2611

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

Block:	District:
• Part Block 34	Molonglo Valley
• Part Block 70	Molonglo Valley
• Part Block 71	Molonglo Valley
• Part Block 72	Molonglo Valley
• Part Block 74	Molonglo Valley
• Block 3	Molonglo Valley

Area of site (e.g. hectares): 464 hectares Current zoning: see attached

To the best of my knowledge, the site **~~is/~~is not*** the subject of an order or agreement under the *Environment Protection Act 1997*.

~~Order/Agreement * no(s)~~ ……

**** Strike out as appropriate***

Site audit commissioned by

Name: Steven Gianakis Company: ACT Environment, Planning and Sustainable Development Directorate

Address: 16 Challis Street, Dickson ACT Postcode: 2602

Phone: 02 62071699……..…… Fax ……..……

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

Kerry Browning, Project Manager, Land Development Agency (LDA) Ph 6207 1699

……..

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

Residential, parks and recreational, community facility, transport and services, non-urban, and commercial, with specified permissible uses detailed in **Attachment 2.**

……

~~**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

- *WSP Environmental*

Title(s) of report(s) reviewed

- *WSP Environmental (2 December 2014) Molonglo Valley Stage 3 (Area A) Sampling, Analysis and Quality Plan (SAQP) (reference SAQP MV3 Area A – 00039275)*
- *WSP Environmental (24 June 2016) Molonglo Valley Stage 3 (Area A) Stage 2 Detailed Site Investigation, ACT Land Development Agency (reference 00039275_Molonglo_Area_A_DSI_FINALv3).*
- *WSP Environmental (25 November 2016) Construction Environmental Management Plan (CEMP), Molonglo Valley Stage 3 (Area A) (reference 00039275_WSP_MV3_Stage 3 Area A – CEMP_FINAL_v2)*
- *WSP | PB (8 February 2017) Unexpected Finds Management Plan, Contaminated Land and Unexploded Ordnance (UXO) / Exploded Ordnance Waste (EOW), Molonglo Valley Stage 3 (Future Urban Area) (reference WSP-PB_Rpt_UFP_MV3_FINAL)*

**** Strike out as appropriate***

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

- *Coffey Geosciences (2005) Molonglo Valley, Preliminary Geotechnical and Contamination Constraints Study.*
- *Coffey Geosciences (2006) Gungahlin Drive Extension – Preliminary Assessment of Spoil Construction over sludge ponds at Coppins Crossing.*
- *AECOM (June 2012) Phase 1 Environmental Site Assessment, Molonglo Stage 3, (for Land Development Agency).*
- *WSP Environmental (September 2012) Phase 1 Environmental Site Assessment, Molonglo Valley Stage 3 ACT (for ACT ESDD).*
- *WSP Environmental (September 2012) Sampling and Analysis Quality Plan (SAQP) for Phase 2 Environmental Site Assessment, Molonglo Valley Stage 3 ACT (for ACT ESDD).*
- *Milsearch Pty Ltd (17 November 2013) Post Activity Report UXO Remediation and Contamination Assessment Survey, Molonglo Development Stage 3 Priority Works.*
- *Milsearch Pty Ltd (21 May 2014) Post Activity Report UXO Contamination Assessment Molonglo Development Stage 3, ACT Land Development Agency.*
- *Milsearch Pty Ltd (30 April 2015) Post Activity Report, Molonglo Stage 3 Urban Development: Geophysical Survey and Remediation of Unexploded Ordnance.*
- *Robson Environmental Pty Ltd (May 2014) Phase 1 Environmental Site Assessment Area C, Molonglo Valley Stage 3, ACT.*
- *Robson Environment Pty Ltd (May 2014) Phase 1 Environmental Site Assessment Areas A and B, Molonglo Valley Stage 3, ACT.*

Information for the greater Molonglo Valley area provided:

- *Coffey Geosciences (2006) Phase 1 Environmental Site Assessment, Former Weston Creek Sewage Treatment Plant, Adjacent Landfill and night spoil area, Weston District, ACT.*
- *SMEC (2009) Final Phase 1 Environmental Site Assessment Report for the precinct of North Weston in Weston Creek.*
- *SMEC (2009) Final Phase 1 Environmental Site Assessment Report for Coombs and Wright, Molonglo.*
- *AECOM (2010) Phase 1 Environmental Site Assessment, Stage 2 Molonglo (West) ACT.*

Site audit report

Title: Site Audit Report: Molonglo Valley Stage 3 Future Urban Area: Area A

Report no. 12080_SAR23_MV3AreaA Date: 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) permitted by its zoning:

- Part Block 72: CZ1 – Core
- Part Block 34, Part Block 70, Part Block 71, Part Block 72, Part Block 74: RZ1 – Suburban
- Part Block 71, Part Block 72, Part Block 74, Part Block 34: PRZ1 – Urban Open Space
- Part Block 71, Part Block 72, Part Block 34: NU24 – River Corridor
- Part Block 71: CZ4 – Local Centre
- Part Block 71: RZ3 – Urban Residential
- Part Block 71: CFZ – Community Facilities
- Part Block 71, Part Block 72: TSZ1 – Transport
- Part Block 71 – Designated Area: Inner Hills – North Canberra (west)
- Block 3:TSZ2 – Services

As detailed in the ACT *Territory Plan 2008 updated on 14 December 2012 (Molonglo, NI2008-27)*:

List Uses: Residential, parks and recreational, open space, community facility, transport and services, non-urban, and commercial, with specified permissible uses detailed in **Attachment 2.**

Subject to compliance with the following environmental management plan

- WSP Environmental (25 November 2016) Construction Environmental Management Plan (CEMP), Molonglo Valley Stage 3 (Area A) (ref: 00039275_WSP_MV3_Stage 3 Area A – CEMP_FINAL_v2) in light of aesthetic contamination remaining on the site.
- WSP | PB (8 February 2017) Unexpected Finds Management Plan, Contaminated Land and Unexploded Ordnance (UXO) / Exploded Ordnance Waste (EOW), Molonglo Valley Stage 3 (Future Urban Area) (ref: WSP-PB_Rpt_UFP_MV3_FINAL)

No chemical contamination exceeding adopted site criteria was identified within Molonglo Valley Stage 3 Area A with the investigations completed to date. As such, there is no requirement for site remediation.

However, within Area A isolated areas of fill (posing aesthetic issues) and some in situ asbestos piping (likely for water transfers) were identified by WSP. Management of areas that contained anthropogenic inclusions within the fill is required through the CEMP, to be implemented during the construction phase of works.

~~**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

The Auditor notes that Area A in entirety meets the most sensitive land use criteria 'Urban Residential and Public Open Space' in addition to 'Residential with garden/accessible soil (HIL- A)' as defined in the NEPC (2013). Based on the available data there are no restrictions on permissible uses from a human health or environmental perspective identified subject to the implementation of the above CEMP and UFMP during site construction phase of works, to address aesthetic issues remaining, and any contamination or potential remnant UXO / EOW that may be encountered.

……

……

……

Section B

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

.....

I certify that, in my opinion:

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

AND/OR

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

AND/OR

- ☐ **the site CAN BE MADE SUITABLE for the following use(s) permitted by its zoning 'XXXXXXX' as detailed in the ACT *Territory Plan 2008 updated on DATE*:**

  List Uses:

  if the site is remediated/managed* in accordance with the following remedial action plan/management plan* *(insert title, date and author of plan)*

  .....

  .....

  .....

  .....

  subject to compliance with the following condition(s):

  .....

  .....

  .....

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

**** Strike out as appropriate***

~~**Overall comments**~~

……..

……..

……..

……..

……..

……..

PART III: Auditor's declaration

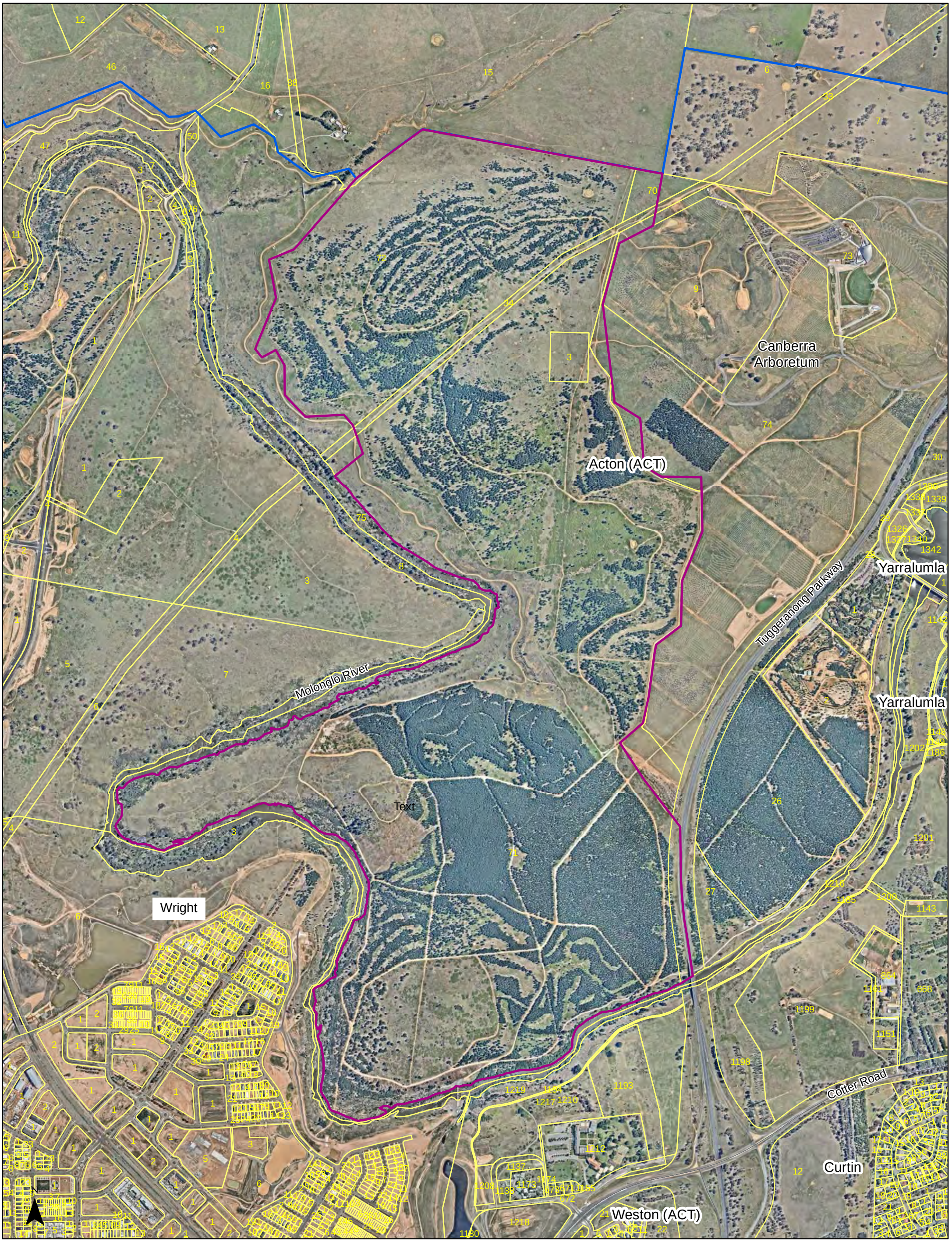
I am accredited as a site auditor by the NSW Environment Protection Authority under the *Contaminated Land Management Act 1997* (Accreditation No. 0802 NSWEPA), and therefore approved as an Environmental Auditor under the *Environment Protection Act 1997*.

I certify that:

- I have completed the site audit free of any conflicts of interest and have not carried out an assessment or remediation of the land to which the audit relates, 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 *Environment Protection Act 1997* for wilfully making false or misleading statements.

Signed: Date: 23 February 2017



Molonglo Valley Area A

Molonglo Valley Area B

Cadestre

550 275 0 550 Meters

Image Source: Nearmap.
Aerial dated 17 January 2015

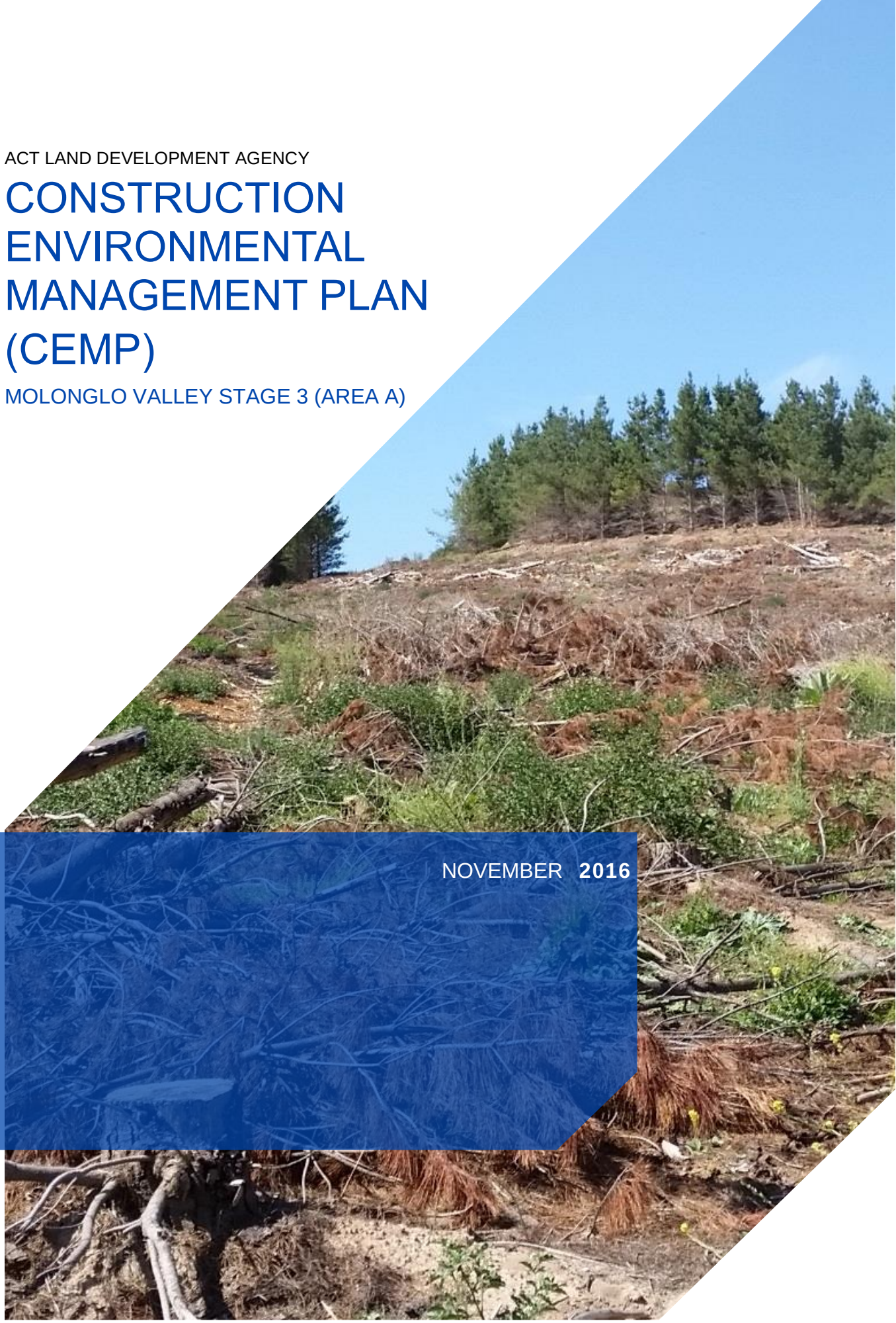
FIGURE 2 - Site Layout

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3

ACT LAND DEVELOPMENT AGENCY

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

MOLONGLO VALLEY STAGE 3 (AREA A)



NOVEMBER **2016**

WSP

Issue/revision	DRAFT	Version 2	Version 3
Remarks	For LDA and ACT EPA approved Site Auditor comment	Incorporation of ACT EPA approved Site Auditor comments (ZOIC Environmental, Interim Advice No. 08, June 2016).	Incorporation of ACT Government (EPA) comments.
Date	22 April 2016	30 June 2016	25 November 2016
Prepared by	Beejal Patel	Blake Dickson	Blake Dickson
Signature	-		
Checked by	Blake Dickson	Blake Dickson	Blake Dickson
Signature	-		
Authorised by	Peter Moore	Peter Moore	Peter Moore
Signature	-		
Project number	00039275.002	00039275.002	00039275.002
File reference	00039275_WSP_MV3_Stage 3 - CEMP_DRAFT	00039275_WSP_MV3_Stage 3 Area A – CEMP_FINAL	00039275_WSP_MV3_Stage 3 Area A – CEMP_FINAL_v2

Construction Environmental Management Plan

ACT Land Development Agency, Molonglo Valley Stage 3 (Area A)

November 2016

Client

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1 Introduction

1.1 Background

WSP Environmental Pty Ltd (WSP) was commissioned by ACT Land Development Agency (LDA) to prepare a construction environmental management plan (CEMP) at the Molonglo Valley Stage 3 development area (MV3) – Area A (southern portion).

The total MV3 area occupies approximately 1,145 hectares and has been investigated in two separable portions, namely 'Area A' pertaining to the lower half of MV3 (southern portion), and 'Area B' pertaining to the upper half of MV3 (northern portion). **This CEMP covers land wholly within Area A only.**

Area A was historically used for forestry and grazing purposes. The Site regional location is presented in Figure 1 and Site boundaries with allotment details in Figure 2, **Appendix A**.

Several bordering areas have been assessed and remediated with ACT EPA approved Site Auditor Statements indicating that the bordering sites are suitable for the proposed development / land uses. This applies to the Molonglo Valley Stage 2 areas to the west of the Site and Stage 1 (Coombs and Wright suburbs) to the south and west of the Site. A figure prepared by LDA in May 2014 (P00192C-01) is presented in **Appendix A** which presents an overview of the stages and previous consultant reports.

A Phase 1 Environmental Site Assessment (ESA) was conducted for MV3 identifying a number of areas of environmental concern (AEC's) and LDA required an assessment of the Site to determine land suitability from a contamination perspective. Following the ESA, a Stage 2 Detailed Site Investigation (DSI) was completed for Area A, detailing suitability for the proposed land use.

The final Stage 2 DSI report for Area A (WSP, June 2016) provides a listing of areas of environmental concern (AECs) and conditions encountered such as land filling and aesthetic issues for soils. This report shall be referred to for any detailed information of Site lithology, filling and areas that require soil management during future earthworks and development.

In summary, Area A was reported to have several areas of filling and some *in situ* asbestos piping (likely for water transfers) and management of several areas that contained anthropogenic inclusions within the fill. Further details on the Stage 2 DSI (WSP, June 2016) results for Area A are provided in Section 3.5.

1.2 Purpose and Scope of the CEMP

The purpose of the CEMP is to detail measures required to manage aesthetic soil impacts identified (and potential for unexpected finds) in subsurface materials within MV3 Area A in a manner which protects human health and the environment for the proposed future land uses. This will be achieved by applying controls and responsibilities for work requiring disturbance of soil, surface water and groundwater at the Site.

This CEMP has been designed to:

- Document the nature and extent of soil aesthetic issues and filling across the Site (as detailed in the Stage 2 DSI report);
- Identify the control measures required to protect the health of future site workers, the public and the environment from potentially contaminated or materials unsuitable from an aesthetic point of view for future reuse during construction and development of the Site;
- Identify responsibilities for the Site owner, notional owner(s), future contractors, consultants and ACT EPA approved auditors accredited in other jurisdictions under section 75(5) of the *Environment Protection Act 1997;*;
- Identify the waste tracking and disposal requirements for any contaminated materials identified or for beneficial reuse within the Site; and

- Provide procedures to manage potentially contaminated soil / fill that may be encountered during the works so that they are excavated, handled, transported, recycled (or disposed of) in accordance with relevant legislative requirements and guidelines.

1.3 Regulatory Framework

Key legislation relevant to contamination management is listed in **Table 1.1** below.

Table 1.1 Key legislation and guidelines

Relevant key legislation and guidelines	Application to the CEMP
Environment Protection Act 1997 (re-publication date 12 November 2014)	Establishes a process for prevention of environmental degradation and risk of harm to human health and the management of contaminated land. Offences exist in relation to activities that cause water, soil and air pollution. This Act also provides limitations associated with waste removal and reuse and the order to assess and remediate land.
Environment Protection Regulation 2005	Provides an assessment of contaminants, likely to cause harm, sources and application, movement in the environment, risks associated with the affect contamination has on the environment and human health. This regulation also details the procedures and protocols required to sample waste and erosion and sediment control measures for development sites. Soil, water and air pollution associated with generation, handling and disposal of waste are controlled through this CMP.
ACT Environment Protection Authority, *Contaminated Sites Environment Protection Policy*, 2009	The Contaminated Sites Environment Protection Policy (EPP) is designed to help people understand the *Environment Protection Act 1997 (*the Act) and the Environment Protection Regulation 2005 (the Regulation) as they apply to contaminated land.
Environment ACT 2000, *ACT's Environmental Standards: Assessment & Classification of Liquid and Non-liquid Wastes*	Defines types of wastes, procedures for assessing waste, waste storage and disposal requirements, record keeping and licence requirements. Applies to the handling, storage and disposal of contaminated materials, if uncovered during construction works.
Work Health and Safety Regulation 2011 (re-publication date 2 January 2015)	Provides for guidance for the application of the assessment of risks associated with health and safety associated with a hazard, task, thing, or circumstance. This regulation also provides risks associated with the disturbance of asbestos.
National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM; amended 2013)	Provides adequate protection of human health and the environment, where site contamination has occurred, through the development of an efficient and effective approach to the assessment of site contamination.
Work Health and Safety (Asbestos) Amendment Regulation 2014	Delivers regulations applying to the removal of asbestos from premises and the controls applicable during the time of removal.
Dangerous Substances (Asbestos Safety Reform) Amendment Bill 2014	Applies to the handling of asbestos, only if the handling is not commercial handling.
National Occupational Health and Safety Commission (NOHSC) 2005, *Code of Practise for the Safe Removal of Asbestos 2nd Edition*	Provides a framework for the safe removal of asbestos and asbestos contaminating materials (ACM) from buildings and structures, plant and equipment and vehicles.

Relevant key legislation and guidelines	Application to the CEMP
Western Australian (WA) Department of Health (DOH) 2009, *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*	Provides guidance for assessing and remediating asbestos impacted sites in order to minimise the risk to public health from the future use of the site.
Safe Work Australia 2011, *How to Safely Remove Asbestos: Code of Practice*	Provides guidance for the safe removal of ACM.

2 Report Limitations

The findings of this report are based on the scope of work outlined in Section 1.2. WSP performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental assessment profession. No warranties, express or implied, are made.

Subject to the scope of work, WSP's assessment was limited strictly to identifying typical environmental conditions associated with the subject property area and does not include evaluation of any other issues. This report does not comment on any regulatory obligations based on the findings. This report relates only to the objectives stated and does not relate to any other work undertaken for the Client. It is a report based on the concentrations observed in soil, water and air at the time of the sample collection. These conditions may change with time and space.

The absence of any identified hazardous or toxic materials on the subject property should not be interpreted as a guarantee that such materials do not exist on the site.

All conclusions regarding the property area are the professional opinions of the WSP personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, WSP assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside of WSP, or developments resulting from situations outside the scope of this project.

WSP is not engaged in environmental assessment and reporting for the purpose of advertising sales promoting, or endorsement of any Client interests, including raising investment capital, recommending investment decisions, or other publicity purposes.

3 Site Condition and Environmental Setting

3.1 Site Identification

Figure 2, **Appendix A** indicates the boundary of the Site and separation of Area A and Area B. **This CEMP covers land wholly within Area A only.**

The site details are summarised in **Table 3.1** below, and described in more detail in the following sections:

Table 3.1 Summary Site Details

Area	Site Detail
Molonglo Valley Stage 3 **Area A**	**Current Site Owner:** ACT Government. **Blocks and Territory Plan Land Use Zone:** ■ Part Block 70. RZ1: SUBURBAN; DES: DESIGNATED. ■ Part Block 71. RZ1: SUBURBAN; CZ4: LOCAL CENTRE; TSZ1: TRANSPORT; NUZ4: RIVER CORRIDOR; RZ3: URBAN RESIDENTIAL; CF: COMMUNITY FACILITIES; PRZ1: URBAN OPEN SPACE; DES: DESIGNATED. ■ Part Block 72. RZ1: SUBURBAN; TSZ1: TRANSPORT; NUZ4: RIVER CORRIDOR; PRZ1: URBAN OPEN SPACE; CZ1: CORE ZONE. ■ Part Block 74. RZ1: SUBURBAN; PRZ1: URBAN OPEN SPACE; DES: DESIGNATED. ■ Block 3: TSZ2: SERVICES. ■ Part Block 34. RZ1: SUBURBAN; NUZ4: RIVER CORRIDOR; PRZ1: URBAN OPEN SPACE; DES: DESIGNATED. **Current Land Use:** Predominantly forestry. **Site Area (approx.):** 4.65sqkm / 465 hectares. **Geographical coordinates for centre of Area A:** Lat: -35.298455, Long: 149.056320. (Sources: LDA, www.ACTmapi.act.gov.au, Nearmap - 7 November 2014).

3.2 Site Layout and Activities

3.2.1 MV3 Area A

Area A was a former pine plantation that was destroyed in the 2001 and 2003 bushfires. Specific features in the Area A include:

- Several farm dams;
- Former commercial forestry plantations of Radiata pine and regrowth forests currently planted;
- Dirt tracks traversing the area for forestry access;
- Several stockpiling areas typically for timber mulch;
- Drainage lines that typically drain from west to east towards the Molonglo River; and
- Several corridors for high voltage power lines and trunk sewer line run across the Site.

Surrounding land uses are predominantly agricultural grazing land, nature reserves, Canberra National Arboretum and Molonglo River and riparian zones.

3.3 Surrounding Landuses

3.3.1 MV3 Area A

Area A is surrounded by the following land uses:

- **North:** Area B Study Area and then William Hovell Drive followed by grazing lands;
- **East:** The Tuggeranong Parkway and Canberra National Arboretum followed by Lake Burley Griffin with farming and residential Lots;
- **South:** Molonglo River and the new residential suburbs of Coombs and Wright and John Cotter Drive.
- **West:** Molonglo River and the Molonglo Valley Stage 2 development area and then John Cotter Drive and open grazing lands.

3.4 Summary of Previous Investigations

A number of historical investigations have been conducted for Area A, and have been summarised in the Stage 2 DSI report (WSP, June 2016). Below is summary of the findings of the Area A Stage 2 DSI report.

3.4.1 WSP, (June, 2016) Stage 2 DSI Molonglo Valley Stage 3 (Area A)

The Stage 2 DSI report covering the Area A portion of the Site was prepared with a primary objective to determine the Site suitability (with regard to contamination) for development for a mixture of future urban residential, urban open space including a recreation and nature reserve along the Molonglo River corridor and limited core commercial and transport services.

The investigation and fieldwork was undertaken between December 2014 and January 2015 and comprised the following scope:

- Advancement of thirty two (32) test pit sample points (TP01 – TP09, TP44 – TP49 and TP82 – TP98).
- Collection of two sediment samples (SS01 and SS02) at two locations across the Site.
- Advancement of twenty seven (27) test pits (TP18 and TP19, TP50 – TP71 and TP77 - TP81) using a backhoe at locations that required deeper assessment of fill materials. This was typically concentrated in the central western portion of the Site near the Molonglo River channel.
- Collection of surface water samples (SW01 – SW05) at five (5) locations across the Site.

Variable subsurface conditions were reported during the excavation of test pits generally associated with the undulating topography across the Site. Fill material across the site were typically described as topsoil and gravelly and sandy clays, underlain by shallow weathered, low strength bedrock (dactite).

No olfactory signs of contamination were noted in soils at the site with the exception of organic odours in several drainage lines (such as TP78 and TP79 sampling locations). Visual indicators of contamination were minimal with the exception of buried construction debris and waste at ROBA_AEC20 and WSPA_AEC22.

One test pit location undertaken by Douglas Partners in November 2014 (TP123) identified an asbestos pipe at a depth of 1.3 mBGL. No visual indicators of ACM were reported at remaining sampling locations with the exception of the in situ piping noted above.

Concentrations for all analytes (Heavy Metals 8, TRH, BTEX, PAHs, Phenols, PCBs, OCPs, OPPs, Herbicides and asbestos) were reported below the laboratory Limits of reporting (LORs) and / or the respective adopted Site criteria for human health. A number of heavy metals were detected above the LOR but below the adopted human health Site criteria. Concentrations of heavy metals were generally consistent across the site and likely attributed to naturally occurring background concentrations. No asbestos was detected in bulk samples or 10 L field sieved samples analysed.

Three (3) soil samples reported minor exceedance of the EILs (zinc and nickel) in samples collected from fill material at ROBA_AEC20. Surface vegetation (grasses) and large trees within the ROBA_AEC20 area appeared to be in relatively good health with no obvious signs of distress.

The investigation concluded fill materials identified at ROBA_AEC20, WSPA_AEC22 and *in situ* asbestos pipe at TP123 (Douglas Partners, 2015) are not considered suitable to remain on the Site within any future residential land uses. The investigation stated, all asbestos materials such as underground pipes and services would need to be excavated and disposed off-site to a licensed waste disposal facility. It was reported, buried former sewer construction wastes at ROBA_AEC20 will not be suitable for *surface* uses under any land use due to the metals, plastics and concrete contained within the fill (aesthetic issues).

It was concluded that the Site can be made suitable for the future urban use and open space along the Molonglo River riparian corridor.

The following actions were identified prior to and during the proposed future development works (mainly associated with earthworks such as stripping and grubbing) to ensure any unexpected finds are managed according to best environmental practice:

- Carry out 'Soil Management' for the areas identified with anthropogenic wastes from an aesthetic contamination perspective. This may include segregation and sorting of soils and wastes and disposal or recycling where appropriate.
- Tracing and removal of asbestos containing materials such as *in situ* piping and potential other redundant utility services installed across the Site.
- Ensuring that any earthworks is carried out under the provision of an 'Unexpected Findings' protocol that identifies any potential soil or water contamination during future development of the Site.

This CEMP, has been prepared to address the 'Unexpected Findings' protocol, management objectives, responsibilities and actions identified above during the earthworks and future development of the Site.

3.5 Current Site Condition and Known Contamination

3.5.1 MV3 Area A

Chemical contamination of soils and groundwater was not identified as part of the Stage 2 DSI works in Area A.

Based on the Stage 2 DSI, Area A is generally reported to be suitable for the proposed mixture of future urban residential and urban open space with the exception of the following areas that require soil management during future earthworks and development.

- An *in situ* asbestos pipe identified at TP123 (Douglas Partners, 2015);
- Fill materials identified at ROBA_AEC20, WSPA_AEC22 containing aesthetic inclusions of construction waste including rusted reo bar, broken concrete, plastics, rope and electrical wiring and hoses; and
- Redundant underground pipes and services across the Site.

The above areas have been annotated for Area A in the figures from the DSI report presented in **Appendix A**.

The management procedures outlines in **Appendix C** of this CEMP should be used for management of the areas noted above. In addition to this, the chosen contractor must prepare a works methodology to remove redundant services and dispose of the materials in accordance with ACT EPA guidelines.

The fill materials at ROBA_AEC20 containing aesthetic inclusions of construction waste must have the waste materials segregated and disposed or recycled in accordance with ACT EPA guidelines. For ROBA_AEC20 (sewer construction waste rock), the rock and soil (not including anthropogenic wastes) could be reused within the Area A Site within non-residential zoned land and below the surface (such as subgrade or earthworks fill). The final reuse option must be discussed with LDA (and any other approval authority) as part of the final landscaping and earthworks plans approved for the Site.

4 Application of the CEMP

This section summarises the various parties that have been allocated a responsibility under this CEMP. The responsibilities have been allocated according to the party best placed to manage the requirements.

The responsibilities may be delegated where appropriate but this must be done in writing and notified to all affected parties.

4.1 Reference to the CEMP

The CEMP must guide the construction methodology planning and also be referred to under the following specific circumstances:

- Prior to commencing construction works that involve the disturbance of any soils within the Site;
- During work in any location where fill material is encountered, areas identified in Section 3.5 and as annotated on the Stage 2 DSI Figures within **Appendix A**;
- When the potential exists for asbestos material to become exposed, in fill material across the Site and / or redundant utility and underground service lines / pipes; and
- In the event that any unexpected potential contamination is encountered.

This CEMP has been prepared to be applied during the pre-design, earthworks and construction of the future urban area.

4.2 CEMP Induction

All project staff, field staff and sub-contractors must undertake an environmental awareness induction prior to their commencement of construction works on the site. Initial induction into the CEMP must be performed by a suitably qualified environmental consultant (SQEC). Subsequent inductions can then be performed by senior site personnel already inducted by the SQEC. The awareness induction will include, but not be limited to:

- Outline of the objective and purpose of the works; and
- Contents of the CEMP and individuals responsibility.

All project staff and sub-contractors will adhere to this CEMP. In addition to this, the civil sub-contractor may provide their own task specific CEMP (or similar document), which will be adhered to for the duration of the Site development works.

4.3 Responsibilities

Due to the works occurring at a future date, this CEMP has listed LDA as the entity responsible for the CEMP and its implementation prior to any development works occurring. The responsibilities may be delegated where appropriate (such as Contractors during site preparation, development and bulk earthworks) but this must be done in writing and notified to all affected parties.

LDA are to ensure that all occupants of the Site and contractors working on the Site have been informed of the requirements of the CEMP prior to commencement of any works, especially soil disturbance. A copy of this CEMP is to be kept on Site at all times during any construction or earthworks.

The supervisor or person-in-charge of works is responsible for implementing the requirements of the CEMP during the course of and at the completion of the works.

The specific responsibilities of LDA and the supervisor or person-in-charge of the works are outlined in **Table 4.1.**

Table 4.1 Responsibilities

Party	Responsibility of Party
LDA as the Site Owner / Project Manager	*General:* 1. Approve the CEMP 2. Advise persons working or operating on the site of the requirements of the CEMP. 3. Ensure LDA staff and any contractors comply with the requirements of the CEMP. 4. Ensure LDA staff and contractors clearly understand the requirements of the CEMP and ensure that compliance with the CEMP is a condition of any agreement with these parties. 5. Ensure the conditions of the CEMP are implemented and supplemented, if necessary, by any conditions of development or works approvals. 6. Commission a suitably qualified environmental consultant to update the CEMP if the condition of the site is changed, and, if necessary, inform other parties of the changes. 7. If necessary, commission a suitably qualified environmental consultant to undertake any necessary assessment, remediation, and/or validation of contamination identified during construction. 8. If necessary, engage suitably experienced contractors (licensed asbestos assessor and/or removalist) to undertake assessment and/or removal of asbestos containing materials. 9. If necessary, engage suitably experienced contractors (remediation). 10. Ensure the site is maintained in accordance with the CEMP. 11. Provide the CEMP for inclusion on the relevant records maintained by the ACT Government. 12. Ensure all non-conformance and/or complaints are recorded in **Appendix D** of the CEMP. 13. Ensure appropriate consents and licences (as required) are obtained for the works. 14. Provide training and induction of employees and contractors before and during the works, as appropriate. 15. Provide a copy of the CEMP to the supervisor or person-in-charge of the works being undertaken. 16. Ensure implementation of the CEMP.
Supervisor or person-in-charge of any major works to be undertaken on the site (Superintendent / Foreman / Construction Manager). **(Project manager/Contractors/ Subcontractors).**	*General:* 1. Implement the CEMP to ensure compliance. 2. Complete the registers, databases and records required by the CEMP. 3. Conduct works in an environmentally responsible manner. 4. Meet relevant occupational health and safety regulatory requirements. 5. Implement the works in a safe and responsible manner. 6. Ensure that environmental protection measures are in place and are functioning correctly during the works and after completion of the works. 7. Conduct monitoring as required in the CEMP. 8. Undertake audits of activities in accordance with the requirements of the CEMP. 9. Ensure non-conformance and/or complaints are reported to the appropriate personnel. 10. Ensure all works comply with relevant regulatory requirements.

Party	Responsibility of Party
Environmental Consultant	1. Develop this CEMP. 2. Provide support for implementation of the CEMP. 3. Site inductions and the provision of validation reports for unexpected finds. 4. Undertake environmental sampling and monitoring, if required. 4. If required, will provide recommendations for changes to the CEMP or additional works that may be necessary. 5. Supervise unexpected findings, if required.
EPA approved Site Auditor	1. Approve the CEMP. 2. Review investigation reports, RAPs, monitoring and validation reports, (if required). 3. Provide site audit statements etc. where gross contaminant impacts are identified. 4. Provided site audit statements or advice, if required.
Environment Protection Authority	The EPA must: 1. Approve subsequent revisions of the CEMP; 2. Endorse validation reports where UFPs are identified not requiring independent auditing; and 3. Approve the disposal or beneficial reuse of potentially impacted material from the site.

4.4 Enforceability of CEMP and Public Notification

This CEMP must be legally enforceable with the mechanism of enforcement left to LDA as the Site owner to decide.

This CEMP will be appended to the Site Audit Statement (SAS) for the Site (Area A) which will be recorded by the ACT EPA. The implementation of the CEMP is a requirement of the SAS for the site.

The CEMP should be enforced within the use of development approval conditions and contract terms for the Principal Contractor (specifically during earthworks). The Principal Contractor must also refer to the CEMP and known “soil management areas” that contain filling and the procedure for unexpected findings, responsibilities and reporting during all induction training.

With regard to public notification, if the development and construction is actioned through the ACT development approval process, once the approval is granted it becomes a publically available document automatically.

4.5 Document Revision

This CEMP is required to be reviewed annually and to be updated or amended when / where necessary. The CEMP must be updated if there is significant change in scope of work, future land uses, and planning design and / or if new previously unidentified sources of contamination are identified. A table of revisions is included at the beginning of this document to track any changes.

It is the responsibility of LDA to ensure the CEMP supplied to any person or company is current. The up-to-date version of the CEMP will be available from LDA on request. It is the responsibility of the supervisor or person-in-charge of works proposed to be undertaken to ensure they have the current version of the CEMP.

The EPA must review and approve all revisions to the CEMP.

4.6 Training

A safety and environmental induction protocol will be developed prior to construction work commencing and will provide the required information, instruction and training for all personnel having business on the site to enable their duties to be performed in a manner that is safe and without risk to health and minimises potential damage

to the environment. Initial induction into the CEMP must be performed by a suitably qualified environmental consultant (SQEC). Subsequent inductions can then be performed by senior site personnel already inducted by the SQEC.

The induction must cover the environmental controls identified in this CEMP and emergency response procedures in the event of an environmental incident such as a spill or release. If any additional training requirements are identified, during site works or review of the CEMP, these will be incorporated as an amendment to the CEMP and actioned accordingly.

LDA and/or the supervising contractor will be responsible for maintaining training records for the site, including who was trained, when they were trained, the name of the trainer, sign off pages and a general description of the training content.

An induction register is presented in **Appendix F** for use with this CEMP.

4.7 Reporting

The following reports may be required during the work:

- Waste classification letters, identifying any waste to be removed from Site, discussing analytical results and waste classification, prepared by the environmental consultant.
- Beneficial reuse reports for soils and fill materials that can be reused within the Site.
- Reporting requirements including a remedial action plan and/or provision of validation reports for unexpected finds which will be endorsed by the ACT EPA approved Site Auditor and ACT EPA.
- Inspection reports provided in **Appendix C.**

4.8 Non-conformance Preventative and Corrective Action

In the event of a non-conformance, the source and nature of the event will be investigated, the effectiveness of the existing controls reviewed and modified where practical, and necessary strategies will be implemented to minimise further impacts.

4.9 Emergency Response

All environmental emergencies must be reported to the EPA by calling the EPA On-call Office on 132281.

All unplanned events, irrespective of how minor the event, shall at the first opportunity be reported to the contractor's supervisor and then to LDA, relevant stakeholders and/or government agencies as necessary. Additionally, should any other site personnel, company visitors or contractors experience an unplanned event they should also report the event through their own organisation's internal reporting mechanism. Employees and contractors directly or indirectly involved with an unplanned event are obliged to assist with the investigation if requested to do so. All unplanned events shall be investigated. The degree and level of investigation shall depend on the severity of the actual event.

Discharge of water containing contamination, suspended matter, any oils or similar materials or any foaming or non-biodegradable detergents into the waterways on and adjacent to the work area is to be avoided using all proper controls. Any release of water may be a breach of ACT EPA regulations and may be subject to action by the ACT EPA.

Any occurrence which may result in the contamination of the land, surface or groundwater or air must be immediately reported to the EPA, site supervisor and LDA immediately. Any occurrence which does or may result in exposure of site workers or the public to contamination must be immediately reported to the site supervisor and LDA immediately and to emergency services if necessary.

4.9.1Spill Management

In the event of a chemical spill, including of potentially contaminated groundwater, the following procedures will be implemented:

- Work will be immediately ceased and the spill will be contained and cleaned up using the spill kit.
- For large leaks, which cannot be contained using the spill kit, or leaks that leave the site, emergency services will be contacted for assistance (000).
- All leaks and spills to be reported as environmental incidents.

5 General Site Management

5.1 Work Health and Safety Requirements

Prior to undertaking excavation works at the site, a site safety plan must be prepared to document occupational health and safety procedures on site. All personnel at the site must read and understand the safety plan and sign on prior to commencing any work on site.

5.2 Excavation Work

During excavation work the following procedures and controls must be in place:

- Ensure erosion and sediment controls are in place prior to works commencing particularly on highly erodible soils.
- Erosion and sediment control will include (where necessary):
  - Diversion banks/drains upslope of the work to divert water around the disturbed area. Drains must discharge onto stable, preferably vegetated surfaces or through sediment controls such as silt fences.
  - Level spreaders or straw bales at the end of diversion banks of any overland flow paths leading from the disturbed area, to dissipate flows and trap sediments.
  - Geotextile filter fabric fences down slope of the work areas.
  - Straw bales or filter fabric socks at the entrance to any drains, gutters or watercourses.
- Maintain all sediment controls as necessary until the site is stable. Once the project site has been stabilised, temporary sediment controls will be removed
- Any permanent water-retaining structures or other erosion and water management controls will be routinely maintained.

On completion of excavation works:

- Any exposed areas are to be stabilised (that is, compacted, sealed or vegetated) as soon as practicable following completion of works.
- Erosion and sediment controls devices are to be removed once work areas have been rehabilitated.

Further best practice information on excavation work is available in the *Environment Protection Guidelines for Construction and Land Development in the ACT"*, March 2011.

5.3 Spoil Management

Stockpiles must be placed to minimise environmental impact. The design of stockpile(s) should include:

- Bunding.
- An impervious pad on which to place stockpiles.
- Minimisation of the amount of water infiltration – consider using some form of cover or capping if soil is to be stockpiled for an extended period of time.
- Sediment control upslope to prevent run-on water.

To manage spoil effectively and meet the above requirements, excavated materials should be stored in a designated area at each site and re-used or disposed of off-site as soon as possible following excavation.

5.3.1 Contaminated Spoil Management

Spoil containing contaminated material will require additional management to minimise potential spread of contamination or leachate. This includes:

- Stockpiles containing asbestos and/or other contamination should be placed on and covered with plastic sheeting to minimise vertical leaching and infiltration. Any cross contamination to underlying soils from inappropriate stockpiling methods will result in the need for potential further scrapping of soils and validation of the stockpiling area(s) by a suitably qualified environmental consultant.
- Stockpiles containing asbestos should be monitored for dust and if necessary should be kept moist to prevent dust production.
- Soil that has the potential to generate vapour or odour should be kept covered and monitored to prevent exposure.
- All leachate from spoil stockpiled must be contained, monitored, tested and where required either disposed offsite to a licensed liquid waste facility or reused subject to approval (for example dust suppression on roads).

5.3.2 Material Tracking

Stockpile tracking should include the following:

- The location, dimensions, volume, source and contamination status, on-site and off-site, if removed for disposal.
- Where stockpiles are moved on-site, the new location and any required validation of the area where the stockpile was removed should be recorded.

The contractor must prepare a suitable material tracking document or system and keep records of the movement of any stockpiles generated on the Site. The records must be kept during construction and for at least seven (7) years after construction (or longer if advised by LDA).

All EPA approvals for the disposal, discharge or beneficial reuse of material from the audit area must also be recorded.

5.4 Waste Disposal

5.4.1 Waste Classification for Off-site Disposal of Soil and Fill

Waste classifications are required for any excavated soil or fill material which is to be disposed of off-site. Soil or fill material to be taken off-site for disposal shall be assessed in accordance with the Environment ACT 2000, *ACT's Environmental Standards: Assessment & Classification of Liquid and Non-liquid Wastes.* Waste classification letters reporting details of material disposed off-site must be provided to the ACT EPA for approval prior to removing material offsite in accordance with the ACT EPA 2014, *Information sheet 4 – Requirements for the reuse and disposal of contaminated soil in the ACT*. No potentially impacted material is to be disposed or discharged off-site without EPA approval.

Material for off-site disposal may also be assessed for suitability for beneficial reuse. Where material is intended for beneficial reuse, a beneficial reuse assessment (BRA) is required to be undertaken in accordance with the ACT EPA 2014, *Information Sheet 4 – Requirements for the reuse and disposal of contaminated soil in the ACT*. Criteria used for the BRA must meet the proposed land uses of the intended placement location.

Materials excavated from the site must be tracked from 'cradle to grave', in order to provide detailed and accurate information about the location and quantity of all materials both on and off-site from the time of their excavation until their disposal. All waste disposal documentation must be retained for inclusion in validation reporting.

For any truck or bin leaving the site, the following information would be recorded:

- Origin of material.
- Material type.
- Approximate volume.
- Truck and/or bin registration number.

5.4.2 Waste Classification for Off-site Disposal of Groundwater

Groundwater is not expected to be intercepted as a part of site works, however, in the event that any dewatering or collection of groundwater from excavations is required, the following procedures must be followed:

- Any water pumped from the excavations or runoff collected is to be stored in retention basins or fully contained tanks on-site in preparation for disposal to an ACT EPA licenced facility.
- Water samples are to be collected that are representative of the stored water; this may require sampling from different depths by a suitably qualified environmental consultant, particularly if the water has been stored long enough to allow it to settle. Samples must be analysed for contaminants of concern; i.e. TRH, BTEX, PAHs, metals, PCBs, chlorinated hydrocarbons and/or pesticides, where appropriate (subject to environmental consultant advice). A sufficient quantity of sample, pre-filtered and/or preserved (if required) must be placed in appropriate sample containers and stored so as to allow a range of chemical analyses to be performed.
- Liquid waste will be disposed of in accordance with *Waste Classification Guidelines* (Environment ACT, 2000).

5.4.3 Classification of Material for Reuse On-site or Off-site

If material is intended to be beneficially reused it must be stockpiled separately to waste materials after excavation. Material must be tracked from the time of excavation to the location of reuse. Details of the material must be reported and a BRA must be prepared and submitted to the ACT EPA for approval. If material is planned for beneficial reuse off-site, approval from the receiving site must be obtained. The ACT EPA 2014, *Information sheet 4 – Requirements for the reuse and disposal of contaminated soil in the ACT* must be referred to for requirements regarding reporting and reuse of material. Criteria used for the BRA must meet the proposed land uses of the intended placement location.

No potentially impacted material is to be beneficially reused off-site without EPA approval.

5.5 Importation of Materials

All soil materials imported for use at the site must be assessed to confirm that they are suitable for use at the site. Imported soil materials to the site can comprise VENM, ACT EPA approved beneficial reuse material, or other approved material. For beneficial reuse material imported to site, a BRA assessment of the material endorsed by the ACT EPA is required.

For imported VENM, a VENM certificate is required. Where other material is to be used (e.g. material for road construction), approval from ACT EPA may be required.

Assuming material is accompanied by appropriate documentation, samples will be collected and analysed at a rate of approximately 1 sample per 100 m^3 for the first 1,000 m^3 of imported fill material and then 1 sample per 500 m^3 thereafter (assuming the same source). Imported fill samples would be submitted for analysis of TRH,

BTEX compounds, PAHs, pesticides, PCBs, asbestos and heavy metals. Samples should not contain any evidence of contamination (by visual, olfactory, or laboratory analysis). Should documentation be considered insufficient, additional sampling may be required to further assess the material(s).

The results of validation sampling must be compared to the NEPM (2013) land use criteria for human health and the environment.

5.6 Construction Works

This section outlines general requirements for works that could significantly disturb known filled areas and potentially contaminated material at the Site. The induction sign off for construction, contractors and maintenance workers are outlined in **Appendix F**.

Major works proposed for the project area include (but are not limited too):

- Construction preparatory works such as offices, sheds and access tracks.
- Grubbing and stripping of vegetation and topsoil's.
- Major earthworks, grading, levelling and compacting.
- Piling, trenching and linear excavations.
- Road construction and cutting / filling.
- Light pole installation and ancillary utility services.
- Construction of retaining wall(s); and
- Landscaping, tree planting and/or removal of trees.

For any major works, determine if specific controls are required. General controls measures for major works comprise:

- All site construction workers and contractors must complete a site induction prior to commencing any maintenance or construction works at the site (provided in **Appendix F**). The induction must cover the contingency plan and unexpected findings protocols in sections 5 and 6 of this document.
- A work health and safety (WHS) plan should be prepared by the contractor which will include safe work method statements (SWMS). This must recognise this CEMP.
- Throughout the duration of any excavation or site works, site personnel should ensure a suitably competent supervisor is present at all times to observe excavations.
- Appropriate personal protective equipment (PPE) must be worn. Based upon the contaminants of concern at the site, long sleeved shirt, long pants and protective gloves (preferably nitrile gloves, below leather gloves) should be worn when undertaking any intrusive works. Where dusty conditions prevail, a fine water mist should be applied during excavation. A disposable P2 dust mask should also be utilised in areas where asbestos may be potentially present.
- Good personal hygiene must be implemented by maintenance workers at the site, including:
  - no eating, drinking or smoking during works
  - avoid contact with soil (wear gloves)
  - wash hands and clothes after work
  - Wash hands before eating, drinking or smoking.
- Dust prevention measures must be put into place – if the conditions are windy, this may include dampening of fill materials prior to and during excavation works.
- The surface capping material must be reinstated following removal and disposal of all excavated potentially contaminated fill materials.

5.7 Achievement and Management of Objectives

5.7.1 Induction

Initial induction into the CEMP must be performed by a suitably qualified environmental consultant (SQEC). Subsequent inductions can then be performed by senior site personnel already inducted by the SQEC.

All personnel, including subcontractors, undertaking major works on the site will be made aware of the requirements of this CEMP and will receive an environmental induction prior to commencing work. These inductions shall be recorded in **Appendix F** or a similar recording sheet provided by the Principal Contractor.

5.7.2 Duration

The CEMP shall remain applicable to the Site until such time as final construction is finished. This shall be determined by the LDA and will principally mean that all Site earthworks, roads, pavements, utilities, housing and other ancillary development works have been completed within the Site.

5.7.3 Monitoring and Reporting Requirements

Monitoring of any site maintenance / excavation works may be undertaken to check whether the CEMP is being effectively implemented by the maintenance workers / site users / subcontractors and whether any corrective actions are required. The inspection and monitoring activities that could be undertaken are outlined in **Table 5.2.**

Table 5.2 Monitoring and measurement for works

Action	Responsibility	Frequency
Develop a WH&S plan	LDA / Principal Contractor	As required for major works
Monitor site maintenance works and effectiveness of risk mitigation measures	LDA / Principal Contractor	As required for major works
Monitor dust generation and implement mitigation measures	LDA / Principal Contractor	As required for major works
Disturbed areas to be reinstated and revegetated on completion of site maintenance works	LDA / Principal Contractor	As required for major works
Monitor effectiveness and control of waste management of contaminated soils and appropriate disposal	LDA / Principal Contractor	As required for major works

6 Work Health and Safety (WH&S)

6.1 Site Hazards

Results of chemical testing to date indicate that the fill material is unlikely to represent an unacceptable risk to construction workers provided they conduct their work in accordance with generally accepted work health and safety procedures on construction sites.

Nevertheless, during construction activities, it is possible that workers may come into contact with contaminated material that has not yet been observed or characterised. Potential hazards exist through dermal contact, ingestion or inhalation of soil or groundwater containing chemical contamination (e.g. heavy metals, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, polychlorinated biphenyls, semi-volatile and volatile organic compounds and asbestos). This risk needs to be appropriately managed.

Recommended personal protective equipment (PPE) may include disposable coveralls, gloves and suitably rated dust masks. Safety glasses may be required if there is a risk of soil or groundwater contact with the eyes.

It is essential that the Principal Contractor prepares and implements a project work health and safety plan, and reviews risk assessments and specific work method statement (SWMS) including job safety analysis (JSA) to assess the specific risks associated with the proposed works.

6.2 Competence, Training and Awareness

Prior to commencing any work at the Site, the contractor must ensure that all employees and subcontractors are provided with the appropriate level of environmental training to achieve the level of awareness and competence appropriate to their assigned activities.

For the proposed construction works, the Site Supervisor will be on-site at all times to conduct and/or supervise the works. The Site Supervisor will engage with any contractors by means of a daily toolbox talk before the start of daily site works to ensure all environmental controls are implemented and any new hazards are identified, assessed and controlled.

All project staff and subcontractors will:

- Become fully briefed and aware of the work they are required to carry out.
- Possess the necessary technical skills, knowledge, training and experience to carry out the work and appropriately manage any associated environmental risk.
- Have the necessary qualifications, certification and competencies required to satisfy applicable environmental legislative requirements and appropriately manage any associated environmental risks.
- Have appropriate verbal language and literacy skills.
- Be qualified with an *Asbestos Awareness Training* certificate by an authorised training supplier.

6.3 Safe Work Practices

The following safe work practices should be employed as a minimum during any construction works performed on site:

- Eating, drinking, chewing gum or tobacco, smoking or any practice that involves hand to mouth transfer increases the probability of ingestion of foreign matter into the body should only be undertaken in a dedicated area away from the work Site. Personnel must ensure that hands are thoroughly washed with an appropriate sanitiser before eating, drinking or smoking;
- Any clothing that becomes dirty from on-site work should be disposed of or washed separately from other clothes; and

- Awareness of potentially explosive or harmful atmospheres (e.g. in confined spaces and / or excavations). Where a potential risk is deemed to exist, appropriately calibrated and intrinsically safe instrumentation should be used by a suitably trained operator.

6.4 Asbestos

Based on the finding of the previous investigation (WSP, June 2016), and the likely age of the known fill at the Site, asbestos may be encountered within redundant service lines / utilities and minor filled areas. In the event of asbestos being encountered, the following controls should be put in place.

All asbestos in soil removal / remediation works undertaken within the Site must be undertaken in accordance with the Work Health and Safety *(Asbestos) Amendment Regulation 2014,* Safe Work Australia 2011, *How to Safely Remove Asbestos: Code of Practice* and any other applicable WH&S requirements.

Further advice is provided in **Appendix E – Unexpected Findings.**

7 Unexpected Findings

Chemical contamination that may not have been detected during previous investigation works may be discovered during the course of excavation works. Such contamination may be discovered due to observations such as:

- Odour.
- Discolouration or staining of soil or rock.
- Seepage of unusual liquids from soil or rock.
- Unusual odours or sheens on groundwater.
- Unusual metal objects.
- Presence of underground storage tanks.
- Presence of oil.
- Presence of waste or rubbish above or below ground.
- Potential asbestos containing material.
- Unusual colour in soil and groundwater.

If such contamination is discovered, the following procedure will be implemented:

- Excavation will cease in the vicinity of the discovery.
- The Contractors authorised person will be informed immediately of the event.
- Excavation should stop and a suitably experienced environmental consultant should undertake an assessment of any unexpected finds and determine any further actions required e.g. sampling and/or validation of material, potential for remediation and/or management.
- A form recording the unexpected find/s should be completed and the register updated and signed off as appropriate (see **Appendix E**).
- Excavation will not recommence until the extent of the contamination has been assessed and, if necessary, a remedial action plan (RAP) has been prepared.
- Recommencement of development activities in an area requiring remediation and validation cannot take place until the EPA has reviewed and endorsed the consultant's validation report into the suitability of the area for its permitted uses.
- The material will be separated from other materials and stockpiled for assessment.
- Sampling of the materials will be undertaken in accordance with the relevant guidelines or professional judgement where justification is applied.
- Samples will be analysed for a range of analytes as required.
- Laboratory results will be assessed to determine the appropriate waste classification of the material in accordance with the Environment ACT, 2000, *ACT's Environmental Standards: Assessment & Classification of Liquid and Non-liquid Wastes*.
- Depending on the classification, material already excavated and stockpiled will be transported to an appropriate waste facility that is licensed to accept waste of the relevant classification or beneficially reused if appropriate. The material should be assessed in accordance with *EPA Information Sheet 4* thus potentially allowing waste disposal or beneficial reuse options. Any disposal or reuse of material requires EPA approval.
- Depending on the classification, vehicles transporting the waste may need to be licensed in accordance with ACT EPA requirements. Prior to works commencing appropriate instruction shall be obtained from ACT EPA.
- A waste tracking system recording the volume of material, waste classification status, removal documentation and truck and receiving landfill facility details must be recorded to ensure all waste is accounted for and disposed of appropriately in accordance with ACT EPA requirements. **Refer to Section 5.3.2 for Material Tracking requirements.**

Any unexpected finds must be documented in the validation report to be prepared at the completion of construction, if required. For 'ad hoc' and minor volumes of materials identified (i.e. <10m^3) records must be kept on file.

Please note that an Unexpected Finds Management Plan (UFMP) has been prepared for both potential contaminated land and unexploded ordnance (UXO) that covers the entire Molonglo Valley Stage 3 development area (November, 2016 WSP | Parsons Brinckerhoff). Reference to the document is provided in Section 11.

8 Construction Works

8.1 Identification of Potential Environmental Impacts During Construction

There are potential environmental impacts (including those to soil, air and water) associated with the identified activities to be performed as part of the proposed works. Procedures required to control potential environmental emissions to acceptable levels have been identified, and are noted in **Table 8.1** along with references to relevant management protocols provided in **Appendix C.**

Table 8.1 Potential Environmental Impacts on Construction Site

Activity	Potential Impacts	Management Procedures
Handling/excavation of Soils	Dust generation Odour generation Air emissions Contamination of heavy equipment Sediment migration Noise generation	01 Air Quality, Odour and Dust 02 Contaminated Materials (Soil and Water) 03 Sediment Control 05 Noise 06 Traffic 07 Emergency Response 08 Unexpected Finds
Stockpiling of Soils	Dust generation Odour generation Contamination of heavy equipment Sediment migration Noise generation Release of contaminants to sub-surface soils and groundwater	01 Air Quality, Odour and Dust 02 Contaminated Materials (Soil and Water) 03 Sediment Control 04 Waste Management 05 Noise 07 Emergency Response
Offsite Disposal of Wastes (if required)	Dust generation Odour generation Contamination of heavy equipment Sediment migration Noise generation Unlawful transport or disposal	01 Air Quality, Odour and Dust 02 Contaminated Materials (Soil and Water) 03 Sediment Control 04 Waste Management 05 Noise 06 Traffic

8.2 Responsibility for Implementation of Environmental Procedures

A number of environmental procedures are referred to in **Table 8.1** above for control of potential emissions during works on the Site. A copy of each environmental procedure referred to is provided in **Appendix C.**

The procedures should be reviewed and amended as necessary to ensure that they are suitable / relevant to the proposed works.

To allow the implementation of each procedure, relevant parties are to be allocated the responsibilities for execution. **Table 8.2** indicates the responsible party(s) for each procedure. Each organisation with responsibility for delivery of aspects of the project must be familiar with the requirements of each of the procedures relevant to their work. Each sub-contractor should ensure their work method statements refer to and adopt the recommendations of the protocols as a minimum requirement.

Table 8.2 General Summary of Responsibilities for Environmental Procedures

Procedure	Principal Contractor	Sub-Contractors	Environmental Consultant
EMP01 Air Quality, Odour and Dust	x	x	
EMP02 Contaminated Materials (Soil and Water)	x	x	x
EMP03 Sediment Control	x	x	
EMP04 Waste Management	x	x	
EMP05 Noise / Vibration	x	x	
EMP06 Traffic	x	x	
EMP07 Emergency Response	x	x	
EMP08 Unexpected Finds	x	x	x

8.3 Pollution Incident Notification

All incidents and complaints encountered during works will be reported to the Site Supervisor. A register will be maintained as shown in **Appendix D** to ensure that any concerns are recorded and addressed. In the event of any environmental pollution incident:

- Refer to EMP07 (**Appendix C**) for general emergency response requirements.
- The Project Manager will ensure that, if required, notice is given of occurrence to the ACT EPA or any other relevant statutory authority.
- Promptly provide key personnel a copy of any notice received from or any penalty imposed by ACT EPA or Council.

8.4 Contingency Plan

It is important that the Contractor establishes contingency plans should environmental issues arise during the future construction works. Potential issues and control measures are provided in **Table 8.3** below:

Table 8.3 Contingency Plan

Environmental Consideration	Issue	Possible Control Measures
Discovery of Unknown Materials	Exposing potentially contaminated soil and / or material of unknown origin and composition to workers or future users of the site.	If potentially contaminated material is encountered during excavation (e.g. drums, petroleum or other strong odours, etc.), cease work, secure the area and immediately notify the Site Manager and Environmental Consultant. Advice must be sought from a suitably qualified environmental consultant as to the nature and origin of the material and associated potential health hazards. See EMP08 Unexpected Finds (**Appendix C**).
Air Quality	Excessive dust generated during excavation	Keep loose surfaces, stockpiles moist or covered. Monitor dust levels visually. Cease dust generating activities if excessive dust is being generated and during periods of high wind. See "EMP01 Air Quality, Odour and Dust (**Appendix C**).
	Odours developed during penetration of the cap	If odours are encountered, work will temporarily be ceased while the odour dissipates to acceptable levels. If the odour continues to be present during excavation works, the work is to be stopped and the source and nature of the odour investigated by a suitably qualified environmental consultant. See EMP08 Unexpected Finds and EMP01 Air Quality, Odour and Dust (**Appendix C**).

Environmental Consideration	Issue	Possible Control Measures
Waste	Potentially contaminated excess soil generated	Avoid over excavation and reuse / retain soil within site where appropriate. If offsite disposal is required, classify the waste in accordance with relevant EPA guidelines. See also EMP04 Waste Management (**Appendix C**).
	Potentially contaminated groundwater generated	Where practicable, avoid excavations below the groundwater table and avoid dewatering. If offsite disposal is required, the water should be tested and disposed of appropriately to a licensed waste facility in accordance with relevant EPA guidelines. Alternatively, a trade waste permit can be obtained through LDA. See also EMP02 Contaminated Materials (Soil and Water) and EMP04 Waste Management (**Appendix C**).
Spillages and Leakages	Spillages of oils and lubricants from machinery contaminating the site surface	Refuel plant and equipment in a designated area away from landscaped areas, excavation or 'open cap' areas or near joins in the concrete pavement. Make available 'spill kits' on site. Clean up spillage as soon as practicable using spill kits. See also EMP02 Contaminated Materials (Soil and Water) and EMP04 Waste Management (**Appendix C**).
Spillages and Leaks	Tracking of dirt from site onto public roads	Check vehicle tyres and clean off excess mud / soil and install a grate at entrance / exit. Install a wheel wash bay at entrance / exit, if necessary. See also EMP03 Sediment Control (**Appendix C**).
Soil and Water	Erosion of loose soils and from stockpiles	Contractor to prepare a Soil & Water Management Plan prior to commencement of works to details site specific soil and water control measures and provide this to the Site Manager for approval. Install sediment fencing down-gradient of the excavation / construction areas. Install silt traps or straw bales around storm water drains / grates. Excavated materials resulting from small-scaled short term excavations should be temporarily placed adjacent to the excavations where appropriate. Where excavated materials cannot be backfilled within one day, the excavated materials should be placed in designated stockpiles and controlled accordingly. See also EMP03 Sediment Control (**Appendix C**).

9 Ongoing Maintenance and Site Activities

Ongoing management of the Site, post construction, is to be managed by the respective Site owner, local Government body or other nominated entity in consultation with LDA. The final responsibility for ongoing post land development maintenance cannot be determined at this time. It has been assumed that any aesthetic issues in soil and potential contamination will be recorded and managed during the construction phase of the urban development. Therefore, it is not envisaged that an overarching CEMP or long term EMP would be required for future excavations across the Site such as trenching for underground services or future excavations.

Where on-going management of contamination is identified and considered necessary following development the area must be re-audited by an EPA approved Site Auditor and the audit findings into site suitability and the adequacy of the management plan endorsed by the EPA prior to occupancy of the site.

10 Periodic Review

Any revision to the CEMP must be performed by a SQEC and endorsed by the EPA prior to its implementation.

The future Construction Project Manager will review the effectiveness of the CEMP during the construction works, on an annual basis and following any incident or other event that suggests the CEMP is ineffective. Furthermore, the Construction Project Manager will record any review of the CEMP undertaken and ensure that any improvements deemed necessary are implemented and communicated to relevant parties.

During the course of the works, if the scope changes, anticipated soil conditions change (e.g. hydrocarbon contamination suspected or large volumes of uncharacterised filling) and / or environmental damage results from exposure to a contamination hazard, then the adopted control measures will be assessed and revised accordingly. Any necessary control measures will be implemented following agreement with the Construction Project Manager.

11 References

ACT EPA (2014) *Information Sheet 4 - Requirements for the Reuse and Disposal of Contaminated Soil*

ACT Government (2014) *Dangerous Substances (Asbestos Safety Reform) Amendment Bill 2014*

ACT Government (2014) *Work Health and Safety (Asbestos) Amendment Regulation 2014*

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ENVIRON, January 2014. *Site Audit Report, MV3 River Corridor, Priority Works Area, Molonglo Stage 3*.

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WSP Environmental, October 2014. *Due Diligence – Review of Ecological and Heritage Information for Molonglo Stage 3 Area.*

WSP Environmental, December 2014. *Molonglo Valley Stage 3 (Area A) Sampling, Analysis and Quality Plan (SAQP).*

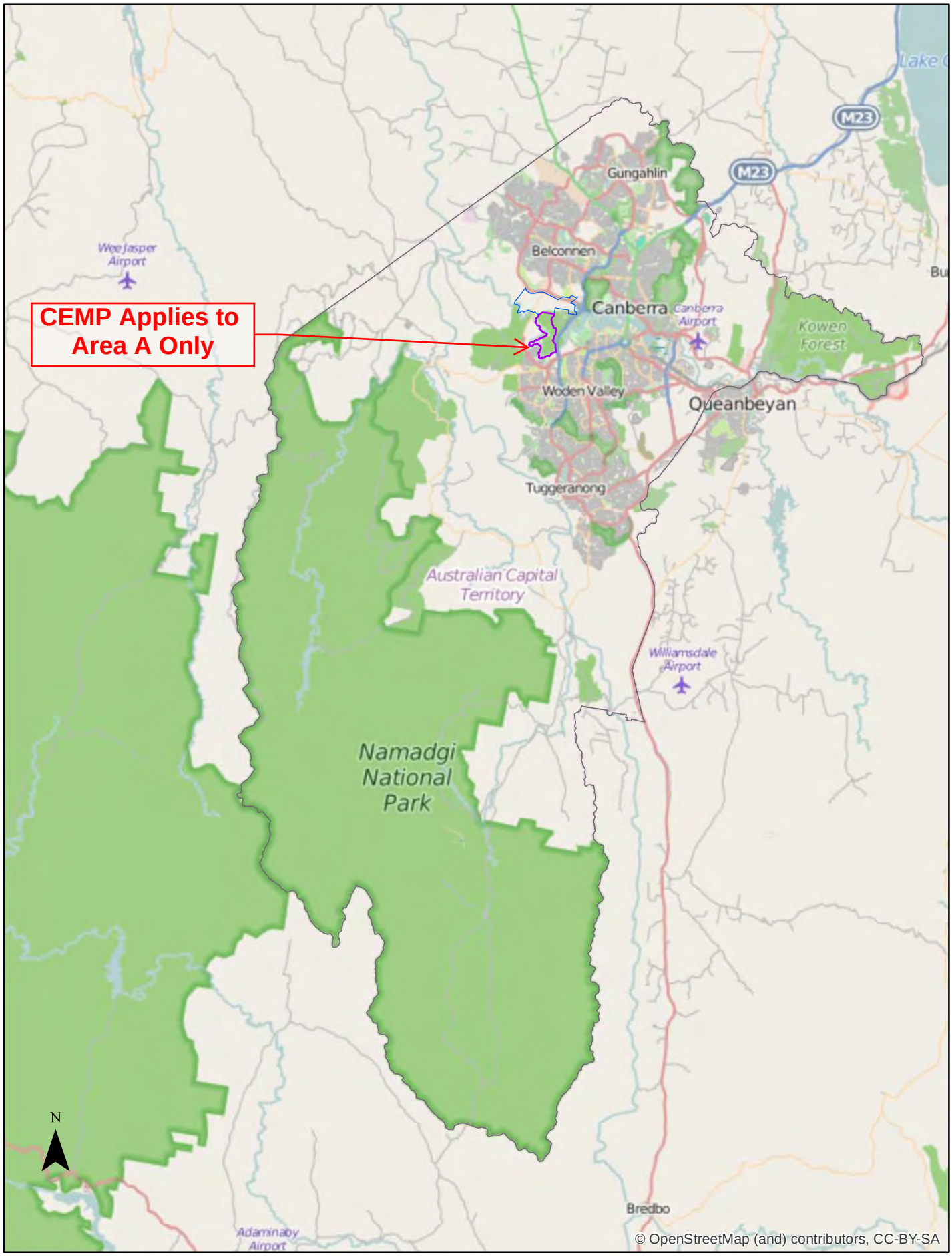
WSP | Parsons Brinckerhoff, November 2016. *Unexpected Finds Management Plan, Contaminated Land and Unexploded Ordnance / Exploded Ordnance Waste, Molonglo Valley Stage 3 (Future Urban Area).*

Western Australian Department of Health (2009) *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*.

ZOIC Environmental Pty Ltd, July 2014. *Site Auditor Interim Advice No.1 - Review of Existing Investigation Reports and Phase 1 Environmental Site Assessments (Robson, 2014) for Molonglo Valley Stage 3 Future Urban Area.*

ZOIC Environmental Pty Ltd, November 2014. *Site Auditor Interim Advice No.4 - Review of Draft Sampling, Analysis and Quality Plan (SAQP) (WSP, 2014) for Area A, Molonglo Valley Stage 3 Land release.*

Appendix A – Site Figures



10 5 0 10 Kilometers

Molonglo Valley Area A

Molonglo Valley Area B

ACT Boundary

FIGURE 1 - Site Location

Project 00039275
Contamination Environmental Mgmt Plan

Area A

Area B

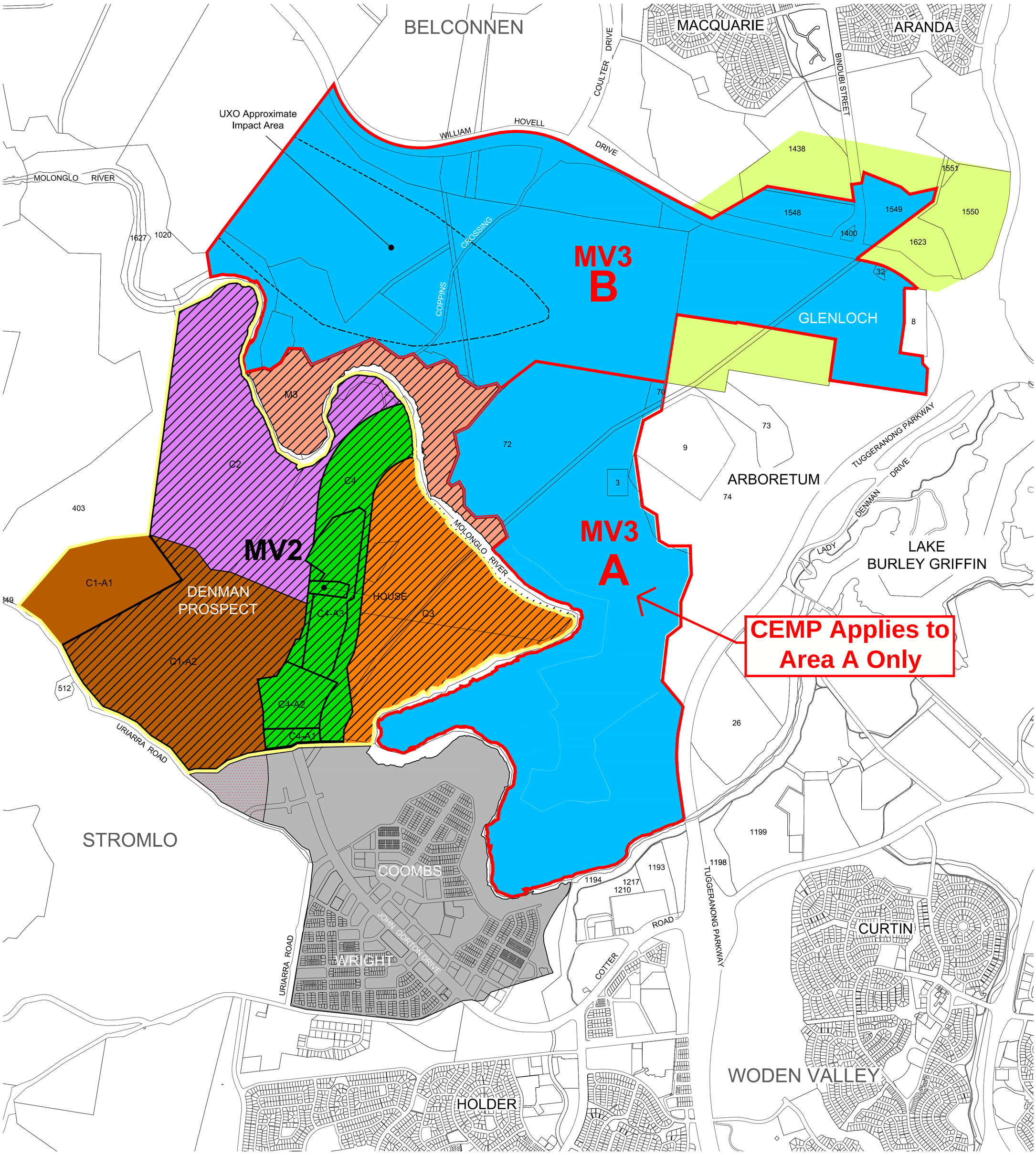
Cadastre

800 400 0 800 Metres

Image Source:
NSW Land & Property Information

FIGURE 2 - Site Boundaries

Contamination Environmental Mgmt Plan



LEGEND

- MOLONGLO 2 STUDY AREA BOUNDARY
- MOLONGLO 3 STUDY AREA BOUNDARY
- AECOM MV2-C1 EXTENT (ENVIRON)
- ROBSON PHASE 1
- COOMBS/WRIGHT STUDY AREA
- AECOM MV2-C2 EXTENT (ENVIRON)
- WSP PHASE 2 (ZOIC)
- AURECON PHASE 1
- AECOM MV2-C3 EXTENT (ENVIRON)
- AECOM PHASE 2 (M3) (ENVIRON)
- AUDITED
- AECOM MV2-C4 EXTENT (ENVIRON)
- UXO Approximate Impact

FIGURE 3 - Molonglo Valley Stages, Previous Audited Areas and Consultant Reports
Project 00039275
Construction Environment management Plan

REVISIONS			
No.	Approved by	Drawn by	Date

SCALE/NORTHPOINT

N

0 250 500 750 1000 1250

1:30000@A3 1:15000@A1

DIRECTORATE/DEPARTMENT

ACT Government | Land Development Agency CANBERRA FIRST

PROJECT

MOLONGLO 3

DRAWING TITLE

MOLONGLO VALLEY
CONTAMINATION STAGE PLAN

PROJECT NUMBER	DRAWING NUMBER	AMENDMENT
P00192E	01	
AutoCAD Saved: 19/09/2016	Plotted: 19/09/2016 11:00:14 AM	By: ----

G:\LDA\5. LRP g-z\Molonglo 3\9. Maps and Figures\P00192 MV Contamination Stage Plan\P00192E.dwg

E2
E3
RobA_AEC20
F2
F3
G2
G3
WSPA_AEC22
N

AreaA_AEC_Points
AreaA_Soil Management Areas

100 50 0 100 Meters

Image Source: Nearmap.
Aerial dated 29 October 2014

FIGURE 8a - Area A Soil Management Areas

00039275 Phase 2 Detailed Site Investigation (Contamination) Molonglo Valley Stage 3

AreaA_AEC_Points
AreaA_Soil Management Areas
AreaA
AreaB

100 50 0 100 Meters

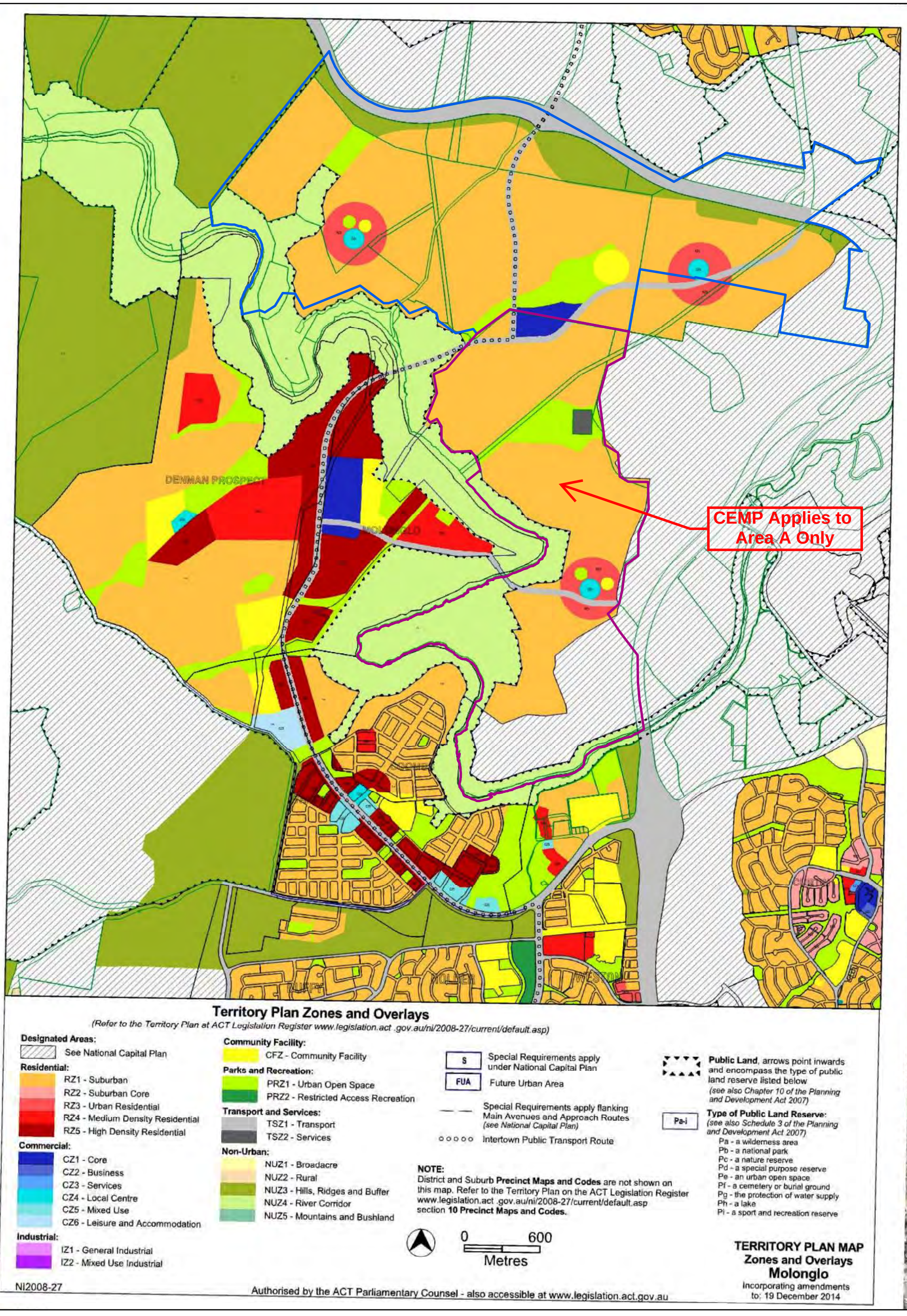
Image Source: Nearmap.
Aerial dated 17 January 2015

WSP

FIGURE 8b - Area A Soil Management Areas

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3

Appendix B – Future Urban Area Landuse



Legend

- Molonglo Valley Area A
- Molonglo Valley Area B

1,000 500 0 1,000 Meters

Background Image Source: Nearmap.
Aerial dated 17 January 2015

WSP

FIGURE 4 - Current and Future Land Zoning

00039275 Phase 2 Detailed Site Investigation (Contamination) Molonglo Valley Stage 3

Appendix C – Site Management and Environmental Procedures

AIR QUALITY, ODOUR AND DUST	EMP01
Responsibility	Principal Contractor (Site Supervisor)
Frequency	All site works
Location	Site
Objective	Minimise dust, odour and hazardous airborne substances from the earthworks

Procedure

Excavation and handling of soils has the potential to generate dust, odour and vapour emissions.

Standards

All operations of the site are to be conducted so that the concentrations of dust, odour and other hazardous airborne substances satisfy those stipulated in ACT EPA published and endorsed guidelines. These include:

- NEPC (1998) '*National Environment Protection Measure for Ambient Air Quality*'

Control and Management

The air quality will be visually and olfactory monitored on a daily basis by the Site Supervisor as excavations progress. Control measures to be implemented during works include:

- Evaluation of weather conditions (including changes in wind direction) prior to and during works
- Minimisation of vehicle movement on exposed ground particularly in areas adjacent to residential properties
- If dust generation is excessive, employ water spray or cease works
- Stockpile heights kept to a minimum, with stockpiles to be kept covered or moist
- Ensure plant equipment emissions comply with air quality standards
- Use of odour suppressants (such as Biosolve) in areas adjacent to sensitive receptors
- Use of surfactant suppressants to control odour when necessary
- Cover all contaminated material being transported from site in accordance with ACT EPA requirements
- Temporary backfilling of problem excavation areas producing excessive dust/odour where necessary
- Adoption of necessary personal protective equipment by personnel on the Site
- Site Supervisor will visually monitor the Site boundary and works area for the presence of dust as works progress. During works with a potential for dust generation, this should be undertaken on a minimum hourly basis.
- Any complaints will be reported to the Site Supervisor and a communication and complaints register will be maintained to ensure that any concerns of local residents and members of the public are recorded and addressed.

Additional specific requirements have been developed for soils which are identified as potentially malodorous as detailed in EMP02 Contaminated Material (Soil and Water) which will also reduce dust and odour. The requirements of this procedure should be reviewed in accordance with the additional requirements of EMP02.

Performance Indicators

- No complaints from local workers, students or site personnel;
- Daily monitoring results for vapours; and
- No onsite visual or olfactory observation of dust, odours or vapour emissions generated during excavation works by Project Team.

CONTAMINATED MATERIAL (SOIL AND WATER)	EMP02
Responsibility	Principal Contractor (Site Supervisor) / Environmental Consultant
Frequency	Disturbance of soils
Location	Site
Objective	Minimise the potential for contaminated soil and water to disperse onto 'clean' land or into migrating surface drainage channels Minimise contact between site workers and contaminated site soil and water

Procedure

The movement of all soil and water removed during the excavation works will be monitored.

Standards

All operations of the site are to be conducted so that contaminated materials are managed in accordance with ACT EPA published and endorsed guidelines. These include:

- NEPC, 2013 *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1)*.
- ACT Parliamentary Counsel (1997) Environment Protection Act
- ACT Parliamentary Counsel (2005) Environment Protection Regulation
- ACT Government (2011) Work Health and Safety Regulation.

Control and Management

- Contaminated soil will not be placed on uncontaminated areas where possible. Contaminated soil should be placed onto sealed areas. Where contaminated soil needs to be placed into an uncontaminated area for stockpiling, a scraping from the original surface will be taken away when the stockpile is removed. The area will then be validated via soil sampling for the contaminants of concern. Alternatively, contaminated soils may be disposed of directly into trucks if suitable for disposal offsite or temporarily stockpiled in appropriately controlled (i.e. plastic lined and covered) locations if chemical characterisation is required.
- An exclusion zone / work zone will be established around the works area. A barricade or mesh fence will be installed around the excavation and stockpile areas; together with appropriate signage to indicate to on-site personnel that the areas are designated contaminated soil construction zones.
- Decontamination Zone: at the completion of the work, all equipment used for excavation, storage and transfer of contaminated soil is to be cleaned within this zone. Decontamination of equipment will comprise physical removal using scraping or brushing of all soil adhering to excavation machinery and implements on to the piles of soil which are scheduled for off-site disposal at a suitably licensed facility.
- If unknown or unexpected potentially contaminated material is encountered during excavation, cease work, secure the area and immediately notify the Site Supervisor. In addition, professional advice should be sought from a suitably qualified environmental consultant as to the nature and origin of the material and associated potential health hazards (see EMP08 Unexpected Finds Protocol).
- Contaminated material will be removed from plant and equipment before relocating from each excavation area containing contaminated soils. Contact of the contaminated soils with the excavator tracks will be minimised. Excavator movements will be in a manner that the tracks do not come into contact with impacted soil.
- All contaminated soils will be transported along designated routes throughout the site. These routes will be clearly identified on a site plan and posted within the site. If required a heavy vehicle decontamination area will be selected.
- Vehicles exiting the site will be washed or cleaned such that sediment deposition to local roads is minimised.

CONTAMINATED MATERIAL (SOIL AND WATER)	EMP02

- Trucks leaving site will have their loads covered.
- Sediment controls such as silt screens or hay bales will be placed downgradient of all excavation and stockpile areas.
- There will be no discharge of contaminated water onto land or surface drains.
- Refuel plant and equipment in a designated area away from landscaped areas, excavations or joins in the concrete pavement.
- Make “spill kits” available on site.
- No maintenance is proposed on-site. In the event of minor equipment failure, maintenance will be undertaken on an applicable hardstand surface. The Site Supervisor will be consulted regarding the selection of a safe maintenance area. Where major maintenance is required, the plant equipment will be returned to the relevant company’s depot.

Performance Indicators

- No complaints from local workers, students or site personnel;
- No fines issued by regulators during the project;
- Daily monitoring of site controls; and
- Materials handled in accordance with requirements deemed necessary based on test results.

SEDIMENT CONTROL		EMP03
Responsibility	Principal Contractor (Site Supervisor)	
Frequency	Disturbance of soils and storage of exposed soils	
Location	Stockpiles and exposed areas generated by earthworks	
Objective	Control potential sediment generation and migration	

Procedure

Sediment migration has the potential to pollute creeks and waterways and increase the sediment load on stormwater management systems and infrastructure.

Standards

All operations of the site are to be conducted in accordance with industry best practice and with reference to:

- Landcom, 2004 *Managing Urban Stormwater - Soils and Construction* (4th Edition);

Control and Management

Control measures to be implemented during works include:

- Placement of approved sediment control measures such as silt fences, downgradient of the work area prior to works commencing.
- Where possible, stockpiles will be placed upslope of open excavations and away from stormwater inlets, ensuring any releases of sediment re-enter the excavation and are not transported offsite.
- Cease works if significant rain event occurs.
- Conduct works in a manner which minimises the potential for sediment and soil migration, whereby excavated material will be quickly reinstated and compacted if possible.
- Mitigation measures implemented in areas where sediment loaded runoff is likely to occur or if rainfall event is predicted.
- Clean up of sediment.
- Additional stormwater control measures such as diversion devices to minimise contact of stormwater flows with stockpiled materials.
- Regular observations will be made by the Project Team.

Performance Indicators

- No complaints from local workers, students or site personnel;
- No fines issued by regulators during the project;
- Project Team members will observe any increases in sediment load in stormwater drains particularly for excavation test pits located close to surface drains.

WASTE MANAGEMENT	EMP04
Responsibility	Principal Contractor (Site Supervisor)
Frequency	All site works
Location	Site
Objective	Minimise and Control any wastes generated and ensure all wastes are appropriately disposed of

Procedure

Waste generated during the investigation works includes sampling and construction supplies (solid), rinse/decontamination water, domestic waste generated by site workers, concrete, liquid waste and contaminated soils.

Standards

All operations of the site are to be conducted so that all waste is lawfully transported and disposed of in accordance with the Protection of the Environment Operations Act, 1997 and associated waste related regulations, and ACT EPA guidelines including (but not limited to):

- ACT Parliamentary Counsel (1997) Environment Protection Act
- ACT Parliamentary Counsel (2005) Environment Protection Regulation
- ACT Government (2011) Work Health and Safety Regulation
- Environment ACT (2000) ACT's Environmental Standards: Assessment & Classification of Liquid and Non-liquid Wastes

Control and Management

- The Site Supervisor will provide waste receptacles for all waste types and ensure that personnel use these correctly. The waste receptacles will be removed by the Site Supervisor and appropriately disposed of.
- Uncontaminated soil from excavations will be returned to the excavation trenches or disposed off-site.
- Contaminated soil and inert building materials will be segregated, stockpiled and then classified for off-site disposal. Any soils requiring on-site remediation will be transported to a designated area and after treatment will be classified for on-site reuse or off-site disposal.
- Recycling of materials will be attempted where possible.
- Waste will only be disposed of to facilities licenced to accept the waste, and tracked in accordance with ACT EPA requirements.
- Waste will only be transported by those licenced to transport the waste.

Performance Indicators

- Waste classification documentation.
- Waste tracking (i.e. consignment authorisation and waste transport certificate) and disposal (i.e. weighbridge receipts).
- No fines issued by regulators during the project.

NOISE / VIBRATION	EMP05
Responsibility	Principal Contractor (Site Supervisor)
Frequency	All site works
Location	Site
Objective	Ensure noise levels generated during works will be at all times within the limits acceptable for the health and safety of site workers Minimise impacts of noise emissions and vibrations on adjoining land users

Procedure

Effects of noise generating activities are to be minimized and managed in accordance with the Protection of the Environment Operations Act 1997 (POEO Act) and the POEO (Noise Control) Regulation 2008. This will be achieved through ensuring site works adhere to Council stipulated work times, minimizing unnecessary site noise and use of appropriate muffling technology.

Standards

- Work hours and allowable noise levels specified by the DA conditions.
- AS2436-2010 Guide to Noise Control on Construction, Maintenance and Demolition Sites

Control and Management

Control measures to be implemented during works include:

- Selection and maintenance of equipment to comply with noise regulations
- Noise suppressors on machinery if necessary
- Any noise complaints will be reported to the Site Supervisor and a communication and complaints register will be maintained to ensure that any concerns of local residents and members of the public are recorded and addressed.
- Concerns over noise generation will be communicated to all site personnel and contractors during site inductions.

In the event that acceptable noise levels are exceeded, corrective action will involve:

- Mitigation of noise to an acceptable standard in the shortest time practicable, or
- Suspension of noise generating activity until noise mitigation measures can be implemented

Performance Indicators

- No legitimate complaints from local workers or students;
- No fines issued by regulators;
- Compliance with the DA conditions;
- Noise levels at the Site Boundary will not exceed 80dBA

TRAFFIC		EMP06
Responsibility	Principal Contractor (Site Supervisor)	
Frequency	All site works	
Location	Site and surrounding local area	
Objective	To avoid impacting local traffic during the completion of works	

Procedure

Potential impacts on local traffic surrounding the University and associated work area may be associated with congestion, disturbance, noise and dust.

Standards

- All traffic movements on the public road network to be in accordance with applicable road laws.

Control and Management

- Field cars and plant will be restricted to sealed surfaces unless requiring access to excavation areas.
- Speed limits and standard traffic rules will be adhered to.
- Works will be suspended should subcontractors fail to comply with instructions to use approved access routes.

Performance Indicators

- Smooth and managed traffic flow on adjacent streets during works.
- No traffic accidents onsite or in surrounding streets.
- No traffic violations.

EMERGENCY RESPONSE		EMP07
Responsibility	Principal Contractor (Site Supervisor) / Environmental Consultant	
Frequency	All site works	
Location	Site	
Objective	Minimise environmental impacts of all incidents on Site	

Procedure

Environmental incidents on the site requiring an emergency response would relate to a spill of hazardous liquid or material on 'clean' soils on the site, or in the proximity of a stormwater discharge point. Response will include notification of relevant emergency personnel, ensuring safety of site personnel and public, notification of the incident to regulators (such as ACT EPA, Council and WorkCover) and cleanup works.

Standards

Notification of pollution incidents is required by the Protection of the Environment Operations Act 1997 (POEO Act). Important changes have been made to the duty to notify provisions as a result of the Protection of the Environment Legislation Amendment Act 2011. Those changes commenced on 6 February 2012, and are designed to ensure that appropriate authorities have the information they need to respond within an appropriate time.

Control and Management

For any spills the following will be undertaken:

- If the incident presents an immediate threat to human health or property, ACT Fire and Rescue, the Police and the ACT Ambulance Service should be contacted first for emergency assistance - phone 000.
- Notify ACT EPA, WorkCover and LDA (as applicable).
- Identify source of spill and stop when/if safe to do so
- Identify area of spill and clear area of all personnel
- Construct bunding using equipment available on the site to contain spill
- Engage services of an environmental consultant to coordinate the excavation and removal of hazardous material to a secure area, and waste disposal in accordance with relevant regulatory requirements
- Assess soils in vicinity of environmental incident for contamination and conduct remediation works where contamination has occurred

All emergency responses to be followed up with incident reporting and review

UNEXPECTED FINDS PROTOCOL		EMP08
Responsibility	Principal Contractor (Site Supervisor)	
Frequency	All site works	
Location	Site	
Objective	Ensure procedure for handling soils has been established prior to excavation	

Procedure

During works at the site, potentially contaminated soil materials that have not been encountered previously during the investigation could become apparent.

Examples of Unexpected Finds are as follows:

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

Standards

Relevant standards will depend on the substance identified but may include:

- ACT EPA (2014) *Information Sheet 4 - Requirements for the Reuse and Disposal of Contaminated Soil*
- ACT Government (2014) *Dangerous Substances (Asbestos Safety Reform) Amendment Bill 2014*
- ACT Government (2014) *Work Health and Safety (Asbestos) Amendment Regulation 2014*
- ACT Parliamentary Counsel (1997) *Environment Protection Act*
- ACT Parliamentary Counsel (2005) *Environment Protection Regulation*
- ACT Government (2011) *Work Health and Safety Regulation*
- SafeWork Australia 2011 *Code of Practice: How to Safely Remove Asbestos*
- SafeWork Australia, 2011 Code of Practice how to Manage and Control Asbestos in the Workplace
- NEPC, 2013 *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1)*.

Control and Management

The following control and management actions are required:

- Works in this area of the site are to cease temporarily and this area of the Site be secured.
- Site Supervisor, Project Manager and environmental consultant to be notified with details of the material description (see above characteristics) and suspected extent.
- Recommencement of development activities in an area requiring remediation and validation cannot take place until the EPA has reviewed and endorsed the consultant's validation report into the suitability of the area for its permitted uses
- The material should be assessed in accordance with *EPA Information Sheet 4* thus potentially allowing waste disposal or beneficial reuse options.
- Where asbestos materials are suspected, Class A (friable asbestos) or Class B (bonded asbestos) licensed contractor will be required to coordinate the works and specify appropriate environmental control measures in accordance with existing legislation and guidance. This may require the following:
  - Establish workplace and site boundary air monitoring;
  - Use of appropriate PPE;
  - Use of closed vehicle cabs with air conditioning running;

- Use of lined and covered vehicles;
- Identification of clearly defined trafficking routes from work area;
- Temporary stockpiling in an appropriately controlled manner to prevent liberation of fibres;
- Appropriate waste classification;
- Notification of the intention to transport waste; and
- Disposal at a suitably licensed facility and provision of relevant materials tracking and disposal dockets.
- Clearance certificates (must be produced for friable and bonded).

- Where chemical contamination is suspected, liaise with the environmental consultant to coordinate the works and specify appropriate environmental control measures in accordance with existing legislation and guidance. This is likely to be similar to that outlined for asbestos above.
- Once the unexpected find has been safely relocated and contained within a secure temporary storage area, the environmental consultant will be required to conduct laboratory analysis to ensure that materials are appropriately classified for suitably licensed waste disposal.
- Any disposal or reuse of material requires EPA approval.

Performance Indicators

- No complaints from local workers or students;
- No fines issued by regulators;
- Compliance with the DA conditions;
- Compliance with waste regulations;
- Appropriate documentation (e.g. waste classification, validation, clearance certification)

Appendix D – Incident and Complaints Register

The purpose of the Environmental Incident Register and Complaints is to maintain a register from concerned parties, which will include a record of any action taken with respect to the incidents / complaints.

The Register is required to be completed immediately following the receipt of any incident / complaints associated with works undertaken at the Site. Written complaints should be addressed or acknowledged within five days of the complaint being received. Complaints made by telephone or in person should be addressed or acknowledged within two days of receipt.

Date	Incident / Complainant Details	Nature of Complaint	Action	Follow Up	Recorded By/signature

Appendix E – Unexpected Finds Register

Date	Time	Type of unexpected find	Personnel advised of unexpected find	Nature of unexpected find	Response to unexpected find (controls)	Signature/Position

Appendix F – Induction Register

The purpose of the induction register is to acknowledge acceptance and compliance with the procedures outlined within this CEMP by signing the attached register. Copies of this document must be made available for review and be readily available at the job Site / Construction Site Office.

The Induction register is required to be completed by each person inducted into the CEMP undertaking ‘construction works’ at the site.

SITE INDUCTION REGISTER					
Date	**Person**	**Company**	**Task/Job**	**Inductee Signature**	**Inductor Signature** **Name / Company**

SITE INDUCTION REGISTER					
Date	Person	Company	Task/Job	Inductee Signature	Inductor Signature Name / Company

LAND DEVELOPMENT AGENCY

Unexpected Finds Management Plan

CONTAMINATED LAND AND UNEXPLODED ORDNANCE (UXO) / EXPLODED ORDNANCE WASTE (EOW), WITHIN MOLONGLO VALLEY STAGE 3 (FUTURE URBAN AREA).

FEBRUARY 2017

WSP | PARSONS BRINCKERHOFF

Unexpected Finds Management Plan

CONTAMINATED LAND AND UNEXPLODED ORDNANCE (UXO) / EXPLODED ORDNANCE WASTE (EOW), WITHIN MOLONGLO VALLEY STAGE 3 (FUTURE URBAN AREA).

Land Development Agency

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1 INTRODUCTION

1.1 Background

Parsons Brinckerhoff Australia Pty Ltd (trading as WSP I Parsons Brinckerhoff) has been engaged by the ACT Land Development Agency (LDA) to prepare this Unexpected Finds Management Plan (UFMP) for the Molonglo Valley Stage 3 (MV3) future urban area. The UFMP has been prepared to manage risks of encountering potential contaminated land, unexploded ordnance (UXO) and exploded ordnance waste (EOW) during future earthworks and construction activities.

The total MV3 area occupies approximately 1,145 hectares and has been investigated for potential contaminated land in two separable portions, namely 'Area A' pertaining to the lower half of MV3 (southern portion), and 'Area B' pertaining to the upper half of MV3 (northern portion). This UFMP covers the entirety of the MV3 future urban area.

The boundary covering this UFMP is presented in Figure 1 and Figure 2, **Appendix A** and further discussed in Section 2 of this UFMP.

The objectives of this UFMP and associated risks during re-development include:

Potentially Contaminated Land

- Manage potential unexpected finds of contamination (if any);
- Mitigate human health and environmental risks (if any) associated with the find; and
- Provide guidance to obtain adequate management advice and allow validation (where required).

Potential UXO and EOW

- Familiarise members of the contractor's workforce, including subcontractors and other personnel requiring access to the MV3 worksite with the unexploded ordnance hazards associated with that site;
- Provide actions on discovery of UXO and EOW;
- Ensure any UXO or EOW finds are handled appropriately (if any); and
- Provide guidance to obtain adequate management advice and contact details for ACT Police and Department of Defence to assess the find and clear the area.

2 SITE DETAILS

Site details are provided in Table 2.1 below. The boundaries covering this UFMP is presented in Figure 1 and Figure 2, **Appendix A.**

Table 2.1 Site Identification

Site	Details
Molonglo Valley Stage 3 Area A	Current Site Owner: ACT Government. Blocks and Territory Plan Land Use Zone: ■ Part Block 70. RZ1: SUBURBAN; DES: DESIGNATED. ■ Part Block 71. RZ1: SUBURBAN; CZ4: LOCAL CENTRE; TSZ1: TRANSPORT; NUZ4: RIVER CORRIDOR; RZ3: URBAN RESIDENTIAL; CF: COMMUNITY FACILITIES; PRZ1: URBAN OPEN SPACE; DES: DESIGNATED. ■ Part Block 72. RZ1: SUBURBAN; TSZ1: TRANSPORT; NUZ4: RIVER CORRIDOR; PRZ1: URBAN OPEN SPACE; CZ1: CORE ZONE. ■ Part Block 74. RZ1: SUBURBAN; PRZ1: URBAN OPEN SPACE; DES: DESIGNATED. ■ Block 3: TSZ2: SERVICES. ■ Part Block 34. RZ1: SUBURBAN; NUZ4: RIVER CORRIDOR; PRZ1: URBAN OPEN SPACE; DES: DESIGNATED. Current Land Use: Predominantly forestry. Site Area (approx.): 4.65sqkm / 465 hectares. *(Sources: LDA, www.ACTmapi.act.gov.au, Nearmap - November 2014).*
Molonglo Valley Stage 3 Area B	Site Owner: ACT Government. Blocks and Territory Plan Land Use Zone: ■ Block 12. RZ1: SUBURBAN; CZ4: LOCAL CENTRE; NUZ4: RIVER CORRIDOR; RZ3: URBAN RESIDENTIAL; CF: COMMUNITY FACILITIES; PRZ1: URBAN OPEN SPACE. ■ Block 44. RZ1: SUBURBAN; PRZ1: URBAN OPEN SPACE; NUZ3: HILLS, RIDGES AND BUFFER AREAS. ■ Block 43. RZ1: SUBURBAN; NUZ3: HILLS, RIDGES AND BUFFER AREAS. ■ Block 42. RZ1: SUBURBAN; NUZ3: HILLS, RIDGES AND BUFFER AREAS. ■ Block 4. RZ1: SUBURBAN; NUZ3: HILLS, RIDGES AND BUFFER AREAS. ■ Block 5. RZ1: SUBURBAN; TSZ1: TRANSPORT; NUZ3: HILLS, RIDGES AND BUFFER AREAS. ■ Block 41. NUZ3: HILLS, RIDGES AND BUFFER AREAS. ■ Part Block 6. RZ1: SUBURBAN; CZ4: LOCAL CENTRE; TSZ1: TRANSPORT; RZ3: URBAN RESIDENTIAL; NUZ3: HILLS, RIDGES AND BUFFER AREAS. ■ Block 1548. DES: DESIGNATED. ■ Block 1439. DES: DESIGNATED. ■ Block 1549. DES: DESIGNATED. ■ Block 1400. DES: DESIGNATED. ■ Block 32. NUZ3: HILLS, RIDGES AND BUFFER AREAS. ■ Part Block 7. RZ1: SUBURBAN; TSZ1: TRANSPORT; RZ3: URBAN RESIDENTIAL; DES: DESIGNATED; NUZ3: HILLS, RIDGES AND BUFFER AREAS. ■ Part Block 33. RZ1: SUBURBAN; TSZ1: TRANSPORT; RZ3: URBAN RESIDENTIAL; NUZ3: HILLS, RIDGES AND BUFFER AREAS. ■ Block 15. RZ1: SUBURBAN; TSZ1: TRANSPORT; CF: COMMUNITY FACILITIES; PRZ1: URBAN OPEN SPACE; NUZ3: HILLS, RIDGES AND BUFFER AREAS; CZ1: CORE ZONE. ■ Block 38. RZ1: SUBURBAN. ■ Block 39. RZ1: SUBURBAN. ■ Block 16. RZ1: SUBURBAN ■ Part Block 72. RZ1: SUBURBAN; TSZ1: TRANSPORT; NUZ4: RIVER CORRIDOR; PRZ1: URBAN OPEN SPACE; CZ1: CORE ZONE. ■ Block 14. RZ1: SUBURBAN. ■ Block 13. RZ1: SUBURBAN. ■ Part Block 46. RZ1: SUBURBAN; NUZ4: RIVER CORRIDOR; RZ3: URBAN RESIDENTIAL. ■ Part Block 10. NUZ4: RIVER CORRIDOR ■ Part Block 45. NUZ4: RIVER CORRIDOR. ■ Block 40. RZ1: SUBURBAN; RZ3: URBAN RESIDENTIAL. ■ Roads and adjacent verges in the vicinity of the intersections of William Hovell Drive, Coppins Crossing Road and Bindubi Street, in the Molonglo Valley. Current Land Use: Predominantly rural, residential and grazing. Site Area (approx.): 6.80sqkm / 680 hectares. *(Sources: LDA, www.ACTmapi.act.gov.au, Nearmap - November 2014).*

3 KEY DEFINITIONS AND TERMS

Key definitions relating to this UFMP are provided in Table 3.1 below.

Please note that definitions are from a variety of sources and are merely used to provide general background information to the reader. For detailed legislative definitions, please refer to ACT environmental policy documents (such as the ACT EPA, *Contaminated Sites Environment Protection Policy*, November 2009) and the *Environment Protection Act 1997*.

Table 3.1 Key Definitions and Terms

Contaminated Land	Contaminated, in relation to land, means the presence in, on or under the land, or a building or structure on the land, of a substance at a concentration above the concentration at which the substance is normally present in, on or under land, or a building or structure on land, in the same locality, if the presence causes, or is likely to cause either or both of the following: (a) A risk of harm to human health; (b) A risk of environmental harm.
Fill Material	Essentially a 'waste material' that may contain contaminants above background levels and include building and demolition wastes and anthropogenic (human made) materials or substances within a soil matrix. Please note the term "fill material" has different meanings in different jurisdictions of Australia.
Remediation of contaminated land	Remediation of contaminated land includes: (a) Preparing a long-term management plan (if any) for the land, and (b) Removing, dispersing, destroying, reducing, mitigating or containing the contamination of the land, and (c) Eliminating or reducing any hazard arising from the contamination of the land (including by preventing the entry of persons or animals on the land).
UFP	Unexpected Finds Protocol which is used to allow contractors to follow a step wise procedure to manage unexpected finds during construction.
UFR	Unexpected Finds Register which is used to keep a record of unexpected finds.
UXO	Unexploded Ordnance – Explosive ordnance that has been primed, fused, armed, or otherwise prepared for action, and have been fired, dropped, launched, projected or placed in such a manner as to constitute a hazard to operations, installation, personnel, or materiel but remains unexploded either by malfunction, design, or any other cause. UXO includes items of EO that have been removed from their original resting place for any reason, including souveniring by members of the public.
EOW	Explosive Ordnance Waste – Inert material remnant from the initiation or functioning of explosive ordnance generally comprising empty cartridge cases, inert/expended ordnance, etc. that has been certified by an EOD technician as Free From Explosives (FFE).
EO	All munitions containing explosives or explosives and chemical agents. This includes bombs and warheads; guided and ballistic missiles; artillery, mortar, rocket and small arms ammunition; all mines, torpedoes, depth charges and demolition charges; pyrotechnics, clusters and dispensers; cartridge and propellant actuated devices; electro-explosive devices; clandestine and improvised explosive devices; and all similar or related items or components explosive in nature.
EOD	The detection, identification, field evaluation, rendering safe and final disposal of unexploded ordnance. It may also include the rendering safe and/or disposal of explosive ordnance, which may have become hazardous by damage or deterioration.
EOD Technician	Appropriately qualified EOD technician who supervises excavations and advises on potential EO/UXO.
ACT EPA	The Environment Protection Authority (EPA) is established under the *Environment Protection Act 1997* (the Act). As a statutory position, the EPA is responsible for the administration of the Act.
ACT EPSDD	The Environment, Planning and Sustainable Development Directorate consolidates ACT planning. The Directorate's planning responsibilities include the planning and land authority's (formerly ACTPLA) management of development assessment under the *Planning and Development Act 2007.*

4 BACKGROUND

4.1 Contaminated Land Investigations and Management

A Phase 1 Environmental Site Assessment (ESA) was conducted for MV3 (Robson, 2014a,b) identifying a number of areas of environmental concern (AEC's) and LDA required an assessment of the Site to determine land suitability from a contamination perspective. Following the Phase 1 ESA, a Stage 2 Detailed Site Investigation (DSI) was completed for Area A and Area B as separable portions (WSP Environmental, 2016a,b), detailing suitability for the proposed land use(s).

The final Stage 2 DSI reports for Area A and Area B (WSP Environmental, 2016a, b) provides a listing of areas of environmental concern (AECs) and conditions encountered such as land filling and aesthetic issues for soils. These reports shall be referred to for any detailed information of Site lithology during future earthworks and construction.

In summary, MV3 Area A was reported to have several areas of filling and some *in situ* asbestos piping (likely for water transfers) and management of several areas that contained anthropogenic inclusions within the fill. No remedial works due to potential risks to human health or the environment was considered necessary, however a construction environmental management plan (CEMP) has been prepared (WSP Environmental, 2016d) that provides a list of construction management practices to deal with anthropogenic materials identified during the DSI.

In summary, MV3 Area B was reported to have several areas that require remediation (2 x sheep dips and the former sludge ponds) and a remedial action plan (RAP) has been prepared for these works (WSP | Parsons Brinckerhoff, 2016b). Remedial works shall be undertaken in the future as separate works that are not part of this UFMP. A remedial action plan (RAP) has been prepared for MV3 Area B (WSP | Parsons Brinckerhoff, 2016e).

References to reports that have further detailed information and are available from LDA have been listed in Section 10.

4.2 UXO Investigations and Management

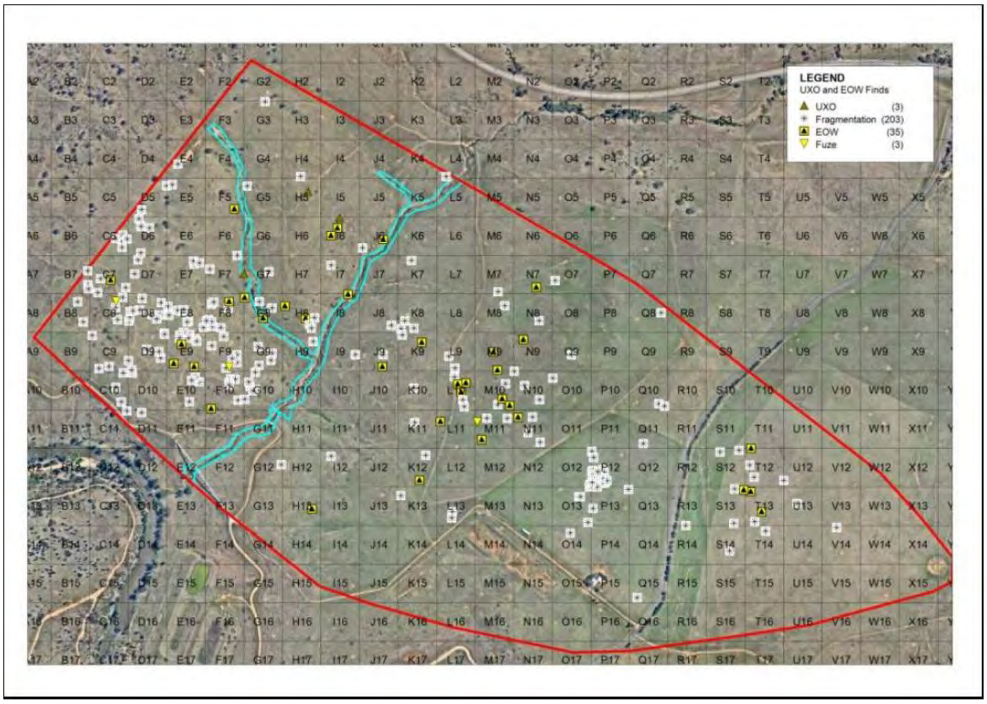
Several UXO investigation surveys and remediation of UXO have been undertaken within the MV3 area. Principally these have been limited to Area B within MV3. All UXO investigation surveys and remediation were undertaken by Milsearch in 2013, 2014 and 2015. References to reports (written by Milsearch) that have further detailed information and are available from LDA have been listed in Section 10.

The Molonglo Valley was used for the training of artillery soldiers from 1915 until the mid1920's. Two known projectiles were used (15pd and 18pd artillery projectiles). The Department of Defence (DoD) has taken reasonable steps to locate and remove all EOW and UXO from Molonglo Valley. There is a possibility (although slight) that future users of the site may encounter explosive ordnance waste or unexploded ordnance, principally within Area B of MV3, based on the studies undertaken to date.

A detailed UXO assessment survey and remediation has been completed in the Remediation Target Area within Molonglo Stage 3 (Milsearch, 2015). The Remediation Target Area is bounded by the Kama Reserve to the west, Molonglo River to the south and includes a portion of Coppins Crossing Road towards the east. The Remediation Target Area was 198ha in size and comprises predominantly open grasslands which are actively grazed to farmers through arrangements managed by the ACT Parks and Wildlife Service. Terrain comprises undulating hills flatter in the east and becoming somewhat steeper westward. A creek system (Deep Creek) flows from north east towards the south west and eventually into the Molonglo River.

An image of the detailed Remediation Target Area from the Milsearch report (2015) is provided on the following page (boundary is the red line with grids and finds located).

Image of the Milsearch Remediation Target Area boundary and grid (Milsearch, 2015).



The limitation and exclusion areas of the Milsearch survey and remediation works include a number of areas that must be evaluated prior to construction / redevelopment occurring.

The recommendations from the Milsearch survey and remediation (2015) is provided below:

1. *In view of the number of fragmentation finds made in close proximity to the external search boundary in the south west, consideration should be given to expanding the remediation boundary westwards into the Molonglo River Valley from the vicinity of Blocks C11 and D11. As land here outside the current search boundary will not be developed but will be accessed by the public as open space – nature reserve etc, full UXO remediation is not warranted. A lesser mitigation treatment to locate surface and very near surface complete UXO items is appropriate, thus reducing the probability of the public coming into contact with accessible UXO items;*

2. *The seven remaining anomalies within the dam in the extreme east of the Site be investigated when the dam bed dries out;*

3. *At a suitable later stage in the development, existing fence lines should be removed under the direction of a safeguarding EOD technician. The alignment of the fences should then be surveyed with Geometrics G858 magnetometer or equivalent to a width of 12m centred on the original fence-line, then all magnetic anomalies investigated;*

4. *The blackberry and other bushes within the Pink Tail Worm Lizard (PTWL)habitat should be slashed when environmental restrictions are lifted and those areas thus made accessible, be deep searched for UXO using analogue techniques;*

5. *Where necessary during redevelopment, removal of the large trees should include complete excavation of root-balls. Removal of root-balls should be safeguarded by an EOD technician and the root-balls and the holes they have come from, should be searched with magnetometers;*

6. *Following demolition of the house and other buildings on the Site, areas beneath should be surveyed and investigated by magnetometer after their removal. These areas may require UXO safeguarded mechanical surface scraping to remove domestic detritus, prior to UXO survey; and*

7. *Following removal of the mounds, the ground beneath should be subjected to a UXO magnetometer search.*

Please note that LDA and the future redevelopment principal contractor MUST ensure that these recommended survey and remediation works have been undertaken and reported prior to construction works occurring within or nearby to these areas.

Please refer to Figure 3, **Appendix A** for a plan showing the areas referred to in the above 7 points for reference.

Two types of material may be encountered:

- EOW – Explosive Ordnance Waste – remnant material from explosive ordnance such as packaging, fragmentation; and
- UXO – Unexploded Ordnance – ordnance that has failed to detonate / function for whatever reason.

EOW remnant material such as packaging, fragmentation or casings of munitions that have been fired or used may be encountered on site. These include flare bodies, smoke grenade bodies and illumination or smoke mortar and artillery casings. EOW poses no threat, however, it should not be handled unless essential to do so and only then if the handler is trained and is absolutely certain that the item is EOW and it is necessary to move it.

It is not necessary to report each find of EOW to the Police. However, should significant or regular numbers of items be found, the Police or a UXO Awareness Trainer should be contacted periodically to arrange for Defence to collect the items.

5 IMPLEMENTATION OF THE PLAN

5.1 Why is This Unexpected Finds Management Plan Required?

Due to the nature of contaminated site investigations the degree of variability in site conditions cannot be known completely and no assessment program can totally eliminate all uncertainty concerning the condition of a site, including those statistically based and substantially following guidelines made or approved by the relevant regulatory authorities. Although the previous and detailed iterative contaminated land and UXO / EOW investigation steps have been performed, there is always a potential for actual conditions to differ from those inferred to exist.

This plan is a precautionary measure (to be implemented during **ALL** future construction works) to ensure that unexpected finds of contamination and UXO / EOW, if any, are appropriately managed and ensures the MV3 future urban area is suitable for the proposed land uses (primarily low density residential, road infrastructure, recreational open spaces and minor commercial).

The plan is necessary to describe the actions to be implemented by contractors if unexpected finds are encountered during excavation / construction activities.

UXO and EOW site induction training is required prior to implementing the plan.

5.2 Who is Responsible to implement this Plan?

The site owner (LDA) is responsible to provide advice and a copy of the Unexpected Finds Management Plan to all excavation / construction personnel prior to commencing work as required under the *Work Health & Safety Act 2011*.

The plan is to be implemented by contractors during any construction works where the ground surface may be disturbed. The plan provides a procedure to be followed in the event of an unexpected find of contamination or UXO / EOW during the redevelopment / construction works.

The site owner (LDA or its nominated representative) is responsible for ensuring that the plan is implemented by contractors during construction works at the site.

5.3 When Does This Plan Apply to the Site?

This plan applies for the period of construction and earthworks being carried out at the site including any early works or preparatory works such as providing access roads and for any infrastructure.

After construction works are completed, as determined by the site owner (LDA) this plan does not include procedures for on-going site management. Should on-going management be determined to be required at a later date or during construction (for any reason relating to contamination of UXO / EOW), than this plan should be updated or an alternative plan prepared.

5.4 Need Help?

Should help be required in the interpretation and / or implementation of the Unexpected Finds Management Plan then contact the LDA (or their nominated representative) using the details below:

- Contact Person: **LDA Project Manager** (Molonglo Valley Stage 3 Future Urban Area) Development.
- Office Phone: (02) 6207 7212– Office hours 9am to 5pm, Monday to Friday.
- Office Location: Level 7 TransACT House, 470 Northbourne Av Dickson ACT 2602.

6 IDENTIFICATION OF POTENTIAL UNEXPECTED FINDS

6.1 Expected Ground Conditions

The *Canberra 1:100,000 Geological Series Sheet* (1992) indicates the area is underlain by Silurian Volcanics which generally comprise Dacites and Ignimbrites with minor tuff and ash stone occurrences. The weathered soils within this Silurian formation are characterised by clay. The Silurian sequence is well fractured and contains low salinity water capable of producing stock and domestic water supplies at depths ranging from 25m to 60m below grade.

During the Stage 2 DSI intrusive works (WSP, 2016b) test pits generally encountered variable subsurface conditions generally associated with the undulating topography across the site. Soils across the site were typically characterised as gravelly and sandy clays, with a covering of topsoil and shallow weathered, low strength bedrock (Dactite). High strength bedrock was encountered at shallow depths near elevated areas across the site.

6.2 Unexpected Finds

Unexpected finds of potential contamination on site may be identified by visual (appearance) and / or olfactory (odour / staining) evidence during earthworks and construction activities.

The following are examples (refer to Table 6.1 below) of typical unexpected finds that occur on rural grazing properties and is based on our experience and the conditions encountered during the DSI works in MV3 Area A and Area B (WSP, 2016).

Please note that this does not infer that they will actually occur or are limited to the finds detailed in Table 6.1 and only act as general guidance.

Table 6.1 Typical unexpected finds (land contamination and UXO / EOW)

Buried or surface asbestos containing materials and/or buried asbestos pipes	This may include cement-bound asbestos (e.g. fibro cement in the form of small fragments, flat sheets, corrugated roofing, or pipe) or other bonded forms of asbestos (e.g. bitumen, textured coatings and floor tiles may also contain asbestos). Friable forms of asbestos including lagging and insulation may be seen as fibrous material which flakes and powders easily. It is often very difficult to identify the presence of asbestos by sight. The only way to be certain is to have a sample of the material analysed by a NATA accredited laboratory.
Buried waste materials	This may include a variety of waste materials, inclusive of wood, plastic, metal fragments, building rubble (e.g. concrete, brick, asphalt, asbestos containing materials) and other general household/farm waste (e.g. tins and containers of farm chemicals and fuels). If waste materials are observed throughout the soil, this could indicate uncontrolled and poor quality fill material. We do not consider that a trivial piece or fragment of foreign material is constituted as an unexpected find (e.g. a single brick). More so, a definitive grouping of these materials buried underground will constitute an unexpected find.
Hydrocarbon impacts	May be identified by a hydrocarbon odour which may vary in strength from slight (just detectable) to very strong (easily detectable at a distance from the source). The odour may or may not be accompanied by specific areas of dark staining (e.g. black, grey or green staining), evidence of oily sheen (e.g. soil produces a coloured effect on water surface) or larger scale discolouration of strata from a previously identified 'natural colouration'.

Septic tanks (biological waste) near farm houses	May be identified by a decaying odour (landfill/sewer/putrefied) which may vary in strength from possible (just detectable) to very strong (easily detectable at a distance from the source). Associated staining may be identifiable; colour and extent may vary dependant on the magnitude of spillage encountered.
Animal burial pits (biological waste)	Identified by reworked local soils overlying waste materials that include hair, coats, bones and decayed matter. Often perched water may collect in the base of the pit and emit a decaying odour upon disturbance.
Underground Storage Tanks (USTs)	These may be identified by encountering a buried cylindrical steel underground tank, deeper sand fill or relatively small concrete footings or steel pipelines, sometimes with observed hydrocarbon odours or staining.
Other unexpected finds	Other indications of contamination include various chemical odours (solvent, acetone, alcohol odour, sulphur (rotten egg), acidic (acetic/formic/citric), ammonia, or caustic) or staining and discolouration of soils. It is not practical to cover all types of possible unexpected finds based on their very nature. It is possible that indications of contamination not specifically covered by the plan may be encountered. In such cases it is assumed that “if in doubt” about a potential find, the precautionary principal will be employed and the unexpected finds procedure (refer to Section 7) will be activated.
UXO and EOW	Due to the specific nature of UXO and EOW, several photos have been provided below. UXO is any sort of military ammunition or explosive ordnance which has failed to function as intended. EOW is remnant material from explosive ordnance such as packaging, fragmentation, ball bearings. Photos below were provided by Milsearch during surveys and remediation in Molonglo Valley. **EOW (fragmentation and shells)** **UXO (live shell)**

7 UNEXPECTED FINDS PROCEDURE

7.1 Training and Induction of Personnel

All construction personnel working on the site are to be inducted on the identification of potential unexpected finds (refer to Section 6.2). The induction can be undertaken at the time of general site induction and toolbox meetings. Induction into the UFMP must be performed by a suitably qualified person (SQP) particularly related to UXO/EOW identification and management.

A training register has not been provided in this UFMP as the contractor must have an overarching training register for construction works that will document all training for personnel prior to working at the site.

The personnel working on the site are required to have the general competencies to identify unexpected finds of contamination in the field and that this competency will be used in good faith during earthworks or construction activities.

It is not possible to provide an awareness induction to cover all types of possible unexpected finds. It is possible that indications of contamination not specifically covered by the induction may be encountered. In such cases it is assumed that "if in doubt" about a potential find the precautionary principal will be applied and the unexpected finds procedure (refer to section 7.2 and the flow and decision charts in **Appendix B**) will be activated.

7.2 Procedure to Follow for an Unexpected Find

Should an unexpected find of potential contamination or UXO / EOW be encountered during the development works, the following procedure (Steps 1 to 15) should be followed, with reference to the flow and decision charts in **Appendix B**.

Additionally, the CEMP (WSP Environmental, 2016d) within Section 7 and the environmental management procedure 'EMP08' provides further details and procedural requirements particularly as they relate to recommencement of work, site validation and disposal of material from the site, the majority of which have been mirrored in the following steps:

1. Stop work in the potentially hazardous area as soon as it is safe to do so and move to a designated meeting point or safe area. Excavation will cease in the vicinity of the discovery.
2. Contact the Construction Foreman OR Superintendent OR Environmental Manager OR Person in control of the workplace.
3. Assess the potential risk to human health and the environment posed by the unexpected find and assess if evacuation or emergency services need to be contacted. A suitably experienced environmental consultant should undertake an assessment of any unexpected finds and determine any further actions required e.g. sampling and/or validation of material, potential for remediation and/or management.
4. Delineate an exclusion / quarantine zone around the area using fencing and / or appropriate barriers and signage.
5. If required, Construction Foreman to arrange inspection by environmental officer / external environmental consultant. / UXO trained person should assess the unexpected find and provide advice as follows:
   - Preliminary assessment of the find and need for immediate management controls (if any).
   - What further assessment and / or remediation works are required and how such works are to be undertaken in accordance with contaminated site regulations and guidelines and UXO management procedures.

- Preparation of a remedial action plan for large scale contamination or specification for smaller or minor volumes of material (if necessary).
- Remediation works required (where applicable).
- Validation works required following remediation works (if applicable).

6. Works are not to recommence in the affected area until appropriate advice has been obtained from the environmental consultant or suitably qualified person and they have provided clearance. Excavation will not recommence until the extent of the contamination has been assessed and, if necessary, a remedial action plan (RAP) has been prepared.
7. Recommencement of development activities in an area requiring remediation and validation cannot take place until the EPA has reviewed and endorsed the consultant's validation report into the suitability of the area for its permitted uses.
8. If it is deemed safe to do so, the environmental consultant will provide clearance for works to proceed in the affected area. If it is not considered to be safe, works must remain on hold until appropriate assessment, remediation and / or validation measures have been actioned.
9. The material will be separated from other materials and stockpiled for assessment. Sampling of the materials will be undertaken in accordance with the relevant guidelines or professional judgement where justification is applied. Samples will be analysed for a range of analytes as required.
10. Laboratory results will be assessed to determine the appropriate waste classification of the material in accordance with the Environment ACT, 2000, *ACT's Environmental Standards: Assessment & Classification of Liquid and Non-liquid Wastes.*
11. Depending on the classification, material already excavated and stockpiled will be transported to an appropriate waste facility that is licensed to accept waste of the relevant classification or beneficially reused if appropriate. The material should be assessed in accordance with EPA Information Sheet 4 thus potentially allowing waste disposal or beneficial reuse options. Any disposal or reuse of material requires EPA approval.
12. A waste tracking system recording the volume of material, waste classification status, removal documentation and truck and receiving landfill facility details must be recorded to ensure all waste is accounted for and disposed of appropriately in accordance with ACT EPA requirements.
13. Any unexpected finds must be documented in the validation report to be prepared at the completion of construction, if required. For 'ad hoc' and minor volumes of materials identified (i.e. <10m^3) records must be kept on file.
14. A trained UXO specialist (or Defence personnel) must provide clearance that any UXO finds or concentrated finds of EOW have been suitable cleared.
15. Keep a record of the unexpected find (refer to **Appendix C** for an example recording sheet). Any validation reports or remedial works will also act as a record of works undertaken to minimise risks to human health and the environment. The record must include exact location / GPS coordinates of the find.

8 FINAL STATEMENTS

It is possible that indications of contamination not specifically covered in this UFMP and any Site inductions may be encountered. The precautionary principal will be applied and the unexpected finds procedure (refer to Section 7) will be activated in all circumstances.

9 STATEMENT OF LIMITATIONS

Scope of services

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

Reliance on data

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

Environmental conclusions

In accordance with the scope of services, WSP | PB has relied upon data previously collected and reported by WSP | PB for the site. The conclusions are based upon the data and visual observations and are therefore merely indicative of the environmental condition of the site at the time of preparing the previous reports, including the presence or otherwise of contaminants or emissions.

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

Report for benefit of client

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

Other limitations

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

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

10 REFERENCES

- Australian Standard AS4482.1-2005 '*Guide to the sampling and investigation of potentially contaminated soil – Part 1: Non-volatile and semi-volatile compounds'.*
- *ACT Environment Protection Act 1997.*
- ACT Environment Protection Authority (EPA, 2009) '*Contaminated Sites – Environment Protection Policy'*.
- *ACT Planning Strategy,* 2012, ACT Government.
- ACT Environment Protection Authority. *Information sheet 4 – Requirements for the reuse and disposal of contaminated soil in the ACT* (June, 2015).
- EPA "*Environment Protection Guidelines for Construction and Land Development in the ACT",* March 2011.
- Douglas Partners, January 2015. *Preliminary Geotechnical Investigation Proposed Residential Development Molonglo 3*.
- Environment ACT (June 2000) *ACT's Environmental Standards: Assessment & Classification of Liquid & Non-liquid Waste.*
- Milsearch, November 2013. *Post Activity Report UXO – Remediation and Contamination Assessment Survey, Molonglo Development Stage 3 Priority Works.*
- Milsearch, May 2014. *Post Activity Report, UXO Contamination Assessment, Molonglo Development Stage 3, ACT Land and Development Agency*.
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- NEPC (1999, amended 2013) *'National Environment Protection (Assessment of Site Contamination) Measure 1999' (the amended NEPM).*
- Robson, May 2014a. *Phase 1 Environmental Site Assessment Area A and B, Molonglo Valley Stage 3, ACT.*
- Robson, May 2014b. *Phase 1 Environmental Site Assessment Area C, Molonglo Valley Stage 3, ACT.*
- WSP Environmental, June 2016a. *Molonglo Valley Stage 3 (Area A), Stage 2 Detailed Site Investigation.*
- WSP Environmental, June 2016b. *Molonglo Valley Stage 3 (Area B), Stage 2 Detailed Site Investigation.*
- WSP | Parsons Brinckerhoff, September 2016c. *Letter Report on Investigation of soils around the Glenloch Property Sheep Dip located within Molonglo Valley Stage 3 Future Urban Area ("Area B"), Block No. 6".*
- WSP Environmental, November 2016d. *Molonglo Valley Stage 3 (Area A), Construction Environmental Management Plan.*
- WSP | Parsons Brinckerhoff, November 2016e. *Molonglo Valley Stage 3 (Area B), Remedial Action Plan.*

Appendix A

SITE FIGURE COVERING THE UFP AREA

AREA A

Canberra Arboretum

Acton (ACT)

Yarralumla

Yarralumla

Tuggeranong Parkway

Molonglo River

Text

Wright

Cotter Road

Curtin

Weston (ACT)

Molonglo Valley Area A

Molonglo Valley Area B

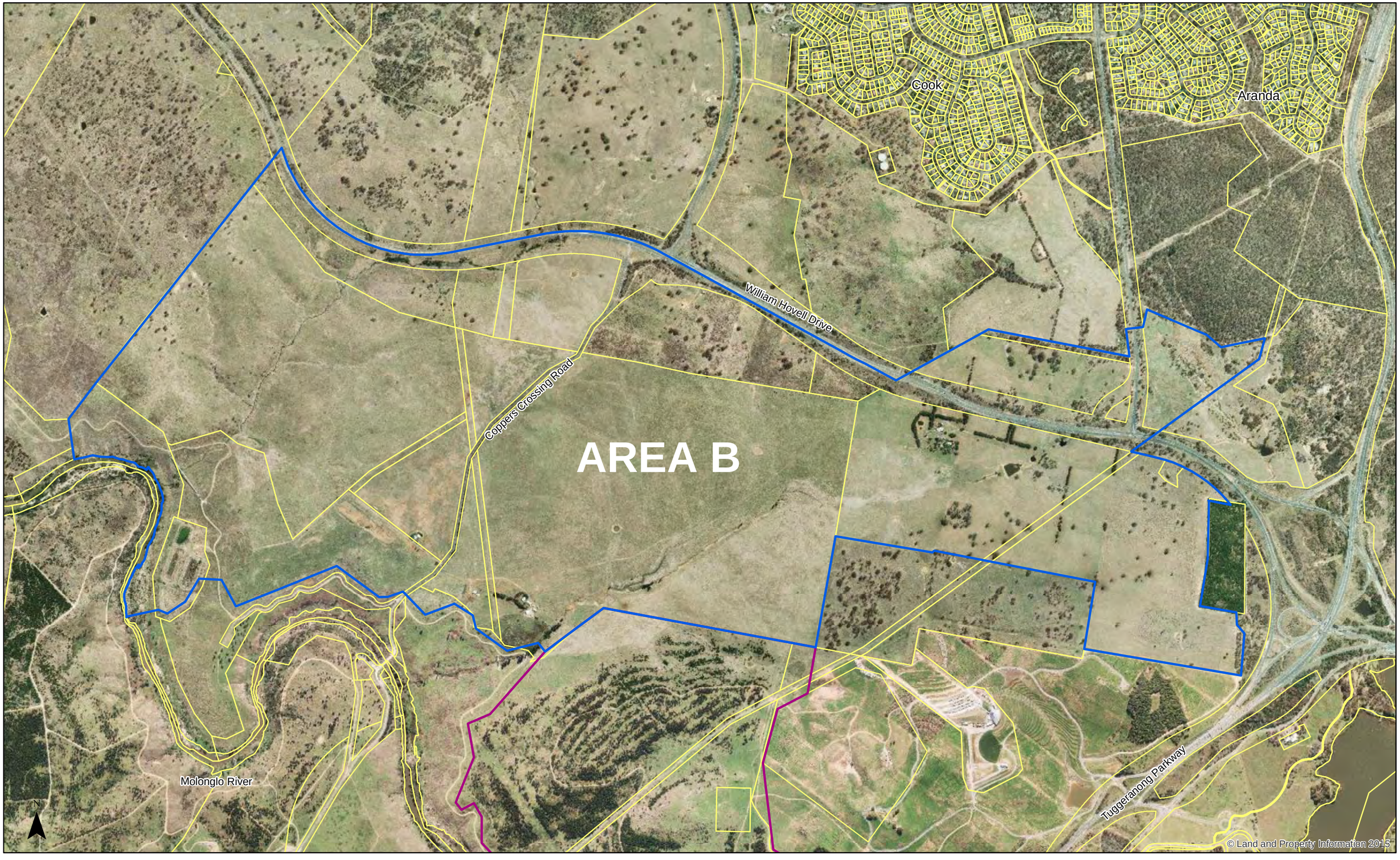
Cadestre

550 275 0 550 Meters

Image Source: Nearmap.
Aerial dated 17 January 2015

Figure 1 - Area A Site Boundary

Unexpected Finds Management Plan
2270207A
Molonglo Valley (Stage 3)



AreaA
AreaB
Cadastre

600 300 0 600 Metres

Image Source: NSW Land & Property Information

Figure 2 - Area B Site Boundary

Unexpected Finds Management Plan
2270207A
Molonglo Valley (Stage 3)

Please note: These areas MUST be surveyed for UXO prior to any future construction / redevelopment works proceeding in the Target Remediation Area (refer to the UFMP for further details).

The recommendations from the Milsearch survey and remediation report (2015) is provided below, with corresponding numbering on the map showing the general areas:

1. In view of the number of fragmentation finds made in close proximity to the external search boundary in the south west, consideration should be given to expanding the remediation boundary westwards into the Molonglo River Valley from the vicinity of Blocks C11 and D11. As land here outside the current search boundary will not be developed but will be accessed by the public as open space – nature reserve etc, full UXO remediation is not warranted. A lesser mitigation treatment to locate surface and very near surface complete UXO items is appropriate, thus reducing the probability of the public coming into contact with accessible UXO items;

2. The seven remaining anomalies within the dam in the extreme east of the Site be investigated when the dam bed dries out;

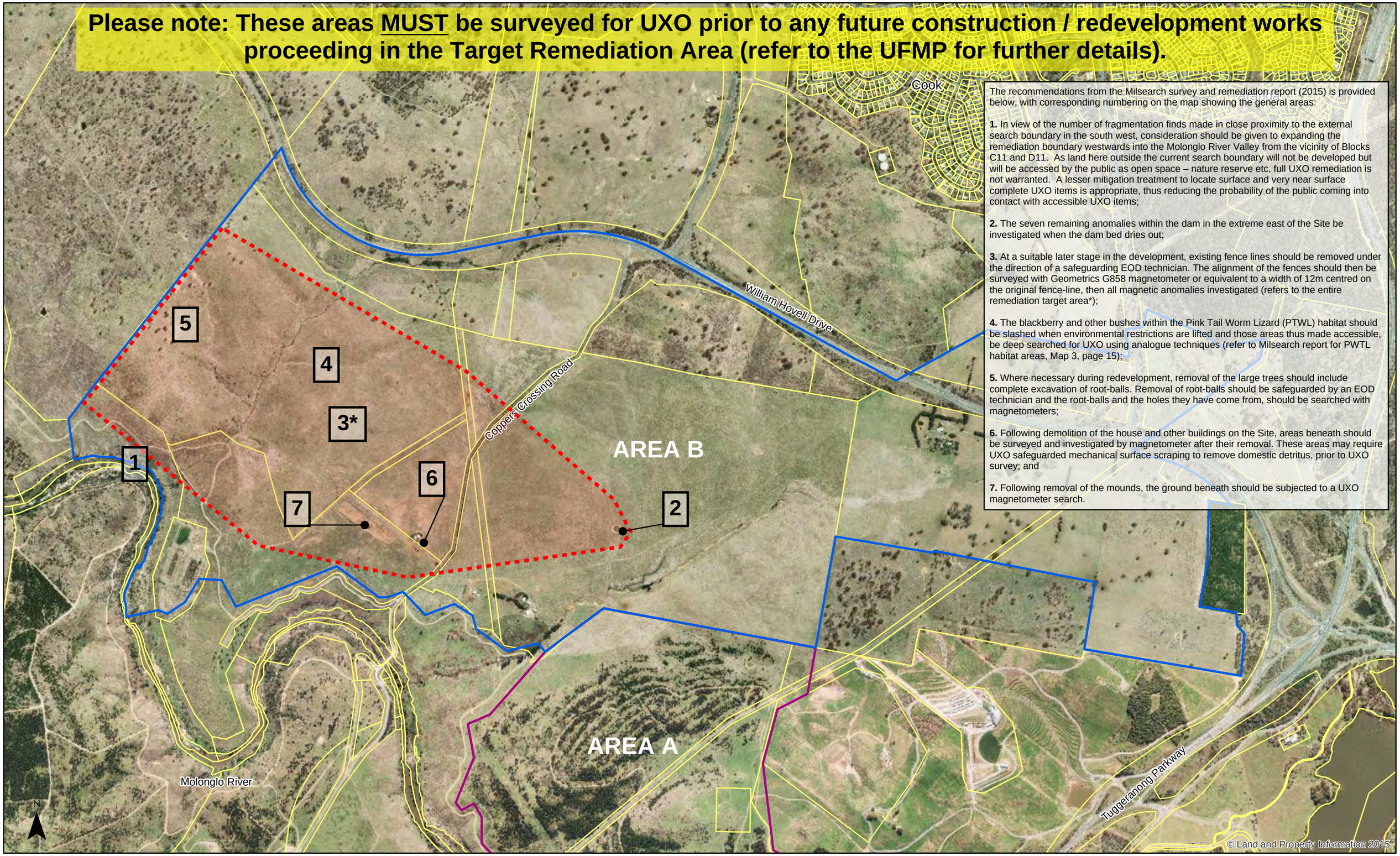
3. At a suitable later stage in the development, existing fence lines should be removed under the direction of a safeguarding EOD technician. The alignment of the fences should then be surveyed with Geometrics G858 magnetometer or equivalent to a width of 12m centred on the original fence-line, then all magnetic anomalies investigated (refers to the entire remediation target area*);

4. The blackberry and other bushes within the Pink Tail Worm Lizard (PTWL) habitat should be slashed when environmental restrictions are lifted and those areas thus made accessible, be deep searched for UXO using analogue techniques (refer to Milsearch report for PWTL habitat areas, Map 3, page 15);

5. Where necessary during redevelopment, removal of the large trees should include complete excavation of root-balls. Removal of root-balls should be safeguarded by an EOD technician and the root-balls and the holes they have come from, should be searched with magnetometers;

6. Following demolition of the house and other buildings on the Site, areas beneath should be surveyed and investigated by magnetometer after their removal. These areas may require UXO safeguarded mechanical surface scraping to remove domestic detritus, prior to UXO survey; and

7. Following removal of the mounds, the ground beneath should be subjected to a UXO magnetometer search.



AreaA
AreaB
Cadastre

Approximate Target UXO Remediation Area (Milsearch, 2015)

600 300 0 600 Metres

Image Source: NSW Land & Property Information

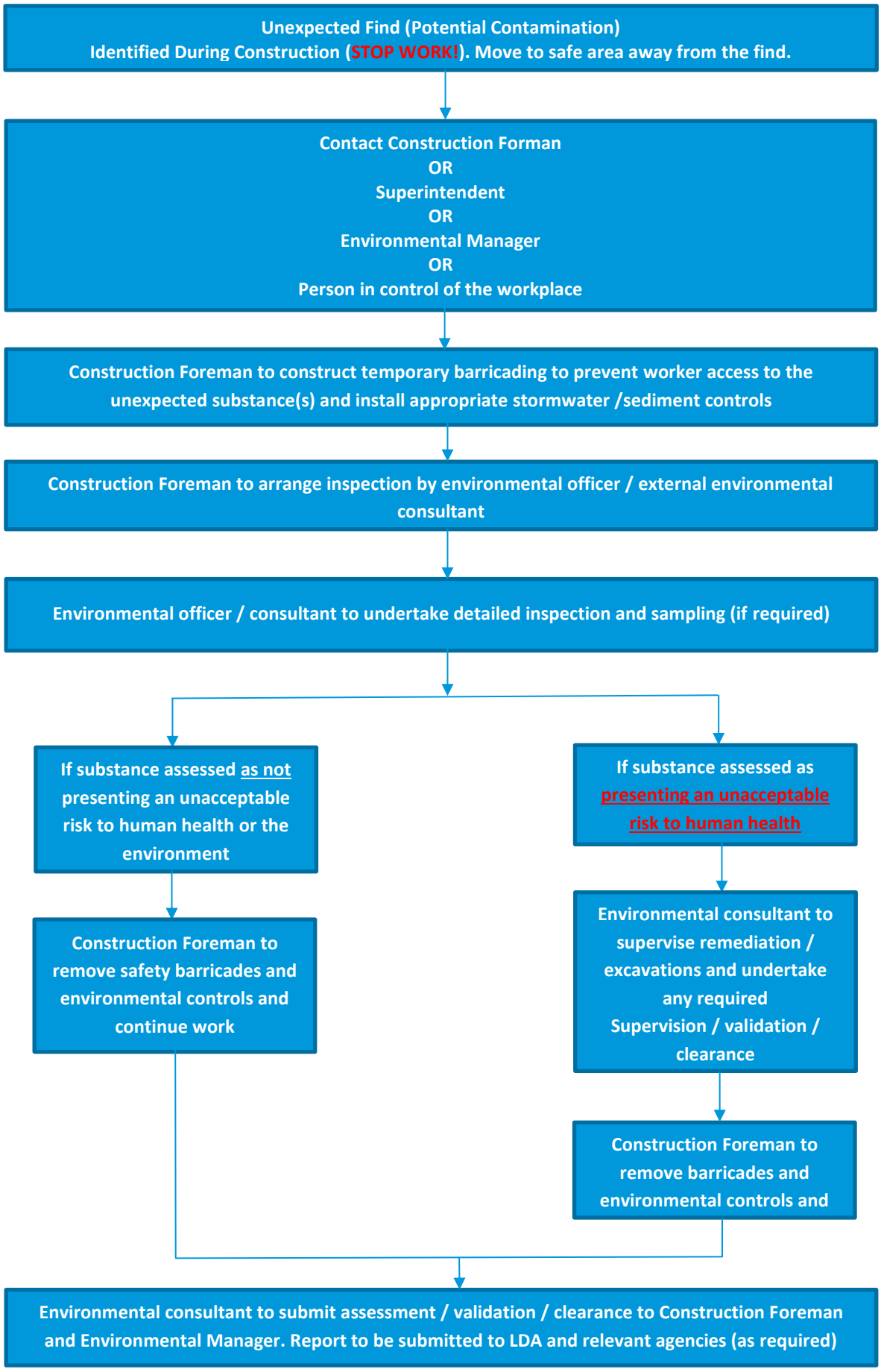
Figure 3 - Previously Excluded UXO Areas to Assess Prior to Construction / Redevelopment Occuring

Unexpected Finds Management Plan
2270207A
Molonglo Valley (Stage 3)

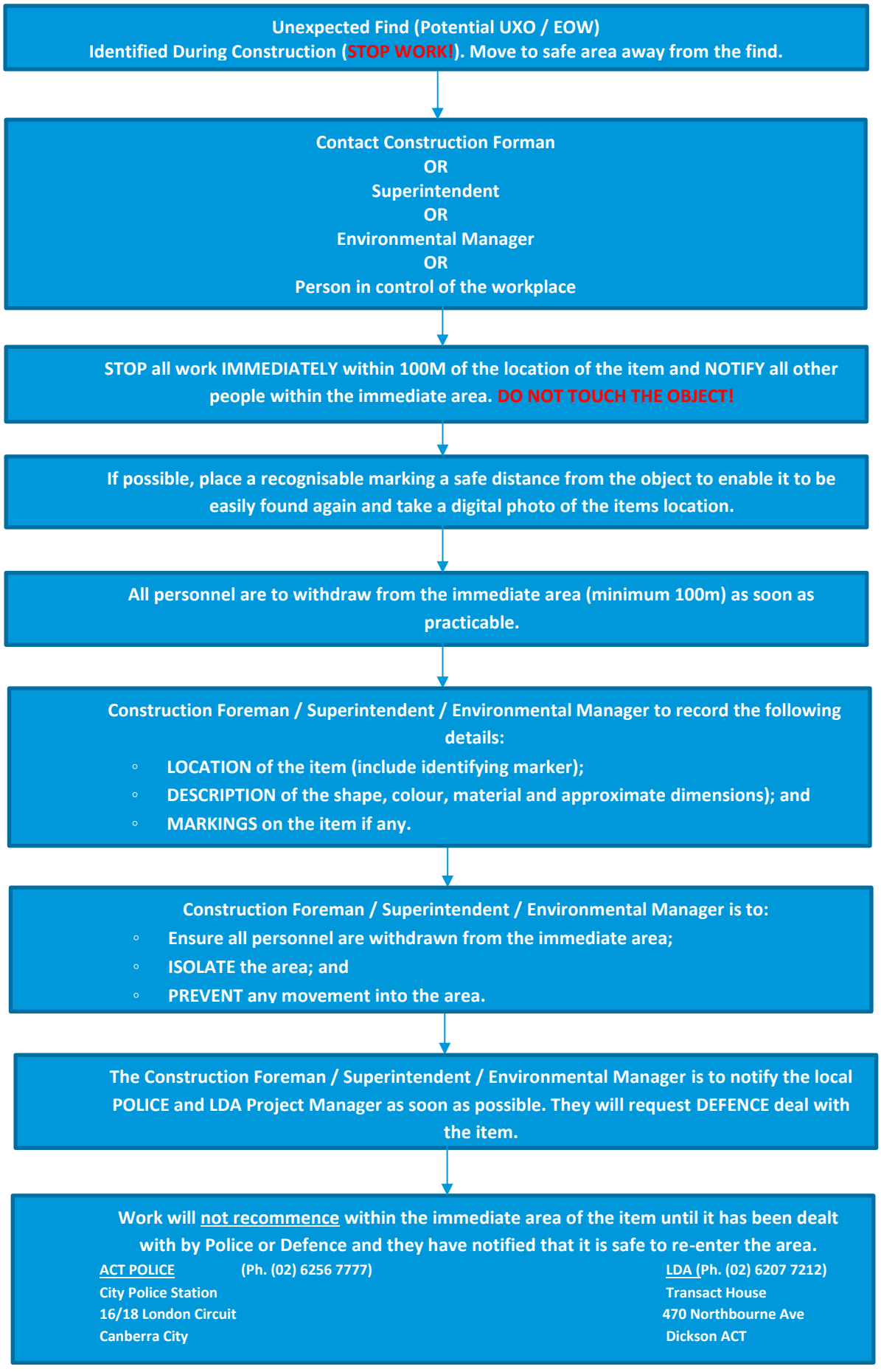
Appendix B

UFP FLOW AND DECISION CHARTS

UNEXPECTED FIND (POTENTIAL CONTAMINATION)



UNEXPECTED FIND (POTENTIAL UXO / EOW)



Appendix C

UNEXPECTED FINDS REGISTER

UNEXPECTED FINDS REGISTER

MOLONGLO VALLEY STAGE 3 (FUTURE URBAN AREA), MOLONGLO VALLEY, ACT

Find No.	Company	Name	Easting	Northing	Item	Comments and Observations[3]
Example: 001	*Doug's Earthworks Pty Ltd*	*Doug Smith*	*686402*	*6095502*	*Fibre cement pipe*	*Located at 1.5m depth and extends north to south. Potential asbestos containing material.*
001						
002						
003						
004						
005						
006						
007						
008						
009						
010						
Continue with register as required during construction activities.						

Important Register Notes:

1. All Unexpected finds must be recorded in the register and the register must be kept on site by the environmental manager or nominated representative. The register must be kept on site until the end of construction activity and provided to LDA or their representative for future reference as required.
2. All Unexpected finds must be reported to the Construction Forman OR Superintendent OR Environmental Manager OR Person in control of the workplace to ensure correct actions can be undertaken.
3. Comments and observations should clearly document the suspect material type (i.e. asbestos, hydrocarbon stained soil, buried construction and demolition wastes, buried drums with liquids), the estimated volume or extent, any odours and specific visual or olfactory observations.

SITE AUDIT REPORT

Molonglo Valley Stage 3 Future Urban Area: Area A

ACT Government Environment, Planning and Sustainable Development Directorate
23 February 2017

12080SAR23_MV3AreaA

Quality Management

Document Distribution

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Prepared by	Rebeka Hall with assistance from: • Diana Turner	Rebeka Hall with assistance from: • Diana Turner	Rebeka Hall with assistance from: • Diana Turner	Rebeka Hall with assistance from: • Diana Turner
Signature				
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This report was prepared in accordance with the scope of services set out in the contract between Zoic Environmental Pty Ltd, ABN 23 154 745 525, and the client.

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Executive Summary

The ACT Government Environment, Planning and Sustainable Development Directorate on behalf of the ACT Land Development Authority (LDA), commissioned Rebeka Hall of Zoic Environmental Pty Ltd (Zoic), a New South Wales Environment Protection Authority (NSW EPA) accredited contaminated land Auditor (accreditation number 0802) to conduct a contaminated land Site Audit.

This Site Audit was conducted to provide an independent review of the suitability and appropriateness of environmental investigation works completed in Area A ('the site'), within the Molonglo Valley Stage 3 (MV3) Future Urban Area as shown in Figure 2 in Appendix A. The total MV3 area occupies approximately 1,145 hectares and the property was divided and separately investigated as two separate portions referred to as:

- Area A, as shown on Figure 2 covers approximately 464 hectares. Approximately 5ha in the eastern central boundary are managed by ACT Transport Canberra and City Services (TCCS). Area A has predominantly been used as forestry land; and
- Area B (northern portion of MV3) which covers approximately 681 hectares of land and has historically been used for rural purposes and grazing. Area B is covered by another Audit.

Area A (as shown in Figure 2) comprises Part Block 70, Part Block 71, Part Block 72, Part Block 74, Block 3 and Part Block 34 of the Molonglo Valley Stage 3 development, and is proposed for a mixture of future urban residential, urban open space including a recreation and nature reserve along the Molonglo River corridor and limited core commercial and transport services.

This is a non-statutory Site Audit conducted in accordance with ACT Environment Protection Authority Contaminated Sites Environment Protection Policy (EPP, 2009) and the Audit has been conducted in accordance with the requirements outlined in NSW DEC (2006) Contaminated Sites: Guidelines for the NSW Site Auditor Scheme – Second Edition. The NSW guidance adopted is endorsed by the ACT Environment Protection Authority (EPA) for use in the ACT through the *Contaminated Sites Environment Protection Policy,* 2009.

Numerous investigation works has been conducted since 2005, with the most relevant investigation works conducted by WSP (2016), which focusses specifically on Area A.

Based on information from title deeds and aerial photographs, the historical land uses included a former commercial Radiata pine plantation destroyed in the 2001 and 2003 ACT bushfires, and grazing lands.

The findings of the WSP DSI for the site concluded the requirement for:

- Management of soil in areas identified with anthropogenic wastes/filling from an aesthetic contamination perspective.
- Tracing and removal of asbestos containing material such as in-situ piping and potential utility underground/buried services across the site.
- Ensure Unexpected Finding protocol in place to ensure appropriate management of any potential soil or water contamination during site development/construction works.

Subsequent to the DSI report, a Construction Environmental Management Plan (CEMP) was prepared to act as a guide for construction methodology planning, and should be referred to under the following circumstances:

- Prior to commencing construction works that involve the disturbance of any soils within the Site;

- During work in any location where fill material was encountered, as annotated on the Stage 2 DSI Figures, reproduced within Appendix A;
- When the potential exists for asbestos material to become exposed, in fill material across the Site and/or redundant utility and underground service lines / pipes; and
- In the event that any unexpected potential contamination is encountered.

Responsibilities for CEMP implementation and maintenance is the land owner, the ACT Land Development Authority (LDA). The CEMP allows for the delegation of responsibilities in writing and notification to be made to all affected parties.

WSP | PB (February 2017) prepared an Unexpected Finds Management Plan (UFMP), Contaminated Land and Unexploded Ordnance (UXO / Exploded Ordnance Wast (EOW), within Molonglo Valley Stage 3 (Future Urban Area) for the Land Development Agency. The UFMP was prepared to manage risks of encountering potential contaminated land, unexploded ordnance (UXO) and exploded ordnance waste (EOW) during future earthworks and construction activities. The UFMP covers the entirety of the MV3 future urban area.

The investigation and management works reviewed are generally considered to have been completed in accordance with ACT EPA endorsed land contamination guidelines and the procedures outlined in the ACT EPP (November 2009). Where WSP's work deviated from the guidelines, the Auditor has discussed this within this SAR and is satisfied that these omissions do not affect the conclusions of the Site Audit.

On this basis, a Section A SAS will be issued certifying that, in the opinion of the Auditor, the site is suitable for the proposed development, provided that WPS's Construction Environmental Management Plan (30 June 2016) is implemented.

The Auditor notes that Area A in entirety meets the most sensitive land use criteria 'Urban Residential and Public Open Space' in addition to 'Residential with garden/accessible soil (HIL- A)' as defined in the NEPC (2013). Based on the available data there are no restrictions on permissible uses from a human health or environmental perspective identified subject to the implementation of the above CEMP to address aesthetic issues remaining.

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1. Introduction

This non-statutory site audit was commissioned by the ACT Government Environment, Planning and Sustainable Development Directorate, on behalf of the ACT Land Development Agency (LDA) which is project managing the redevelopment of the site.

This Site Audit Report (SAR23_AreaA) and associated Site Audit Statement (SAS23_AreaA) were produced by Rebeka Hall, employed by Zoic Environmental Pty Ltd (Zoic) to document the findings of a Site Audit. Rebeka Hall is an accredited environmental auditor under the NSW Contaminated Land Management Act 1997 (accreditation number 0802) and therefore approved by the ACT Environment Protection Authority (ACT EPA) under Section 75(5) of the Environment Protection Act 1997. Diana Turner, also from Zoic, provided assistance during the course of the Audit.

This Site Audit was conducted to provide an independent review of the suitability and appropriateness of environmental works completed in Area A ('the site'), within the Molonglo Valley Stage 3 (MV3) Future Urban Area as shown in Figures in Appendix A. The total MV3 area occupies approximately 1,145 hectares and the property was divided and separately investigated as two separate portions referred to as:

- Area A (southern portion of MV3) which covers approximately 464 hectares with a small portion (5ha) at the central eastern boundary managed by ACT Transport Canberra and City Services (TCCS) . Area A has predominantly been used as forestry land; and
- Area B (northern portion of MV3) which covers 681 hectares of land and has historically been used for rural purposes and grazing. Area B is covered by another Audit.

Area A was formerly a pine plantation that was destroyed in the 2001 and 2003 ACT bushfires. Specific features of the site include several dams, former commercial forestry plantations of Radiata pine and regrowth forests currently planted, forestry access tracks, stockpiling areas for timber chip mulch, drainage lines and several corridors for high voltage power lines and a trunk sewer line running across the site.

ACT EPA records indicate that a large portion of the study Area may have been impacted in the past by unexploded ordinance (UXO) and explosive ordnance waste (EOW) from former Department of Defence activities.

This SAR and associated SAS considers investigation works conducted across the site to form an opinion on whether Area A (as defined by WSP Figures represented in Appendix A), is suitable for redevelopment for mixed residential and urban open space, including recreational and nature reserve along the Molonglo River, with limited core commercial and transport services.

This is a non-statutory Site Audit conducted in accordance with ACT Environment Protection Authority Contaminated Sites Environment Protection Policy (EPP, 2009) and the Audit has been conducted in accordance with the requirements outlined in NSW DEC (2006) Contaminated Sites: Guidelines for the NSW Site Auditor Scheme – Second Edition. The NSW guidance adopted is endorsed by the ACT Environment Protection Authority (EPA) for use in the ACT through the *Contaminated Sites Environment Protection Policy,* 2009.

1.1 Objectives of Audit

The objectives for the non-statutory Site Audit were to:

- Confirm the nature and extent of contamination; and

- Determine the appropriateness of a detailed Phase 2 environmental investigation conducted by the appointed Environmental Assessor (WSP).
- Based on the findings of the Phase 2, the Audit was to also conclude on the suitability of the site for the proposed future landuse(s) as defined by the zoning outlined in the ACT Territory Plan 2008 (updated 14 December 2012) for Molonglo (NI2008-27).

1.2 Overview of Site Audit Process

This site audit has been conducted in accordance with the contaminated land provisions of the *Environment Protection (EP) Act 1997* (ACT) and *Environment Protection Regulation* (2005), the *Australian Capital Territory Environment Protection Authority* (ACT EPA) Contaminated Sites Environment Protection Policy (EPP, 2009), and relevant policies and guidelines approved by the New South Wales Environment Protection Authority (NSW EPA) relating to contaminated land site audits as endorsed for use in the ACT by the ACT EPA.

The site audit has been conducted in accordance with the requirements of the EP Act, which describes a site audit as (S.91A (2)):

- An environmental audit for assessment or remediation of contaminated land is an audit by an auditor:

a. that relates to an assessment or remediation carried out (whether under this Act or otherwise) in relation to actual or possible contamination of land; and
b. that is conducted for the purposes of determining any 1 or more of the following:

    i. the nature and extent of the assessment or remediation undertaken;
    ii. the nature and extent of any contamination or remaining contamination of the land;
    iii. what further assessment or remediation is necessary before the land is suitable for any specified use or range of uses.
    iv. the appropriateness of any remediation plan, long-term management plan, assessment proposal or remediation proposal.

Sections 91C (5) and 91D (5) of the EP Act describe that in preparing site audits reports, ACT EPA approved Site Auditors must take the following matters into account:

- The provisions of the EP Act and the EP Regulations;
- The permitted and approved uses of the land to which the assessment relates;
- The degree or extent of contamination;
- Any relevant environment protection policies; and
- Any relevant environment protection measures.

NSW DEC (2006) Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd Edition), which is approved by the ACT EPA, through the *Contaminated Sites Environment Protection Policy,* 2009, describes the site assessment and audit process as:

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

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

1.3 Guidelines approved by the ACT EPA as listed in the ACT Contaminated Sites Protection Policy 2009

The National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM, April 2013) is prescribed under the Environment Protection Act 1997 and is a National approach to the assessment of land contamination. According to the ACT Environment Protection Authority 'Contaminated Sites Environment Policy' (November 2009) the guidelines listed below should be used, as appropriate, for contaminated land assessment or remediation.

ACT EPA Publications:

- ACT Environmental Standards: Assessment and Classification of Liquid and Non-liquids Wastes (June 2000);
- Information Sheet No.1 - Contaminated Sites - Decommissioning, Assessment and Audit of Sites Containing Above Ground or Underground Fuel Storage Tanks, (October 2016);
- Information Sheet No.2 - Contaminated Sites - Requirements for the Assessment and Validation of Former Service Station Sites in the ACT (October 2016);
- Information Sheet No.3 - Contaminated Sites - Requirements for the Assessment and Validation of Sites Containing Above Ground or Underground Fuel Storage Tanks in the ACT (October 2016);
- Information Sheet No.4 - Contaminated Sites - Requirements for Re-use and Disposal of Contaminated Soil (October 2016);
- Information Sheet No. 5 – Requirements for the Transport and Disposal of Asbestos Contaminated Wastes (October 2016);
- Information Sheet No. 6 – Management of Small Scale, Low Risk Soil Asbestos Contamination (October 2016);
- Information Sheet No. 7 – Guidance for undertaking preliminary contamination investigations for development or lease variation purposes (October 2016);
- Environmental Guidelines for Service Station Sites and Hydrocarbon Storage (January 2014);
- Environmental Protection Guidelines for Construction and Land Development in the ACT (March 2011);
- General Environment Protection Policy (August 2007);
- Water Quality Environment Protection Policy (April 2008); and
- Hazardous Materials Environment Protection Policy (December 2000).

ANZECC, ARMCANZ, enHealth and NHMRC publications:

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand, Paper No. 4, October 2000;
- Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites, Australian and New Zealand Environment and Conservation Council and National Health and Medical Research Council, January 1992;
- Financial Liability for Contaminated Sites Remediation: A Position Paper, Australian and New Zealand Environment and Conservation Council, 1994;
- Guidelines for Groundwater Protection in Australia, Agriculture and Resources Management Council of Australia and New Zealand & Australian and New Zealand Environment and Conservation Council, 1995;
- National Water Quality Management Strategy, Australian Drinking Water Guidelines 6, 2004, National Health and Medical Research Council, Natural Resources Management Ministerial Council, 2004;
- Polychlorinated Biphenyls Management Plan, Australian and New Zealand Environment and Conservation Council, Canberra, April 2003;

- Minimum Construction Requirements for Water Bores in Australia, Agriculture and Resource Management Council of Australia and New Zealand, Australian and New Zealand Environment and Conservation Council & Agriculture and Resources Management Council of Australia and New Zealand 1997;
- Guidelines for the Assessment of On-site Containment of Contaminated Soil, Australian and New Zealand Environment and Conservation Council 1999;
- Management of Asbestos in the Non-occupational Environment, enHealth 2005.

NSW DECC publications recognised by ACT EPA are:

- Guidelines on Significant Risk of Harm from Contaminated Land and the Duty to Report, NSW EPA, 1999
- Guidelines for the NSW Site Auditor Scheme, NSW DEC, 2006
- Guidelines for Assessing Service Station Sites, NSW EPA, 1994
- Sampling Design Guidelines, NSW EPA,1995
- Guidelines for Consultants Reporting on Contaminated Land, NSW EPA,1997
- Guidelines for the Vertical Mixing of Soil on Former Broad-Acre Agricultural Land, NSW EPA, 1995
- Guideline for Assessing Former Orchards and Market Gardens, NSW EPA, 2005

EPA Victoria publications recognised by ACT EPA are:

- Groundwater Sampling Guidelines: Publication 669, EPA Victoria, 2000
- Hydrogeological Assessment (Groundwater Quality) Guidelines, Publication 668, EPA Victoria, 2006
- A guide to the Sampling and Analysis of Waters, Wastewaters, Soils and Wastes, 7th Edition, Publication 441.7, EPA Victoria, 2000
- Classification of Wastes, Publication 448.3, EPA Victoria, 2007

Relevant Australian Standards:

- AS 4482.1 : 2005 Guide to the investigation and sampling of sites with potentially contaminated soil – Non-volatile and semi-volatile compounds
- AS 4361.2-1998 : Guide to lead paint management – Residential and commercial buildings
- AS/NZS 5667.11:1998 : Water quality – Sampling – Guidance on sampling of groundwaters
- AS/NZS 5667.1:1998 Water quality – Sampling – Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples

Other publications and references:

- Remediation of Contaminated Soil and Groundwater: Proposals for Criteria and Priority Setting (the Revised Dutch Guidelines), Swartjes, F. A & van den Berg, R., 1993.
- Imray, P & Langley, A. (1996) Health-Based Soil Investigation Levels. National Environmental Health Forum Monographs, Soil Series No.1, SA Health Commission, Adelaide.
- Taylor, R & Langley, A. (1996). Exposure Scenarios and Exposure Settings. National Environmental Health Forum Monographs, Soil Series No.2, SA Health Commission, Adelaide.
- Lock, W. H. Composite Sampling. National Environmental Health Forum Monographs, Soil Series No.3, SA Health Commission, Adelaide.

1.4 Reports Reviewed

The most recent documentation relevant to meet the objectives of this SAR included a detailed review of the following:

1. WSP Environmental (WSP) (2 December 2014) Molonglo Valley Stage 3 (Area A) Sampling, Analysis and Quality Plan (SAQP) (reference SAQP MV3 Area A – 00039275).
2. WSP (24 June 2016) Molonglo Valley Stage 3 (Area A) Stage 2 Detailed Site Investigation, ACT Land Development Agency (reference 00039275_Molonglo_Area_A_DSI_FINALv3).
3. WSP (25 November 2016) Construction Environmental Management Plan (CEMP), Molonglo Valley Stage 3 (Area A) (reference 00039275_WSP_MV3_Stage 3 Area A – CEMP_FINAL_v2).
4. WSP | PB (8 February 2017) Unexpected Finds Management Plan, Contaminated Land and Unexploded Ordnance (UXO) / Exploded Ordnance Waste (EOW), Molonglo Valley Stage 3 (Future Urban Area) (reference WSP-PB_Rpt_UFP_MV3_FINAL).

These reports have been reviewed in accordance with the requirements in the NSW DEC (2006) Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition), as endorsed by the ACT Environment Protection Authority (EPA) for use in the ACT through the *Contaminated Sites Environment Protection Policy,* 2009, the reporting checklist in the NSW OEH (2011) Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites; and the current requirements outlined in Schedule B2 Guidelines on Site Characterisation in ASC NEPM (May 2013).

For the purposes of this assessment, the focus has been on the most recent documentation received by the Auditor as these were most relevant to the site, being Area A. The other documents provided were reviewed to form an overview of the issues surrounding the overall Molonglo Valley area and its potential contaminants of concern. Data relevant for Area A are derived from the most recent documentation from WSP.

During the course of the Site Audit, the following reports were also provided to the Auditor for background information and were summarised in WSP reports:

- Coffey Geosciences (2005) Molonglo Valley, Preliminary Geotechnical and Contamination Constraints Study.
- Coffey Geosciences (2006) Gungahlin Drive Extension – Preliminary Assessment of Spoil Construction over sludge ponds at Coppins Crossing.
- AECOM (June 2012) Phase 1 Environmental Site Assessment, Molonglo Stage 3, (for Land Development Agency).
- WSP Environmental (September 2012) Phase 1 Environmental Site Assessment, Molonglo Valley Stage 3 ACT (for ACT ESDD).
- WSP Environmental (September 2012) Sampling and Analysis Quality Plan (SAQP) for Phase 2
- Environmental Site Assessment, Molonglo Valley Stage 3 ACT (for ACT ESDD).
- Milsearch Pty Ltd (May 2014) Post Activity Report UXO Contamination Assessment Molonglo Development Stage 3 (prepared for LDA).
- Robson Environmental Pty Ltd (May 2014) Phase 1 Environmental Site Assessment Area C, Molonglo Valley Stage 3, ACT.
- Robson Environment Pty Ltd (May 2014) Phase 1 Environmental Site Assessment Areas A and B, Molonglo Valley Stage 3, ACT.

Other information provided which was considered as part of this Site Audit included:

- Coffey Geosciences (2006) Phase 1 Environmental Site Assessment, Former Weston Creek Sewage Treatment Plant, Adjacent Landfill and night spoil area, Weston District, ACT.
- SMEC (2009) Final Phase 1 Environmental Site Assessment Report for the precinct of North Weston in Weston Creek.
- SMEC (2009) Final Phase 1 Environmental Site Assessment Report for Coombs and Wright, Molonglo.
- AECOM (2010) Phase 1 Environmental Site Assessment, Stage 2 Molonglo (West) ACT.

1.5 Audit Meetings and Site Inspection

A site inspection was conducted by the Audit team and appointed assessors, WSP, on 15 October 2014. The inspection involved driving to and observed the Areas of Potential Concern identified by WSP (and others) and targeted for the Phase 2 investigation. The following observations were made relative to Area A:

- The Auditor noted that limited access was available at the time of the site inspection completed by Zoic and WSP (on 15 October 2014).
- Significant areas of blackberry management were occurring on the site.
- A project meeting was held with EPD, LDA and the Auditor on 6 June 2016 to discuss the outcome of both the detailed site investigations conducted on Area A and B. The original objective of the audit was to form an opinion on the suitability of the site characterisation works. However, given the absence of chemical contamination identified on Area A, it was agreed that two separate Site Audit Reports and Statements would be prepared. For Area A the aim was to obtain a Section A Site Audit Statement given the absence of chemical contamination identified, and a Section B Site Audit Statement (endorsing a remedial action plan) for Area B to address areas of impact that would require remediation prior to or during redevelopment of Area B.

1.6 Audit Correspondence

The Auditor provided feedback during the course of the Site Audit to the consultant and documented them as interim advice letters or email correspondence. A copy of these letters or relevant email correspondence is included in Appendix B together with consultant responses (where provided).

2. Site Identification and Description

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

2.1 Site Identification

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

Table 2.1: Site Identification

Title	Details
Street Address:	Area A in Molonglo Valley Stage 3 Future Urban Area The intersection of the Tuggeranong Parkway and the Bicentennial National Trail mark the south eastern corner of Area A
Property Description:	• Part Block 70, District Molonglo Valley. • Part Block 71, District Molonglo Valley. • Part Block 72, District Molonglo Valley. • Part Block 74, District Molonglo Valley. • Block 3, District Molonglo Valley: • Part Block 34, District Molonglo Valley.
Current Site Ownership:	ACT Government
Geographical Coordinates: (Sources: LDA, www.ACTmapi.act.gov.au, Nearmap - 7 November 2014.)	Lat: -35.298455 Long: 149.056320.
Property Size:	465 hectares (approximately)
Zoning – Existing:	• Part Block 70. RZ1: Suburban; DES: Designated. • Part Block 71. RZ1: Suburban; CZ4: Local Centre; TSZ1: Transport; NUZ4: River Corridor; RZ3: Urban Residential; CF: Community Facilities; PRZ1: Urban Open Space; DES: Designated (Inner Hills – North Canberra (west)). • Part Block 72. RZ1: Suburban; TSZ1: Transport; NUZ4: River Corridor; PRZ1: Urban Open Space; CZ1: Core Zone. • Part Block 74. RZ1: Suburban; PRZ1: Urban Open Space; DES: Designated. • Block 3: TSZ2: Services. • Part Block 34. RZ1: Suburban; NUZ4: River Corridor; PRZ1: Urban Open Space; DES: Designated. • Permissible development for each Land Zoning have been included in • Appendix F
Zoning – Previous:	Not provided. However, the site has been historically used for forestry purposes.

2.2 Surrounding Land Use

The site is located in a rural area, including grazing and forestry land uses as well as newly developed residential estates. The immediate adjoining land uses are described as follows:

Table 2.2: Immediate Site Surrounds

Title	Details
North:	MV3 Area B investigation area and then William Hovell Drive followed by grazing lands
East:	The Tuggeranong Parkway and Canberra National Arboretum followed by Lake Burley Griffin with farming and residential Lots
South:	Molonglo River and the new residential suburbs of Coombs and Wright and John Cotter Drive
West:	Molonglo River and the Molonglo Valley Stage 2 development area and then John Cotter Drive and open grazing lands

2.3 Site Condition

Current

The site is irregular in shape and has gently undulating to rolling topography.

The northern and central portions of Area A consist of grazing land for cattle, while the southern portion was a former pine plantation that was destroyed in the 2001 and 2003 bushfires. Specific features include:

- Several dams;
- Former commercial forestry plantations of Radiata pine and regrowth forests currently planted;
- Dirt tracks traversing the area for forestry access and management;
- Several stockpiling areas for timber chip mulch;
- Drainage lines that typically drain from west to east towards the Molonglo River. There are no known 'named' drainage lines within the Site apart from Molonglo River; and
- Several corridors for high voltage power lines and trunk sewer line run across the Site.

The Molonglo River is located along the western and southern boundaries of the site, and flows in a north westerly direction, discharging in the Murrumbidgee River. Rainfall is expected to predominantly infiltrate surface soils and flow as surface water into incised drainage lines flowing to Molonglo River to the west.

Surface water flow across the site is generally controlled by topography. Several small dams are present that collect water from surrounding up gradient catchment areas for forestry use. Several concrete culverts and rock drainage channels are present along the western most access tracks that discharge onto the Molonglo River channel.

The surrounding land uses are typically grazing lands, Canberra National Arboretum, Lake Burley Griffin, rural residential lots, Molonglo River and the new residential suburbs of Coombs and Wright.

Proposed

The proposed development includes future urban residential, urban open space including recreation and nature reserve along the Molonglo River corridor with limited core commercial and transport services. Appendix A includes the future urban area landuse for the site.

2.4 Auditor Discussion

The Auditor notes the configuration and referencing of the site area changed during the completion and reporting of various site assessments. The areas which have been excised from Area A involves the locations of sampling points located at the central-south part of Area A, along Tuggeranong Parkway and Yarralumla (refer Figure 6_F3, Appendix A). The excision has resulted in three sampling reference points noted in the SAQP (AECs ROBA_AEC12, ROBA_AEC13, ROBA_AEC14 and ROBA_AEC15) no longer falling within the assessment boundary for works being completed by WSP (2015). This has been noted in Section 7.

The Auditor further notes that descriptions of the proposed future development has not been fully provided, as the final designs and layouts for the proposed development had not been finalised at the preparation of this SAR.

However, the information required by OEH (2011), in regard to site identification and condition, was generally provided, and is consistent with observations made during the site inspection conducted as part of this audit. Where the information was not provided, the Auditor consulted with the Client and WSP to obtain the necessary information.

3. Stages of Work

3.1 Summary of Works

Table 3.1 provides a summary of the investigation works that have taken place initially as part of the greater Molonglo Valley assessment, and specific to the Area A redevelopment.

Table 3.1: Summary of Works Completed

Date	Report Objectives, Scope and Outcomes
AECOM (2012) Phase 1 Environmental Site Assessment (Molonglo Valley Assessment – MV3)	AECOM completed a Phase 1 ESA for the entire Molonglo Valley Assessment (including current MV3) which incorporates Area A. The outcomes of the report were the identification of several Areas of Environmental Concern (AEC), as identified: - AEC1 – sewage sludge ponds located adjacent and to the north; - AEC2 – former pine plantation; - AEC3 – unsealed pad; - AEC4 – existing unsealed roads; - AEC5 – abandoned vehicle and old drums; - AEC6 - sheep dip located (adjacent) offsite to the north east; - AEC7 – former pine plantation. It is the Auditor's understanding that the majority of the land covered by the AECOM Phase 1 has been further evaluated, remediated and Audited (by Environ), and therefore is excluded from the current Molonglo 3 investigation area. It is however noted that AECs 1 and 6 are located within Area A, and are relevant to the current site audit.
WSP Environmental (2012) Phase 1 Environmental Site Assessment (Molonglo Valley Stage 3)	The Phase 1 completed by WSP covered both Area A and B within the MV3 project area, with a study area of 1,028 hectares. The objectives of the Phase 1 ESA were to: • Complete works in accordance with ACT EPA Contaminated Sites Environment Protection Policy (November 2009) and ACT EPA endorsed guidelines including NSW EPA (2011) Guidelines for Consultants Reporting on Contaminated Sites; • Determine the potential for land contamination and identify any associated land use constraints; • Identify all past and present potentially contaminating activities; • Identify potential contamination types; and • For areas identified provide strategic advice on the scope of work required to investigate with greater certainty the contamination status (Phase 2 Detailed Environmental Investigation). The scope of the report included: • Review of existing reports (those listed in Section 1.4); • Review of the environmental setting based on topographical maps, topography, soil and geological maps and a groundwater bore search through the ESDD Environment Protection and Water Regulation; • Review of historical aerial photographs between 1944 and 2009; • Review of historical title deeds for selected blocks; • Contaminated Land Search of the ACT Environment Protection Authority Records for selected blocks; • Search of Office of Regulatory Services (ORS) WorkCover Records for Dangerous Substances, Dangerous Goods, Underground Storage Tanks and Licence History for selected blocks. The outcomes of the report were: • Property descriptions, at the time of the study, were reported as: - Privately leased land: Blocks 4, 5 and 41 (Mr Maurice Tully). - Unleased land with grazing: Blocks 12, 13, 14, 15, part of 37, 42, 43 and part 46. - Former Pine Plantation: Part Blocks 36, 37 and 46.

Date	Report Objectives, Scope and Outcomes
	- Infrastructure corridors: Blocks 34, 38, 39, 40 and roads (Coppins Crossing Road) - Molonglo River and banks: Blocks 11, part 45, 47, 49, 60, 66, part 1214, Weston Ck. - Coppins Crossing and sludge pond: Block 10 • The northern and central portions of the study area consisted of grazing land for cattle, while the southern portion was a former pine plantation that was destroyed in the 2001 and 2003 bushfires. Specific features in the Study Area included: - Horse paddocks in the north-western portion along William Hovell Drive. - One farm with several sheds (409 Coppins Crossing Road). - Two occupied dwellings: one near the farm and one across Coppins Crossing Road on the boundary of Blocks 13 and 46. - Coppins Crossing Sludge Ponds. Four (4) derelict ponds in the western portion of the Study Area, located adjacent to Molonglo River. - Several corridors for high voltage power lines and trunk sewer line run across the Study Area. • Surrounding land uses are predominantly agricultural grazing land, Kama Nature Reserve, the Arboretum and residential developments across Molonglo River (MV Stage 2 development). • Historical aerial photographs were reviewed for 1944, 1968, 1985, 1998 and 2009. Major changes to landform and presence of built structures were described over the years. The activities observed were consistent with known land uses registered for the site. Following the review of previous reports, government records, historical aerial photographs, site walkover inspection and anecdotal interviews, WSP identified 29 AECs across Area A (and B) requiring further assessment. The following AECs were located within the current Area A study area: • WSPA_AEC6: dam which may be constructed with imported fill material. Dams may also act as 'sinks' for any applied localised chemicals. • WSPA_AEC22: stockpiled soil, with empty 205L Castrol drum partly exposed. • WSPA_AEC 29: pesticide use on the adjacent and topographically up gradient Canberra International Arboretum. In addition to the above specific AECs, WSP also identified 4 additional AECs, for which the exact location within the Study Area could not be determined: • AEC30. Presence of artillery shells (as both Exploded Ordnance Waste (EOW) and Unexploded Ordnance (UXO). Potential occurrence throughout the Study Area, with the possible exception the most southern portion. • AEC31. Herbicides and pesticides associated with agricultural land use, pine plantation operations and nature conservation. • AEC33. Stockpiles and isolated occurrences of burnt timber, likely resulting from the 2001 and 2003 bushfires. Based on the results of the Phase 1 ESA, WSP recommended that: • Targeted sampling be conducted across the AECs identified and subsequent development of appropriate remedial action plan and/or management strategy if required; • A hazardous material survey be conducted of various buildings, sheds and structures across the Study Area. Depending on the results, an asbestos management plan may be required; • A protocol be developed to address unexpected findings during the later phases in the study area development.
WSP Environmental (2012) Sampling and Analysis Quality Plan (SAQP) for Phase 2 ESA	The objectives of the SAQP were to: • Provide a robust sampling strategy to address the AECs identified during the Phase 1 investigation. • Establish Data Quality Objectives (DQOs) for the SAQP to ensure that the data is in accordance with appropriate guidelines. • Determine whether further investigation, management or remediation is required in relation to any of the investigated AECs. The WSP SAQP was prepared for 1028ha of the greater Molonglo Stage 3 Area.
Milsearch	Milsearch completed research into the historical Military Live Fire Training activities conducted by the Royal Military College within the footprint of the proposed Molonglo

Date	Report Objectives, Scope and Outcomes
(17 November 2013) Post Activity Report UXO Remediation and Contamination Assessment Survey Molonglo Development Stage 3 Priority Works	Valley 3 development. The research revealed that artillery live firing practices were conducted in 1914 utilizing 15 pounder guns with target areas identified as high ground adjacent to, and either side of, Coppins Crossing.Live firing practices occurred in 1920 and 1921 utilizing 18 pounder guns with target areas nominated as being one mile north of Coppins Crossing and near Deep Creek. An unexploded ordnance (UXO) contamination remediation and assessment (at 10% clearance) program was completed across Priority Works land identified by the LDA (101 ha area of land either side of Coppins Crossing, north of the Molonglo Rover). A 100% clearance search was conducted in the area proposed for construction of sewer facilities and a bridge within the Molonglo River corridor (10.44 ha). During the 100% assessment of the 10.44 ha Priority works zone, 133 ferrous anomalies were recorded and investigated. It was concluded by Milsearch that none of these anomalies had originated from Explosive Ordnance (EO). Two items of exploded ordnance waste (EOW) were detected. Thes two items were Shrapnel projectile sub-munitions, being lead/antimony balls each approximately 1cm in diameter. Their find provided strong evidence that the spur rising from the river's southern bank in an east-south-easterly direction towards Molonglo Development Stage 2, had most probably been an artillery impact area for shrapnel projectiles from the 15 pdr firing practice of 1914. During the 10% assessment of the remainder of the site, all anomalies detected were manually excavated / investigated at the time of discovery. No items of EO were detected. All anomalies investigated were metallic scrap from farming or fencing origins. No evidence was found that artillery impact areas existed within, or close to the remaining 90ha of land investigated. The report concluded that the area of contamination surveyed was exclusively within the Priority Works corridor. Development of adjacent land outside the corridor should entail further examination for UXO contamination, particularly if development works are planned for the spur line running south of Coppins Crossing onto Molonglo Stage 2 Development land. That examination should first comprise a 10% transect sampling assessment to delineate the impact areas, followed by 100% UXO geophysical remediation of those areas to be developed. The Auditor notes that the Priority Works area assessed in the 2013 Milsearch report does not fall within the current MV3 Area A audit area, and is located along the upper north-western boundary of MV3 Area A. Furthermore, the results of the geophysical survey indicated that there was a low risk for shortfall (within Area 3A), with no evidence of impacts noted within the boundary of the current Area A audit area,
Milsearch (21 May 2014) Post Activity Report UXO Contamination Assessment Molonglo Development Stage 3, Act Land Development Agency	The objectives of the 2014 UXO assessment were to: • Conduct a 10% UXO Technical Assessment of the 265 ha site (located within MV3 Area B only) by detecting along nominally parallel 1m wide lanes separated at 10m intervals; • Where contamination existed to the border of the 265 ha site, conduct additional 5% contamination sampling assessments along parallel transects until fade out of impact evidence was achieved; and • Conduct a detailed inspection of land within the Federal Police Training Compound located in the central south of the 265 ha site. The purpose of this inspection was to formulate an approach to the conduct of any UXO mitigations thought necessary to allow the Compound to be absorbed into the Molonglo Stage 3 housing development. The UXO survey area was bound by William Hovell Drive to the north, Kama Nature Reserve to the north east, Molonglo River to the south, Coppins Crossing Road to the east and a fence line to the west (which is the boundary of the current Molonglo 3 Audit Area). Conclusions and recommendations of the survey were as follows: • In Milsearch's opinion, significant volumes of explosive ordnance waste (EOW) was encountered in the initial study area as well as land further eastward. • The absence of finds south of Molonglo River (which comprises Molonglo Stage 2 FUA) strongly suggested that the artillery activities were confined to land north of Molonglo River. • No items of UXO were discovered within the survey area; however an UXO was reported on the western boundary suggesting further contamination outside of the assessed land may be present. • The area of impact was not been delineated to the east.

Date	Report Objectives, Scope and Outcomes
	• It was recommended that a 100% geophysical UXO survey (and where necessary remediation) be conducted for Molonglo Stage 3. Further assessment was also required in land to the west which is under the control of ACT Parks and Conservation. • Land excluded from the May 2014 survey should be assessed. • Install appropriate warning signs and conduct appropriate training of staff/contractors/ consultants who may be conducting works across Molonglo Stage 3. The Auditor considers the recommendations to be appropriate given the potential 'contamination' risk associated with historical military training activities, and given the proposed urban development of the land. Anecdotal evidence indicates the potential burial of live shells at depths > two feet (below plough depth) (as reported by WSP 2012) which warrants further geophysical surveys using methods that can detect buried items. The Auditor notes that the Milsearch 2014 assessment does not fall within the current MV3 Area A audit area, and is located to the north west of the current Audit Area within MV3 Area B.
Milsearch (30 April 2015) Post Activity Report Molonglo Stage 3 Urban Development: Geophysical Survey and Remediation of Unexploded Ordnance	Following the results of the 2014 assessment (10% of 265 ha located within the identified artillery training range), Milsearch completed a further 100% assessment and remediation of 198 ha area deemed to require detailed assessment. This assessment area falls with MV3 Area B only. The objective of the assessment was to identify and investigate all anomalies equating to a minimum size target of 5.5kg ferrous mass (15 Pounder equivalent) buried at 0.61m depth within the 198 ha site. As anticipated, EOW was distributed throughout the site. Areas east of Coppins Crossing Road were found to primarily contain items of fragmentation and one inert Shell 18 Pdr Shrapnel. Larger items such as shell bodies and identifiable internal components of shrapnel shells, were found in the central and western areas. All items of UXO were found to the west of the main creek-line. Seven anomalies within the dam (Blocks X14, X15, Y14, with MV3B) were unable to be investigated as the dam refilled with water after being surveyed. Coordinates of these seven anomalies are tabulated in Appendix A of the Milsearch report for future investigation when the dam is dry. Milsearch stated that all UXO and EOW identified within the assessment area were entirely derived from the firing of 15 Pdr and 18 Pdr guns. There was no evidence suggesting that other types of weaponry had ever been employed on the Site. The following recommendations were made by Milsearch: 1. In view of the number of fragmentation finds made in close proximity to the external search boundary in the south west, consideration should be given to expanding the remediation boundary westwards into the Molonglo River Valley from the vicinity of Blocks C11 and D11. As this land (outside the current search boundary) will not be developed but will be accessed by the public as open space –nature reserve etc, full UXO remediation is not warranted. A lesser mitigation treatment, such as locating surface and very near surface complete UXO items, is considered appropriate, thus reducing the probability of the public coming into contact with accessible UXO items; 2. The seven remaining anomalies within the dam in the extreme east of the Site are to be investigated when the dam bed dries out; 3. At a later stage in the development, existing fence lines should be removed under the direction of a safeguarding exploded ordnance device (EOD) technician. The alignment of the fences should then be surveyed with Geometrics G858 magnetometer or equivalent to a width of 12m centred on the original fence-line, with all magnetic anomalies investigated; 4. The blackberry and other bushes within the pink tail worm lizard habitat should be slashed when environmental restrictions are lifted making the areas accessible, for deep searching for UXO using analogue techniques; 5. Where necessary during redevelopment, removal of the large trees should include complete excavation of root-balls. Removal of root-balls should be safeguarded by an EOD technician and the root-balls and the holes, should be searched with magnetometers; 6. Following demolition of the house and other buildings on the Site, footprints should be surveyed and investigated by magnetometer l. These areas may require UXO safeguarding by mechanical surface scraping to remove domestic detritus, prior to UXO survey; and

Date	Report Objectives, Scope and Outcomes
	7. Following removal of the mounds, the ground beneath should be subjected to a UXO magnetometer search. The Auditor notes that the Milsearch 2015 assessment does not fall within the current MV3 Area A audit area, and is located to the north west of the current Audit Area, wholly located within MV3 Area B. Based on the review of the overlay drawing prepared by the LDA (Molonglo Valley UXO Contamination Stage the Auditor concurs with WSP that an UXO / OW management plan be implemented during the redevelopment of MV3 Area A (and MV3 AreaB), to manage any potential residual risk of these items being present.
Milsearch (5 October 2016) Email from Mike Ransom	The Auditor reviewed the Milsearch Post Activity Reports (2013, 2014, 2015), and noted that no physical UXO assessment or ground survey has been completed specifically within the audit MV3 Area A. Based on the review of estimated firing lines (as presented in LDA Drawing 01, including in Appendix A), an indicative gun firing location is present on the eastern boundary of MV3 Area A. Milsearch completed an assessment within the Indicative Targeted Impact Zone (located to the west of MV3 Area A in 2013 associated with trench and sewer construction activities within the River corridor). No 'targeted impact zone' is located within MV3 Area A as shown on LDA Drawing 01, including in Appendix A. The Auditor requested further clarification from WSP|PB and Milsearch, regarding potential risks for from short fall UXO/EOW within MV3 Area A. Correspondence from Mike Ransom (Milsearch, email 5 October 2016) stated that the risk for short fall rounds (from targeted impact zones to the west) to have landed within MV3 Area A was considered to be an "extremely slight risk". Further Milsearch considered that the implementation of the Unexpected Finds Management Plan (WSP, February 2017), including induction to a UXO chance find protocol, was appropriate to manage this slight risk. The Auditor has reviewed the results of the UXO assessments completed in the areas outside audit Area A (specifically MV3 Area B to the north / east). The Auditor considers that based on these assessments, it would appear that UXO/EOW has been primarily found within the mapped targeted areas, with very minimal to none EOW found within the short fall potential impact zone. Based on this comparison, the Auditor concurs with Milsearch that the risk of UXO/EOW within MV3 Area A can be considered low, and that the implementation of the WSP|PB UFMP (February 2017), and UXO induction, is appropriate to manage this risk as part of future development activities. It is additionally noted that no UXO was observed within MV3 Area A during the 2014 intrusive Geotechnical assessment by Douglas Partners, or the 2016 intrusive environmental assessment by WSP|PB.
Robson Environmental (2014) Phase 1 Environmental Site Assessment Robson Areas A and B, Molonglo Valley Stage 3, ACT	The Land Development Agency (LDA) engaged Robson Environmental Pty Ltd (Robson) to complete a Phase 1 for two parcels of land within Molonglo 3. The objectives of the Phase 1 were to: • Identify past and present contaminating activities that may have been formerly undertaken upon the site; • Discuss the current site condition; • Identify potential areas of environmental concern (AECs); • Provide a preliminary assessment site contamination (if any); and • Assess and provide recommendations (if required). Robson Areas A and B comprise the following Blocks: • Robson Area A – Parts of Blocks 10, 12, 45, 46 and 66 Molonglo Valley, and part of Block 8 Section 3 Denman Prospect; • Robson Area B – Parts of Blocks 71 and 75 Molonglo Valley. Robson Area A is located on, and north of, the Molonglo River, located to the west of Coppins Crossing. Robson Area B is located on, and north of, the Molonglo River in the area between the residential estates of Coombs and North Weston, the Tuggeranong Parkway and the National Arboretum Canberra. The combined area of the two Robson investigation areas was approximately 249.4 hectares (ha). Based upon the review of the site history and a site walkover, Robson identified the following AECs within the current Area A study area:

Date	Report Objectives, Scope and Outcomes
	• Robson report that all Blocks were previously utilised as part of artillery firing range. Robson reported that there is the potential for unexploded ordnance (UXO) and explosive ordnance waste (EOW) to be present as a result of ricochet and overshot from the former military firing ranges; • The area was formerly part of commercial forestry plantations and may have been subjected to weed and pest control; • RobA_AEC16, 17, 18: Numerous (estimated at 68) stockpiles of soil and mulch were observed; • RobA_AEC20: A flat area containing potentially 24,000m3 of fill was observed near the mouth of a gully discharging in the Molonglo River (coordinates 686722 m E 6091423 m N referenced as AEC20). The material observed mostly comprised boulders of volcanic rock, likely to be material excavated during the installation of the subsurface sewer infrastructure, however there is the potential for imported material to be present within the fill. • RobA_AEC 22, 23: two (2) concrete driveway structures. • RobA_AEC24, 25, 26, 27, 28: Drains and associated feeder channels used to control surface water flow which receive runoff from up-gradient areas; The report included an SAQP for each AEC listed. In the absence of a conceptual site model (CSM), the Auditor was unable to effectively assess the appropriateness of the proposed SAQP for 'Robson Areas A and B'. It was recommended by the Auditor that: • A concise CSM is formulated based on the existing site information; • An assessment of the relative risk for each AEC be conducted. This may result in more rigorous sampling in high risk AECs, with a relaxed and targeted sampling regime proposed for low risk AECs; • For the analytical suite proposed consider the persistency for each likely contaminant and if it could be reasonably expected with the AEC (for example OPPs degrade relatively quickly); • Review of AECs against proposed future land use; • Consider and comment on the necessity and practicality of the scope of the proposed environmental assessment works and whether the project objectives can be achieved with a refined and targeted SAQP (refer to Schedule B2 ASC NEPM (2013) for guidance).
WSP Environmental 2 December 2014 Molonglo Valley Stage 3 (Area A) Sampling, Analysis and Quality Plan (SAQP)	The 2014 WSP SAQP provided a summary of site history and environmental setting (based on previous consultant reports and site auditor interim advice) and presented the preliminary Conceptual Site Model (CSM) and Data Quality Objectives (DQO) for the proposed Phase 2 DSI. The objectives of the SAQP were to: • Provide a robust sampling strategy to address the discrete and diffuse AECs identified during previous investigations. • Detail the sampling methods, media and analytical schedule to allow for the characterisation of AECs and ensure enough information is gathered to allow for an appropriate Remedial Action Plan (RAP) be prepared to render to site suitable for the proposed land use if required. • Establish Data Quality Objectives (DQOs) to ensure that the data is in accordance with appropriate guidelines including the National Environment (Assessment of Site Contamination) Measure, Amended (NEPM, 2013) and in particular Schedule B2 Guideline on Site Characterisation. The SAQP was considered sufficiently robust to characterise the site and to enable the development of an appropriate Remedial Action Plan (RAP) and/or Environmental Management Plan (EMP) to render to site suitable for the proposed land use, if required. Two additional AECs were identified for Area A at this stage labelled as WSPA_AEC50 and AEC 51 comprising Dams.
Douglas Partners April 2015 Preliminary Geotechnical Investigation Proposed Residential	This document was not provided to the Auditor, however summarised by WSP (2016) DSI. Douglas Partners (DP) completed a geotechnical investigation across both Area A and Area B in November 2014. The investigation included broad grid based test pitting across the Areas A and B with an unexpected finds protocol (UFP). The UFP was recommended to be carried out by the Site

Date	Report Objectives, Scope and Outcomes
Development Molonglo 3	Auditor (ZOIC) to enable a recording of any potential areas of filling, anthropogenic wastes or suspect materials (if encountered). The following is a summary of findings relating to potential contamination risks: • Sixty two (62) test pits were completed within Area A. Six (6) test pits were not completed due to access restrictions. • Lithology encountered was typically: - TOPSOIL: sandy silt/silty sand, occasionally with some gravel or clay encountered at all pit locations to depths of 0.1–0.7 m. - SAND, SILT, CLAY AND GRAVEL: variable mixture of sand, silt, clay and gravelly soils to depths of 0.3 m to in excess of 5.0 m. - BEDROCK: variably very low to very high strength, extremely weathered to fresh stained, bedrock below depths of 0.2 – 4.7 m. The bedrock comprised mainly dacite with some areas of siltstone and rhyodacite. The pits were discontinued at depths of 1.0–5.0 m. • The Site was predominantly heavily vegetated (pine trees and blackberries) with numerous rock outcrops and a series of fire trails. • The flanks of the ridgelines and hills dominate the area and were generally steeply sloping with the minor foot slopes and gullies. • Rock outcropping was observed in extensive sections of the ridgelines and hills. • Residual soil profiles were observed in the sides of the gullies and fire trail cuttings which comprised orange brown and red brown clayey sand/sandy clay. • No 'filling' was reported within the test pits completed within Area A. Some filling was reported in Test Pits 26 and 60 in Area B. • No free groundwater was observed in any test pits during excavation. • Development constraints were listed in the report from a geotechnical perspective such as water logging, unsuitable soils and erosion. • The preliminary geotechnical site investigation indicated that the majority of the Site was suitable from a geotechnical perspective for residential development. An unexpected find relating to an in situ asbestos pipe at TP123 was encountered. A sample of the pipe was analysed by EnviroLab (certificate No. 120218 dated 4 December 2014) which conformed the material was 'grey compressed fibre cement material' containing Chrysotile and Amosite asbestos.
WSP Environmental 24 June 2016 Molonglo Valley Stage 3 (Area A) Stage 2 Detailed Site Investigation	The scope of works were as follows: • Site investigation works undertaken on 8 - 10 December 2014 and 20 - 21 January 2015. • Thirty two (32) sample points (TP01 – TP09, TP44 – TP49 and TP82 – TP98) and two sediment samples (SS01 and SS02) were collected using hand tools (in December 2014). The sampling locations were generally in accordance with the SAQP (WSP, December 2014) with minor changes due to access restrictions (such as fencing) and where a more representative location was considered appropriate after the detailed site walkover; • Twenty seven (27) test pits (TP18 and TP19, TP50 – TP71 and TP77 - TP81) were completed using a backhoe in areas of deeper fill material. This was typically concentrated in the central western portion, near the Molonglo River channel; and • Collection of surface water samples (SW01 – SW05) at five (5) locations across the Site. Key findings: The test pits encountered variable subsurface conditions generally associated with the undulating site topography. Soils were typically characterised as gravelly and sandy clays, with a covering of topsoil and shallow weathered, low strength bedrock (dacite). Fill material was encountered in TP01 – TP03 (stockpiled soil), TP44 – TP61 (stockpiled soil and filled ground), and TP82 (dam sediment). The largest volume of fill material was encountered at ROBA_AEC20 at the mouth of a gully. No odorous material, saturated rock or soil, or signs of gross contamination were observed with the exception of buried construction debris and waste at ROBA_AEC20. No obvious signs ACM were noted to occur however, several bulk soil samples were collected for asbestos analysis. No detection of asbestos was reported. Reworked natural soils were identified in dam and earthen embankments (i.e. ROBA_AEC21 at TP66 – TP71) and dam walls. The reworked natural soil did not include anthropogenic or building debris and was considered to be made up of natural site-sourced soils.

Date	Report Objectives, Scope and Outcomes
	One test pit location, undertaken by DP in November 2014 (TP123), identified an asbestos pipe at 1.3m depth. No asbestos containing materials (bonded fibre cement fragments or similar) were observed during the Site works in any of the test pits or surface sampling locations with the exception of the DP piping identified. No groundwater or saturated layers were observed at any sampling locations including deeper test pits to a maximum depth of 3.0m bgl. As such no groundwater sampling completed. Concentrations for all analytes (Heavy Metals 8, TRH, BTEX, PAHs, Phenols, PCBs, OCPs, OPPs, Herbicides and asbestos) were below the laboratory Limits of reporting (LORs) and/or the respective adopted site criteria for the protection of human health under a residential landuse scenario. Heavy metals were detected above the LOR although below the adopted site criteria. There were three (3) soil samples with minor exceedance of the ecological investigation levels (EILs) (for zinc and nickel) and were related to filling at ROBA_AEC20. Surface vegetation (grasses) and large trees within the ROBA_AEC20 area appeared to be in relatively good health with no obvious signs of distress. No bonded or friable asbestos was detected in bulk samples (500g) and during sieving of the 10L samples for the twelve (12) samples analysed. No asbestos fines (AF) or fibrous asbestos (FA) were identified above the laboratory detection limit in any of the samples analysed. No exceedances of adopted criteria for asbestos were reported. WSP reported that the soil in Area A did not have any noticeable odours except for organic odours in several drainage lines (such as TP78 and TP79 sampling locations). Fill materials identified at ROBA_AEC20, WSPA_AEC22 and the in situ asbestos pipe at TP123 (Douglas Partners, 2015) are not considered suitable to remain on the Site within any future residential land uses. WSP stated that all asbestos materials such as underground pipes and services would need to be excavated and disposed off-site to a licensed waste disposal facility. Additionally any buried former sewer construction wastes, at ROBA_AEC20, will not be suitable for any land use scenario due to the metals, plastics and concrete contained within the fill for aesthetic reasons. The following actions were recommended by WSP, to be addressed during the proposed future development works: • Carrying out 'Soil Management' for the areas identified with anthropogenic wastes / filling from an aesthetic contamination perspective. • Tracing and removal of asbestos containing materials such as in situ piping and potential other utility services installed across the Site. • Ensuring that any earthworks is carried out under the provision of an 'Unexpected Findings' protocol that identifies any potential soil or water contamination during development. This may also require the need for a 'watching brief' to be undertaken during bulk earthworks to ensure any minor contamination issues are identified and dealt with by suitably qualified and experienced environmental consultants. Based on the findings above, the Auditor recommended the preparation of a construction environmental management plan (CEMP) (including an unexpected finds protocol) to ensure that the management of anthropogenic waste and any additional fill arising during the construction phase was appropriately managed.
WSP Environmental 25 November 2016 Construction Environmental Management Plan (CEMP) Molonglo Valley Stage 3 (Area A)	The CEMP for Area A was designed to: • Document the nature and extent of soil aesthetic issues and filling across Area A (as identified in WSP's DSI report); • Identify the control measures required to protect the health of future site workers, the public and the environment from potentially contaminated or materials unsuitable from an aesthetic point of view for future reuse during construction and development of the site; • Identify responsibilities for the Site owner, notional owner(s), future contractors, consultants and accredited Site Auditor; • Identify the waste tracking and disposal requirements for any contaminated materials identified or for beneficial reuse within the site; and • Provide procedures to manage potentially contaminated soil / fill that may be encountered during the works so that they are excavated, handled, transported, recycled (or disposed of) in accordance with relevant legislative requirements and guidelines.

Date	Report Objectives, Scope and Outcomes
WSP | PB 8 February 2017 Unexpected Finds Management Plan Contaminated Land and Unexploded Ordnance (UXO) / Exploded Ordnance (EOW), within Molonglo Valley Stage 3 (Future Urban Area)	WSP | PB prepared an Unexpected Finds Management Plan (UFMP) for the entirety of the Molonglo Valley Stage 3 (MV3) future urban area (covering Area A and Area B audit areas). The UFMP has been prepared to manage risks of encountering potentially contaminated land, unexploded ordnance (UXO) and exploded ordnance waste (EOW) during future earthworks and construction activities. The Stage 2 DSI reports for Area A and Area B (WSP Environmental, 2016) provided a list of areas of environmental concern (AECs) and conditions encountered such as land filling and aesthetic issues for soils. In summary, MV3 Area A was reported to have several areas of filling and some in situ asbestos piping (likely for water transfers) and management of several areas that contained anthropogenic inclusions within the fill. based on the investigation findings, no remedial works were considered necessary within Area A, however a construction environmental management plan (CEMP) has been prepared (WSP Environmental, 2016) that provides a list of construction management practices to address anthropogenic materials identified during the DSI or that may be identified during construction works. Several UXO investigation surveys and remediation of UXO have been undertaken within MV3 (as reported by Milsearch 2013, 2014, 2015). The Molonglo Valley was historically used for the training of artillery soldiers from 1915 until the mid 1920s, with two known projectiles used (15pd and 18pd Artillery Projectiles). The Department of Defence (DoD) has reportedly taken reasonable steps to locate and remove all explosive ordnance waste and unexploded ordnance from Molonglo Valley. There is however a possibility that future users of the site may encounter explosive waste or unexploded ordnance (principally within Area B of MV3 and not Area A). The objectives of the UFMP are to: • Manage potential unexpected finds of contamination (if any); • Mitigate human health and environmental risks (if any) associated with the find; and • Provide guidance to obtain adequate management advice and allow validation (where required). With regards to potential for UXO and EOW within MV3, the UFMP requires to the following: • Familiarise members of the contractor's workforce, including subcontractor and other personnel requiring access to the MV3 (Area A ad Area B) worksites, with the unexploded ordnance hazards associated with that site; • Provide actions on discovery of UXO and EOW; • Ensure any UXO or EOW finds are handled appropriately (if any); and • Provide guidance to obtain adequate management advice and contact details for ACT Police and Department of Defence to assess the find and clear the area.

3.2 Auditor Discussion

The Auditor considers the works completed, followed an iterative process collecting information to characterise the contamination with assessment on data on the suitability for mixed use development comprising urban residential, urban open space including recreation and nature reserve along the Molonglo River corridor with limited core commercial and transport services.

The following chapters of this SAR contain information relevant to Area A including the findings of the detailed investigation and requirements to ensure the site is suitable for the proposed development. All other information pertaining to Area B is not relevant to the current SAR and is covered under a separate Audit.

4. Evaluation of Conceptual Site Model

4.1 Site Condition

The site condition prior to the commencement of the works described in this SAR is summarised in this section. This information has been sourced from the reports listed in Section 1.4 which were prepared covering MV3 Areas A and B collectively.

Table 4.1: General Site Condition

Title	Details
Topography and Drainage:	The overall MV3 site area is noted to range from gently undulating to rolling with slope angles between 5° and 15°. The elevation within the Study Area ranges from 630 to 530, dropping further steeply to Molonglo River. The nearest surface water receptor is Molonglo River located along the western and southern boundaries of the Site. The Molonglo River flows in a north-westerly direction, discharging in the Murrumbidgee River, which is the most significant river system in the region. Coppins Creek is situated on the northern boundary of the site. There are at least four drains and associated feeder channels used to control surface water flow which receive runoff from up-gradient areas was noted onsite.
Boundary Condition:	The Auditor noted that there were no structures along the boundaries of the site.
Visible Signs of Contamination:	No visible signs of contamination were noted within the MV3 Area A study area.
Visible Signs of Plant Stress:	No visible signs of distressed vegetation was noted onsite, with the exception of Blackberry pest control
Presence of Drums, Wastes and Fill Materials:	Stockpiles and isolated occurrences of burnt timber likely from the bushfire impact plantation timber noted to be dispersed in the central and southern portion of the MV3 Area A site. Mound of imported gravel and fill material along unsealed road.
Odours:	Organic odour detected in several drainage lines during WSP's January 2015 site visit.
Condition of Buildings & Roads:	Roads/tracks within the site noted to be unsealed.
Quality of Surface Water:	Surface water quality observations were: • Agricultural dams onsite, dam water observed to be turbid. • Surface water in creeks onsite – water quality observation not provided. • Molonglo river water quality – water quality observation not provided. • Ponded surface water within drainage lines in lower parts of the local catchment near Molonglo River. Sampling conducted and details of results provided in sections below.
Flood Potential:	The Molonglo River is adjacent to the site, and is known to flood during high rainfall events, however, no information pertaining to flood potential to the Molonglo Valley was provided.
Relevant Local Sensitive Environments:	Sensitive receptors and environments identified were: • The Molonglo River riparian areas along the western boundary of the site • Molonglo River water quality and freshwater aquatic species downgradient from the site.

4.2 Site History & Records

The site history and review of government records is summarised in this section. Previous assessment reports have been completed for the entire MV3 study area (Area A and Area B combined). As a result, the historical assessment described below includes information relevant to both Areas A and B. This information has been sourced from the reports listed in Section 1.4:

Table 4.2: Site Land use and Historical Records

Title	Details
Previous Land Use & Chronological List:	• 1944: The site was under agricultural use. • 1968: A forestry plantation was developed on the MV3 Area A site. • 1985: Forestry plantation had expanded northwards towards MV3 Area B. • 1998: No major changes observed. • 2009: Plantation of MV3 Area A was impacted by the 2001 and 2003 bushfires, with majority of the forested area cleared. The remainder of the site was noted to be under agricultural landuse.
Land Titles:	The land within MV3 Area A is owned by the ACT government which permits access/use of the land via: • Privately leased land and land with grazing access – Part Blocks 70, 71, 72, 74 • Infrastructure Corridors - Part Block 34 and Block 3
EPA Records:	No applicable EPA records were available for MV3 Area A
WorkCover Dangerous Goods Licenses/ USTs/ ASTs:	No WorkCover records are associated with the MV3 Area A site.
Summary of Aerial Photographs (on overall MV3 site and adjacent sites):	• 1944: Northern portion of the site (MV3 Area B) was under agricultural use with a network of track noticeable in southernmost portion the site (MV3 Area A). Coppins Crossing Road had been constructed. Surrounding land use primarily was agricultural landuse, Molonglo River to the south and west, and Weston Creek Sewage Treatment Plant in Area B. • 1968: Northern portion of site (MV3 Area B) remained under agricultural use, a forestry plantation was developed on the southernmost portion of the site (MV3 Area A). • 1985: Forestry plantation in MV3 Area A expanded northwards. Surrounding landuse - Tuggeranong Parkway constructed to the east and William Hovell Drive to the north of the site. • 1998: No major changes to the site landuse. No major changes to surrounding landuse. • 2009: Plantation of the southern portion of the site (MV3 Area A) impacted by 2001 and 2003 bushfires, with majority of the forested area cleared. No major changes in site area and surrounding landuse.
Description of Manufacturing / Industrial Processes and Location:	Majority of the site was historically used for agricultural purposes. The MV3 Area A site has been used for forestry plantation.
Inventory of Chemicals and Wastes and their Location:	WSP did not provide an inventory of chemicals used, and their location. However, the historical maintenance of the forest plantation may have included associated chemical usage such as pesticides/herbicides, and fertilizers. Wastes identified onsite were: • Stockpiles of burnt timber (estimated to arise from the bushfires in the area) found in MV3 Area A. • Driftwood and plastic on the banks of Molonglo River to the western and southern boundary of the site.
Product Spill and Loss History:	Nil reported
Discharges to Land, Air & Water:	Discharges to land and water may include agricultural dams, excavated areas, stockpiles, agricultural chemical use, uncontrolled fill material for construction, and uncontrolled surface and groundwater discharges to Molonglo River.

Title	Details
	No discharges to air identified.
Complaint History:	Nil reported
Sewer & Service Plans:	No services and sewer plans were available for the site.
Local Site Knowledge:	Relevant anecdotal information reported by Consultants indicated the following: • Territory and Municipal Services Directorate Nature District - No major filling has occurred across the overall MV3 site. - Spraying has been done on a regular basis for herbaceous weed control, targeted against blueberry bushes. Products that are used: 2.4D Amine, Dicamba, Roundup (glyfosate), Grazon (picloram, tryclopir), Brushoff (metsulfuron methyl) • Forestry and Roads with ACT Parks - After the 2001 bushfires the area was air sprayed with Velpar: an all0-purpose herbicide with active ingredients diuron and hexazinone and anecdotally an active lifetime of 12 months. Possibly also atrazine was sprayed. - After the bushfires, the remaining timber was stockpiled and burnt. Part of the timber was chipped and spread out in the area. - After 2003, plantation operations ceased. No herbicides and fertilisers have been applied since. - During the inspection, a mound of natural material was encountered with an oil drum partially exposed. Site contact indicated that such oil drums were sometimes left behind by contractors working in the plantation area and are not indicative of tip areas. - The former plantation area has locked gates, but used to be open to the public leading to incidental dumping of domestic waste and road races. - A helicopter pad was in use for forestry operations (transportation of pesticides, fertiliser and other goods) to the east of the Study Area. - Former quarry (use in the 1970s) located along the eastern boundary of the site, near the north-western corner of the Arboretum, to provide rock for upgrading works to William Hovell Drive.
Permits, Licenses and Approvals:	See above. Nil identified for current site use.

4.3 Geology, Hydrogeology and Hydrology

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

Table 4.3 Subsurface Conditions

Title	Details
Geology Map Conditions:	The Canberra 1:100,000 Geological Series Sheet (1992) indicates the site is underlain by Silurian Volcanics which generally comprise Dacites and Ignimbrites with minor tuff and ash stone occurrences.
Soil Map Conditions:	The weathered soils within this Silurian formation are characterized by clay. The Silurian sequence is well fractured and contains low salinity water capable of producing stock and domestic water supplies at depths ranging from 25m to 60m below grade.
Acid Sulfate Soils:	The area is considered to have no known occurrence of acid sulfate soil (ASS).
Salinity:	It is not considered likely that the site would be significantly impacted by saline soils based on the regional geology, hydrology, and soils.
Soil Classification Method:	Not outlined.

Title	Details
Ground Conditions Summary from borehole records:	Surface perched water tables will periodically occur in the relatively thin soil cover on top of the volcanics, leading to local water logging after heavy rainfall. The potential for significant perched groundwater systems was considered low due to the limited thickness of the soil and weathered rock cover on the Silurian sequence (up to several metres) and the low permeability of the clay based subsoil. Alluvium aquifers were not considered to be a substantial storage of water as alluvium sediment volume and thickness is likely to be low and confined to the lower reaches of the Molonglo River channel which appeared to be dominated by bed rock controlled fluvial geomorphology.
Location of Fill Material:	Fill material identified across the site: • Imported fill material used to construct agricultural dams • Fill material found at mouth of a gully • Fill material to construct two concrete driveways onsite • Fill material to construct drainage and underground sewage pipelines across the site.
Regional Hydrogeology:	Based on WSP (2012), the Silurian sequence underlying the site is well fractured and contains low salinity water capable of producing stock and domestic water supplies at depths ranging from 25 to 60 metres below grade. Based on the 1:100 000 Hydrogeology Map of the ACT and Environs (Evans and Moffat, 1984), Coffey (2005) report that aquifer yields are generally less than 0.5 L/s.
Summary of Monitoring Wells:	A search of privately managed water abstraction bores and groundwater monitoring wells with ACT ESDD Environment Protection and Water Regulation shows that there are no registered bores within the site boundary.
Depth to Groundwater:	Based on geology, topography and the information from the Hydrogeology Map, groundwater levels in the area are generally deeper than several tens of metres below ground level. No wells were installed in Area A.
Direction and Rate of Groundwater Flow:	Regional groundwater flow is expected to be towards the Molonglo River.
Use of Water Abstraction:	No registered groundwater bores for water abstraction were found for the site.
Nearest Water Body:	Molonglo River is located along the western and southern boundary of the site. Coppins Creek is located on the northern boundary of the site. Deep Creek is located 1.9 km north/north-west of the site.
Direction of Surface Water Run Off:	Surface water is channelled through drainage and associated feeder channels onsite which drain towards Molonglo River. The presence of agricultural dams serves to collect up-surface water runoff as well.
Background Water Quality:	Surface Water Quality is discussed in Section 7.3 as surface water samples were collected.
Preferential Water Courses:	Coppins Creek, Deep Creek and Molonglo River.
Summary of Local Meteorology:	The Bureau of Meteorology (BoM) characterised the regional meteorology for Canberra as a relatively dry, continental climate with warm to hot summers and cool to cold winters

4.4 Contaminants and Media

WSP (2012, 2014) had identified the following potentially contaminating activities and contaminants of concern associated with past and present activities for Area A. WSP's SAQP considered findings from other consultant's investigations. Given the size of the site, the areas of concern are notated as AECs and their locations are provided in WSP Figures in Appendix A.

Table 4.4 Summary of AECs, Potentially Contaminating Activities and Contaminants of Concern for MV3 Area A

Area	Activity	Potential Contaminants
AEC 6 (WSP 2012)	Agricultural dam with potential to act as a sink for any contamination runoff	Heavy metals (As, Cd, Cr, Cu, Pb, Ni, Hg, Zn); Organochlorine Pesticides (OCPs); Organophosphorus pesticides (OPPs); Triazine Herbicides; Total Recoverable Hydrocarbons (TRH); Polycyclic Aromatic Hydrocarbons (PAHs); Polychlorinated Biphenyls (PCBs); Phenol; Nutrients (phosphate, ammonia, nitrate).
AEC 16, 17, 18 (Rob 2014)	Contaminants arising from individual stockpiled soil and mulch	Heavy metals (As, Cd, Cr, Cu, Pb, Ni, Hg, Zn); OCPs; OPPs; Triazine Herbicides.
Single location (AEC 22) (Rob 2014)	Stockpiled soil, with empty 205L Castrol drum	Heavy metals (As, Cd, Cr, Cu, Pb, Ni, Hg, Zn); TRH; PAHs; BTEX and asbestos.
Up-gradient of Arboretum (AEC 29) (WSP 2012) (Located offsite, however included for completeness)	Pesticide use	OCPs; OPPs
AEC 20 (Rob 2014)	Large flat area of fill at mouth of gully	Heavy metals (As, Cd, Cr, Cu, Pb, Ni, Hg, Zn); OCPs, OPPs, Triazine Herbicides, TRH; PAHs; BTEX; PCBs; Phenol, asbestos.
AEC 21 (Rob 2014)	Agricultural dam with potential to act as a sink for any contamination runoff	Heavy metals (As, Cd, Cr, Cu, Pb, Ni, Hg, Zn); OCPs; OPPs; Triazine Herbicides; TRH; PAHs; (PCBs; Phenol; Asbestos.
AEC 22, 23 (Rob 2014)	Uncontrolled fill material for construction of 2 concrete driveways	Heavy metals (As, Cd, Cr, Cu, Pb, Ni, Hg, Zn); TRH; PAHs; asbestos.
AEC 24, 25, 26, 27, 28 (Rob 2014)	Five (5) drains used to control surface water runoff from up-gradient land uses.	Heavy metals (As, Cd, Cr, Cu, Pb, Ni, Hg, Zn); OCPs, OPPs, Triazine Herbicides, Nutrients.
AEC 31 (WSP 2012)	Herbicide and pesticide usage from current and historical land use: grazing land, nature conservation and forestry.	Heavy metals (As, Cd, Cr, Cu, Pb, Ni, Hg, Zn); OCPs, OPPs, Triazine Herbicides.
AEC 33 (WSP 2012)	Stockpiles and isolated occurrences of burnt timber, likely resulting from bushfires.	Heavy metals (As, Cd, Cr, Cu, Pb, Ni, Hg, Zn); Total Recoverable Hydrocarbons (TRH); Polycyclic Aromatic Hydrocarbons (PAHs).
AEC 50, 51 (WSP 2012)	Agricultural dam with potential to act as a sink for any contamination runoff.	Heavy metals (As, Cd, Cr, Cu, Pb, Ni, Hg, Zn); OCPs; OPPs; Triazine Herbicides; TRH; PAHs; PCBs; Phenol; Nutrients.
Molonglo River water (WSP 2014)	Contamination from uncontrolled runoff from the site.	Heavy metals (As, Cd, Cr, Cu, Pb, Ni, Hg, Zn); OCPs; OPPs; Triazine Herbicides; TRH; PAHs; BTEX; PCBs; Nutrients.
Molonglo River sediment (WSP 2014)	Contamination from uncontrolled runoff from the site.	Heavy metals (As, Cd, Cr, Cu, Pb, Ni, Hg, Zn); OCPs; OPPs; Triazine Herbicides; TRH; PAHs; BTEX; PCBs; Phenol; Nutrients; Faecal Coliforms; pH.

WSP reported that OPPs will have degraded relatively quickly after application in MV3 Area A. However, pesticide spraying has occurred intermittently in forestry areas and more regularly in grazing and Molonglo River areas (WSP, 2012) and therefore WSP considered it prudent to allow for OPPs analysis.

Consideration of the relative risk for each AEC was also assessed (based on previous reports and the detailed site walkover conducted by WSP and Site Auditor) for the detailed site investigation programme. An example of this is AEC22 and AEC23 which were observed to be concrete

driveway structures. Observation test pits adjacent to the concrete footprint were proposed with no analytical testing and 'observation' only to assess for the presence of waste material.

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

- Soil
- Soil Vapour
- Groundwater
- Surface Water

4.5 Auditor Discussion

The information required by OEH (2011), in regard to site condition and history, geology, hydrology and hydrogeology, has been provided, and is consistent with the Auditor's understanding of the site. Those items not provided were noted in Auditor Interim Advices, and responded to by WSP in updating and revising the reports (notably the SAQP). Where items were not been addressed, their omission is not considered to affect the conclusions of this SAR.

The Auditor concurs with WSP that the COPC and potentially impacted media as identified above are appropriate for the Areas of Environmental Concern (AECs) WSP has identified for assessment at Area A and are appropriate for the purposes of this SAR.

5. Sampling and Analysis Plan

This section provides details of the sampling and analysis plan and associated methodologies adopted by WSP for the detailed investigation works conducted at the site. This information has been sourced from the WSP SAQP prepared in December 2014. It should be noted that the SAQP covered both Area A and B.

Table 5.1: Sampling and Analysis Plan

Sampling Item	EPA Guidelines	Auditor Comments
Data Quality Objectives (DQOs)	"Data Quality Objectives: Outline of the DQO Process" in Appendix IV of the DEC (2006) Guidelines for the NSW Site Auditor Scheme.	The 7 step DQOs by WSP (2014) are summarised as follows: • Step 1: To determine (i) the nature, extent and concentration of contamination in soil, (ii) the likely source of identified contamination, (iii) risk to human health and/or the environment, and (iv) site suitability for residential landuse or whether remediation is required to render the site suitable for such use. • Step 2: Decisions are (a) does contamination pose an unacceptable liability or risk to human health and/or environment for its proposed use? (b) are contaminants within the adopted site criteria levels? (c) is surface water quality in dams and Molonglo River suitable based on comparison to criteria adopted? (d) are there any aesthetic issues which need to be addressed? (e) are local background concentrations exceeding the site criteria adequately reported in site assessment reports? (f) is the site management strategy appropriate? (g) are evidence of, or potential for, migration of contaminants from the site adequately addressed and reported? If so (h) what is the risk priority and what measures can be adopted to mitigate or manage risk? (i) what is the likely source and what activities (current/historic) would have contributed to the identified contamination? • Step 3: Key inputs are concentrations of CoPC in soil collected in the study area, the pathways for contaminant movement (underlying geological and hydrogeological conditions) and the location of sensitive receptors. • Step 4: The vertical extent of the study boundary will be a minimum of 0.25m into residual natural soils, or 0.5m below the extent of observable contamination (whichever is greater). The vertical boundary may be limited by excavation refusal. The temporal boundaries of the study will be limited to those dates that the investigation/site works is undertaken. • Step 5: Decision rules are meeting NEPM (2013) criteria; not being asbestos contaminated; materials suitable for use; and waste classification. • Step 6: Decision error limits based on AS4482.1-1995 for number of samples to make a decision. • Step 7: Design to identify a resource-effective data collection approach for generating data to meet the project objectives. • The Auditor considers the DQOs to be appropriate to characterise site conditions and whether additional investigation or remediation is required.
Sampling Pattern Rationale	The EPA (1995) Sampling Design Guidelines (Section 2.3) provides details on judgmental, random, systematic and stratified sampling pattern.	The sampling strategy is a combination of targeted, bulk sampling (for asbestos) and broad grid-based assessment that meets the needs of both: • NSW EPA (1995) Sampling Design Guidelines.

Sampling Item	EPA Guidelines	Auditor Comments
		• National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) – NEPM ASC, 2013. The Auditor considers the sampling pattern to be appropriate for to the COPC and AECs identified, and with consideration of findings from all the previous studies and site conditions.
Sampling Density Rationale:	NSW EPA (1995) Sampling Design Guidelines	The sampling density and coverage (vertical and horizontal) was designed to ensure a sufficiently large dataset is collected to enable calculation of 95%UCLavg (if required) and/or characterisation of the material being assessed. The Auditor considers that the sampling density rationale was appropriate to meet the objectives of the investigation.
Locations Shown on Site Plan:	The OEH (2011) Guidelines for Consultants reporting on Contaminated Sites requires that sampling locations are shown on a site plan.	The locations are shown on WSP Figures in Appendix A. The Auditor considers this requirement has been met.
Sampling Depths	The OEH (2011) Guidelines for Consultants Reporting on Contaminated Sites requires information on the depths of samples that were collected. NEPM (2013) Schedule B2.	Test pits will be excavated to a maximum of 3.0 – 5.0m below ground level, or top of competent rock, top of refusal on fill inclusions or as judged safe by the field scientist/engineer in the field based on lithology encountered. Excavation will ensure that the fill/natural interface is recorded across the site to allow for a CSM to be prepared. The Auditor considers that the sampling depths was appropriate to meet the objectives of the investigation.
Selection of Samples for Analysis:	The OEH (2011) Guidelines for Consultants Reporting on Contaminated Sites. NEPM (2013) Schedule B2	Soil samples will be collected from nominal depths of 0-0.1m, 0.25m, 0.5m, 1.0m, 2.0m and +2.5m. A minimum of one soil sample per location will be collected and analysed for the main contaminants of concern to allow sufficient vertical delineation of contaminant impact. Samples selected for analysis based on field observations and screening but will most likely be target surface soils (uncontrolled filling, asbestos debris, sinks, spraying of chemicals) within the soil/fill profile. The Auditor considers that the selection of samples for analysis was appropriate to meet the objectives of the investigation.
Sample Splitting Techniques and Statement of QA/QC Sample Frequencies	NEPM (2013) Schedule B3 DEC (2006) Guidelines for the NSW Site Auditor Scheme OEH (2011) Guidelines for Consultants Reporting on Contaminated Sites	Analysis for asbestos fibres (AS 4964 – 2004) in soil bulk samples will be performed regardless of whether asbestos fragments are observed on the ground surface or shallow subsoil. Duplicate and triplicate quality control samples will be obtained at the rate of one in twenty samples. The Auditor considers that the sample splitting techniques were appropriate for the purposes of this SAR. The QA/QC sampling frequencies for the investigations generally comply with NEPM (2013) requirements. The Auditor considers this to be acceptable.
Analytical Methods:	DEC (2006) Guidelines for the NSW Site Auditor Scheme	Laboratory analysis of asbestos will be completed at a NATA accredited laboratory in accordance with the Australian Standard method for the Qualitative Identification of Asbestos in Bulk Samples (AS4964-2004) and enHealth (2005) using phase-contrasted microscopy or polarised-light microscopy with a detection limit of 0.1 g/kg. Other parameters to be analysed by NATA accredited analytical methods. The Auditor considers the analytical methods to be appropriate for the purposes of the investigation and detection reporting acceptable for the criteria being adopted.

Sampling Item	EPA Guidelines	Auditor Comments
Sample Container Selection:	NEPM (2013) Schedule B2 and B3	All samples will be collected in laboratory prepared containers. The Auditor considers the sample container selection to be appropriate for the investigation.
Sampling Devices / Techniques	NEPM (2013) Schedule B2 and B3 NSW DEC (2007) Groundwater Guidelines	Gloves will be used for sample collection and renewed between each sample location, decontaminated hand tools may be used. The Auditor considers the sampling techniques adopted to be appropriate for the COPC and to achieve the DQOs.
Decontamination Procedures:	Australian Standard AS4482.1 – 2005 NEPM (2013) Schedule B2 and B3	Decontamination of hand tools used involves washing between each sampling location using phosphate-free detergent, followed by adequate rinsing with clean water. The Auditor considers the decontamination procedures to be appropriate for the purposes of the investigation.
Sample Handling and Preservation Procedures:	NEPM (2013) Schedule B3 AS4482.1 and AS 4482.2	Each sample will be labelled using a unique identifier, comprising site name, sample location number, sample type and sample depth. These will be stored at cool temperatures during transport and will be forwarded to NATA accredited laboratories. The Auditor considers the procedures appropriate for the COPC.
Field Calibration and Screening Protocols	NEPM (2013) B2	Field screening (visual, olfactory and PID) will be used to select the particular samples which will be subject to laboratory analysis. A visual evaluation of the presence of ACM fragments will also be conducted. Equipment used (PID, water quality meter) for onsite measurements were calibrated prior use. The Auditor considers the field calibration and screening protocols to be appropriate for the investigation.
Groundwater Monitoring Well Installation	NEPM (2013) Schedule B2 NSW DEC (2007)	No groundwater monitoring wells were installed onsite as groundwater was expected to be located within the fractured volcanics underlying the majority of the Area A (>20m below ground level), hence historical contamination to the regional aquifer is considered to be of low risk and potential. The Auditor considers this appropriate given the AECs, COPC and future landuse.
Groundwater Monitoring Well Development & Sampling	NEPM (2013) Schedule B2 NSW DEC (2007)	As above.

5.1 Auditor Discussion

The information required by OEH (2011) in regard to the sampling and analysis plan and associated methodologies, has been generally provided in the SAQP for the detailed site investigation with the aim of characterising the site. The Auditor considers the SAQP adopted to be appropriate given the conceptual model for the site. It is noted that the SAQP provides for sampling of river water quality from 2 point sources along the Molonglo River.

Further comments on WSP's reports were provided in the Interim Advice correspondence presented in Appendix B.

The NSW EPA (2006) requires that an Auditor must comment on each of the following:

- The Auditor confirms that WSP (2014) included a general statement of the predetermined DQOs for field and laboratory procedures (including quantitative DQOs).
- The Auditor confirms that WSP (2014) included a plan to achieve pre-determined DQOs; and
- The Auditor confirms that WSP (2014) included procedures to be undertaken if the data did not meet the expected DQOs.

6. Evaluation of Site Criteria

6.1 Assessment Criteria for Soil

The **soil assessment** criteria adopted were appropriate for the most sensitive landuse for the future development of Area A, by adopting criteria for low density residential and open space/recreational for both the protection of human health and the environment. Criteria was adopted from the following guidelines:

- National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) for Health Based Investigation Levels (HILs) and Health Screening levels (HSLs) for the majority of contaminants in soil, in particular, Table(s) 1A(1) – (5) from Schedule B1.
- National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) for Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) for the majority of contaminants in soil, in particular, Table(s) 1B(1) – (7) from Schedule B1.

Specifically, the site assessment criteria used were:

- NEPM, 2013: HIL A – Residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry), also includes childcare centres, preschools and primary schools. Residential/Soil HSLs (0 m to <1 m sand).
- NEPM, 2013: HIL C – Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. This does not include undeveloped public open space where the potential for exposure is lower and where a site-specific assessment may be more appropriate. Recreational/Soil HSLs (0 m to <1 m sand)
- NEPM, 2013: Management Limits (Coarse) Residential/Open Space (0 m to <1 m sand)
- NEPM 2013: EILs/ESLs - Urban Residential, Surface Soils (0.0 – 0.2m depth)
- NEPM 2013: EILs/ESLs - Urban Residential, Sub Soils (>0.2 – 2.5m depth)

Where individual sample values exceeded the adopted criteria, the site may still be considered suitable for residential and open space land use if the following conditions are met:

- The 95% UCL value is less than the criteria;
- The standard deviation does not exceed 50% of the adopted criteria value; and
- The values are less than 250% of the criteria.

The assessment will undertake leaching tests (TCLP and ASLP) on select samples (if any). This provides data to determine risk of contaminant migration from the site via infiltration and groundwater transport for reuse of soils on the site.

With respect to asbestos in soil, the NEPM 2013 Health Screening Levels (HSLs) for residential with garden accessible soils and recreational / open space were adopted. These criteria include concentrations for bonded and friable asbestos in soil, which are based on scenario-specific likely exposure levels and are adopted from the WA Department of Health (2009) Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia. The guidelines (now adopted in NEPM, 2013) also require that no visible asbestos containing materials or fragments are present at the site surface.

Soil aesthetic criteria is based on the amended NEPM, 2013 (Schedule B1, Section 3.6) which provides circumstances whereby assessment of aesthetics may be required as part of site suitability assessment. There are no specific numeric aesthetic guidelines and professional judgement is considered applicable based on a `balanced approach' when considering whether various inclusions within fill materials warrant remediation or management for aesthetic reasons. The main type of issues that relate to aesthetics include stained or discoloured soil, large volumes

of inert refuse, unsightly or malodourous soils, leachate production, hydrocarbons sheens and chemical residues.

6.2 Assessment Criteria for Groundwater

No groundwater assessment was conducted in Area A.

6.3 Other Assessment Criteria

Surface water sampled was compared against the following guidelines for specified analyses and physiochemical parameters:

- ANZECC/ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Paper No 4, Canberra:
  - Fresh Water Quality (95% Protection Levels) for 'slightly to moderately disturbed systems'.
- NHMRC National Health and Medical Research Council (2008) Guidelines for Managing Risk in Recreation Waters.

In the absence of total arsenic and chromium guidelines, the more conservative arsenic (V) and chromium (VI) speciated criteria have been adopted.

River sediment sample results were compared to the Interim sediment quality guidelines (ISQG) in the Australian and New Zealand guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ 2000). The ISQG have limitations relating to the availability of appropriate ecotoxicology data and the small number of species on which they are based. However, they will be used as an initial tier 1 screening criteria. The ISQG provide criterion for a common metal, metalloid and organometallic contaminants and organics, principally PAHs and organochlorine pesticides (OCPs).

6.4 Waste Classification

Leachate results allowed for the classification of waste for disposal completed in accordance with the Environment ACT (June 2000) ACT's Environmental Standards: Assessment & Classification of Liquid & Non-liquid Wastes.

6.5 Auditor Discussion

The Auditor considers that the adopted criteria were appropriate for the contaminants of concern, the environmental setting for the site and the proposed future land use.

7. Assessment of Investigation Results

The results for the soil investigation completed on Area A by WSP (2016) are summarised below. Refer to Appendix A and C for sample locations and analytical result summary tables.

7.1 Soil Analytical Results

Table 7.1: Summary of Soil Results (mg/kg) for Area A

Contaminant	No of Samples	HIL A - Resi	HSL A/B, 0m to <1m, Sand, Soil	NEPM EIL/ESL Urban Res (surface / sub soils)	NEPM ML Residential, Parkland & Open Space, Coarse	No. Samples > Criteria (max result mg/kg)
METALS						
Arsenic	61	100	-	100	-	0 (max 52)
Cadmium	61	20	-	-	-	0 (max LOR)
Chromium	61	100 300	-	427 / 431	-	0 (max 38)
Copper	61	6000 17000	-	307 / 311	-	0 (LOR)
Lead	61	300 600	-	1113 / 1110	-	0 (max 150)
Mercury	61	40 80	-	-	-	0 (max LOR)
Nickel	61	400 1200	-	42 / 189	-	1 (ROBA_AEC20 TP60 0.0-0.1m 63mg/kg, exceeds NEPM EIL 42 mg/kg for surface soils)
Zinc	61	7400 30000	-	273 / 451	-	2 (ROBA_AEC20 TP56 0.0-0.1m 280mg/kg, ROBA_AEC20 TP60 0.0-0.1m 322mg/kg, exceed NEPM EIL 273mg/kg for surface soils)
F1 TRH C_6-C_{10} less BTEX	36	-	45	- / 180	- / 700	0 (max LOR)
F2 TRH >C_{10}-C_{16} less Naphthalene	36	-	110	- / 120	- / 1000	0 (max LOR)
F3 TRH >C_{16}-C_{34}	36	-	-	300	2500	0 (max LOR)
F4 TPH >C_{34}-C_{40}	36	-	-	2800	10000	0 (max LOR)
BTEXN						

Contaminant	No of Samples	HIL A - Resi	HSL A/B, 0m to <1m, Sand, Soil	NEPM EIL/ESL Urban Res (surface / sub soils)	NEPM ML Residential, Parkland & Open Space, Coarse	No. Samples > Criteria (max result mg/kg)
Benzene	36	-	0.5	50	-	0 (max LOR)
Toluene	36	-	160	85	-	0 (max LOR)
Ethylbenzene	36	-	55	70	-	0 (max LOR)
Total Xylene	36	-	40	105	-	0 (max LOR)
BaP TEQ	36	3	-	-	-	0 (max LOR)
BaP	36	-	-	0.7	-	0 (max LOR)
Naphthalene	36	-	3	170	-	0 (max LOR)
Total PAH	36	300	-	-	-	0 (max LOR)
Selected PAH	36	NL	-	NL-170	-	0 (max LOR)
Phenol	29	3000	-	-	-	0 (max LOR)
PCB	29	1	-	-	-	0 (max LOR)
Aldrin + Dieldrin	60	6	-	-	-	0 (max LOR)
Chlordane	60	50	-	-	-	0 (max LOR)
DDT+DDE+DDD	60	240	-	-	-	0
DDT	60	-	180	-	-	0
Endosulfan	60	270	-	-	-	0
Endrin	60	10	-	-	-	0 (max LOR)
Heptachlor	60	6	-	-	-	0 (max LOR)
HCB	60	10	-	-	-	0 (max LOR)
Methoxychlor	60	300	-	-	-	0 (max LOR)
Atrazine	60	320	-	-	-	0 (max LOR)
Chlorpyrifos	60	160	-	-	-	0 (max LOR)
Asbestos	12	0.01g/kg	-	-	-	0 (max none)

Notes:
- NL; No Limit

7.2 Auditor Discussion on Soil Quality

Based on the number of soil samples analysed, the sampling spread and targeting of the AECs and soil type encountered at the site, the Auditor considers that soil was adequately characterised when the data set is considered as a whole. Based on the information presented in Table 7.1, the following conclusions regarding soil quality are as follows:

- Concentrations for all analyses (Heavy Metals 8, TRH, BTEX, PAHs, Phenols, PCBs, OCPs, OPPs, herbicides and asbestos were below the laboratory Limits of Reporting (LORs) and/or the respective adopted site criteria for human health.
- EIL exceedances related to filling at ROBA_AEC20, showed no visible signs of plant stress, with plants reported to be in healthy condition in this area.

- No odorous materials were observed with the exception of organic odours associated with drainage lines (TP78 and TP79);
- No visible signs of contamination were observed with the exception of buried inert construction debris within ROBA_AEC20.
- No signs of fibre cement sheeting or ACM were observed.
- Soils across the site were typically characterised as gravelly and sandy clays, with a covering of topsoil and shallow weathered, low strength bedrock (dacite). Filling or reworked natural soils were encountered.
- No free groundwater or saturated layers were observed at any sampling locations including deeper test pits to a maximum depth of 3.0m below ground level.
- The identified fill material with waste inclusions/intact asbestos pipe will require future 'management' due to aesthetic requirements for wastes and human health risks for disturbance of currently buried in-situ asbestos piping. Management shall occur during the earthworks for the future development of the land.
- WSP identified the following areas (and which are shown in Figures 8a and 8b, Appendix A) requiring 'management' during development works:

    - ROBA_AEC20: Buried construction waste and blast rock from the sewer line construction. WSP's preliminary volume was estimated at 10500m2, (7,000m^2 with an average depth of 1.5m). Using a conservative bulking factor of 2.0, this equates to 21,000 tonnes. WSP report that much of this volume will be made up of cobble sized blast rock. Segregation of buried construction waste is likely to be required and the volume is likely to be much less in a range of approximately 5,000 tonnes. Some of this may be further segregated where clean concrete can be crushed and recycled.
    - WSPA_AEC22: Consisting of soils and empty drums in a surface stockpile. Preliminary volume estimated at 30m^3. Using a conservative bulking factor of 2.0, this equates to 60 tonnes. It should be noted that much of this volume will be made up of reworked soils that could be segregated, stockpiled and assessed for reuse instead of disposing offsite to a licensed waste facility.
    - ROBA_AEC16 to ROBA_AEC18: Consisting of forestry mulch. WSP's preliminary volume estimate at 150m^3. Using a bulking factor of 1.5, this equates to 225 tonnes. It is considered likely that these mulch stockpiles can be reused and/or will be removed by the Parks and Conservations Service before redevelopment occurs. Chemical assessment indicated that the mulch / soils were suitable for reuse.
    - WSPA_AEC50: Consisting of dam embankment soils (no waste). The dam embankment soils at WSPA_AEC50 did not identify anthropogenic wastes within the embankment. It was considered that the soils were reworked natural soil. Chemical assessment indicated that the soils are suitable for reuse and could remain onsite from a contamination perspective.
    - TP123 (Douglas Partners, 2015) UFP for Asbestos Pipe: Consisting of confirmed fibre cement pipe (approx.150mm diameter internal), unknown length, however may be at least 500m long. Therefore pipe will require either tracing and locating (or review of plans to determine length) prior to removal. Pipe may have been installed as part of the sewer line works in the mid-1970s.

7.3 Surface Water Results

Surface water samples (SW01 – SW05) were obtained at five locations across the site.

Table 7.2: Summary of Surface Water Results (units as shown)

Constituents	ANZECC 2000 FW - 95% Protection Levels	ANZECC 2000 South East Australia Trigger Values	2008 GMRRW[2] Recreational Waters (Health)	Dutch 2000 Intervention Values	No of Samples	Max Results	Exceedances
Nutrients							
Ammonia (µg/L)	900	-	-	-	5	400	0
Nitrate (mg/L)	0.7	-	1	-	5	0.26	0
Nitrite (mg/L)	-	-	-	-	5	0.01	0
Nitrogen a Total Oxidised (mg/L)	-	0.25	-	-	5	6.12	4
Phosphorus (mg/L)	-	0.02	0	0	5	7.75	4
Metals							
Arsenic (mg/L)	0.013	-	0.14	-	5	<0.001	0
Cadmium (mg/L)	0.0002	-	0.04	-	5	<0.001	0
Chromium[1] (mg/L)	0.001	-	1	-	5	<0.0001	0
Copper (mg/L)	0.0014	-	40	-	5	0.002	2
Lead (mg/L)	0.0034	-	0.2	-	5	0.002	0
Mercury (mg/L)	0.0006	-	0.02	-	5	<0.0001	0
Nickel (mg/L)	0.011	-	0.4	-	5	<0.001	0
Zinc (mg/L)	0.008	-	-	-	5	0.012	3
TRH							
C_6-C_9 (µg/L)	-	-	-	-	2	<20	0
C_{10}-C_{14} (µg/L)	-	-	-	-	2	<50	0
C_{15}-C_{28} (µg/L)	-	-	-	-	2	<100	0
C_{29}-C_{36} (µg/L)	-	-	-	-	2	<50	0
+C_{10}-C_{36} (µg/L)	-	-	-	600	2	<50	0
C6-C10 (µg/L)	-	-	-	-	2	<20	0
>C10-C16 (µg/L)	-	-	-	-	2	<100	0
>C16-C34 (µg/L)	-	-	-	-	2	<100	0
>C34-C40 (µg/L)	-	-	-	-	2	<100	0
+C10-C40 (µg/L)	-	-	-	600	2	<100	0
F1 C_6-C_{10} less BTEX (µg/L)	-	-	-	-	2	<20	0
F2 C10-C16 less Naphthalene (µg/L)	-	-	-	-	2	<100	0
BTEX							
Benzene (µg/L)	950	-	20	-	2	<1	0

Constituents	ANZECC 2000 FW - 95% Protection Levels	ANZECC 2000 South East Australia Trigger Values	2008 GMRRW[2] Recreational Waters (Health)	Dutch 2000 Intervention Values	No of Samples	Max Results	Exceedances
Toluene (µg/L)	-	-	16000	-	2	<2	0
Ethylbenzene (µg/L)	-	-	6000	-	2	<2	0
Xylene (o)	350	-	-	-	2	<2	0
Xylene (m+p)	-	-	-	-	2	<2	0
Total Xylene	-	-	12000	-	2	<2	0
Total BTEX	-	-	-	-	2	<1	0
PAH							
Selected PAHs	-	-	-	-	2	<1	0
Benzo(a)pyrene (µg/L)	-	-	0.2	-	2	<0.5	0
Naphthalene (µg/L)	16	-	-	-	2	<1	0

Notes:
1 Value for Cr (III) + Cr (VI)
2 NHMRC National Health and Medical Research Council (2008) Guidelines for Managing Risk in Recreation Waters.
- No Guideline

7.4 Auditor Discussion on Surface Water Quality

Based on the information presented in Table 7.2, the Auditor draws the following conclusions regarding the quality of surface sampled:

- Exceedances for copper above the selected criteria for SW01 and SW02.
- Exceedance for zinc at SW01, SW02 and SW03 above the selected criteria at 0.0011mg/l, 0.0012mg/l and 0.008mg/l respectively.
- Exceedances for total oxidised nitrogen at SW01, SW03, SW04 and SW05 above selected criteria with levels ranging from 0.27 to 6.12 mg/l.
- Exceedances for phosphorus for all sampling points above selected criteria with levels ranging from 0.03 to 7.75mg/l.
- All other analytes were below the respective detection levels or below the selected site assessment criteria.

WSP concluded that the elevated copper and zinc levels were a result of the local geology and catchment characteristics. As the concentrations did not exhibit a significant deviation from each other and only marginally exceeded the criteria, it was the opinion of WSP that they do not pose a significant risk to ecological receptors.

Elevated nitrogen and phosphorus levels were considered to be related the local catchments (dams and drainage lines) and upstream catchment for Molonglo River. Some algal blooming was noted in two dams (WSPA_AEC50 and WSPA_AEC51) although the bloom was limited to the periphery of the water line. It was considered that nutrient levels would reduce as landuse of the area changed to future urban and concluded that given that based on the current use of dams (for stock) there was currently a low risk to ecological receptors.

Based on the number of surface water samples actually analysed, the location of monitoring sampling points and COPC encountered at the site, the Auditor considers that surface water was adequately characterised for Area A with results not showing any gross impact from AECs, rather

concentrations of constituents typically associated with the environmental setting and rural use of the site. Water quality across the broader site appears consistent, and the results reported appear reflective of the catchment area.

7.5 Sediment Results

Three sediment samples were collected from three dams (TP82, TP83 and TP98) and two samples from the Molonglo River (SS01 and SS02). Sediment samples from Molonglo River were typically a light to soft, dark brown, clayey sand with trace gravel and organic inclusions such as rootlets and some organic matter. Dam sediments were typically very soft, silty sandy clays. The results of the sediment analysis are summarised below.

Table 7.3: Summary of Sediment Assessment Results (mg/kg)

Constituents	ANZECC 2000 ISQG-Low[1] (Trigger value)	ANZECC 2000 ISQG-High[2] (Trigger value)	No of Samples	Max Results	Within Range of Exceedance of ISQG High
Nutrients					
Ammonia	-	-	5	30	-
Nitrate	-	-	5	3.8	-
Nitrite	-	-	5	0.5	-
Nitrogen a Total Oxidised	-	-	5	0.9	-
Phosphorus	-	-	5	290	-
Metals					
Arsenic	20	70	5	26	1 within range
Cadmium	1.5	10	5	<1	0
Chromium	80	370	5	30	0
Copper	68	270	5	14	0
Lead	50	220	5	78	2 within range
Mercury	0.15	1	5	<0.1	0
Nickel	21	52	5	13	0
Zinc	20	41	5	218	5
TRH					
C_6-C_{10}	-	-	5	<10	0
>C_{10}-C_{16}	-	-	5	<50	0
>C_{16}-C_{34}	-	-	5	<100	0
>C_{34}-C_{40}	-	-	5	<100	0
+C_{10}-C_{40}	-	-	5	<100	0
F1 C_6-C_{10} less BTEX	-	-	5	<10	0
F2 C_{10}-C_{16} less Naphthalene	-	-	5	<50	0
BTEX					
Benzene	-	-	5	<0.02	0
Toluene	-	-	5	<0.5	0

Constituents	ANZECC 2000 ISQG-Low[1] (Trigger value)	ANZECC 2000 ISQG-High[2] (Trigger value)	No of Samples	Max Results	Within Range of Exceedance of ISQG High
Ethylbenzene	-	-	5	<0.5	0
Total Xylene	-	-	5	<0.5	0
PAH					
Selected PAHs	0.016-4	0.5-45	5	<4	0
Benzo(a)pyrene	0.43	1.6	5	<0.5	0
Naphthalene	0.16	2.1	5	<0.5	0
Phenol	-	-	5	<0.5	0
Sum of total PCB	-	-	5	<0.1	0
Herbicides					
Atrazine	-	-	4	<0.05	0
Simazine	-	-	4	<0.05	0
Selected OPPs	-	-	4	<0.05	0
OCP[+]					
Chlordane	0.0005	0.006	4	<0.05	0
DDT+DDE+DDD	0.0016	0.046	4	<0.05	0
DDT	-	-	4	<0.2	0
Dieldrin	0.00002	0.008	4	<0.05	0
Aldrin + Dieldrin	-	-	4	<0.05	0
Endosulfan	-	-	4	<0.05	0
Endrin	0.00002	0.008	4	<0.05	0
Heptachlor	-	-	4	<0.05	0
Hexachlorobenzene	-	-			
Methyloxychlor	-	-			
Faecal coliform	-	-	2	640	0

Notes:
1 Interim sediment quality guidelines – low. Probable effects concentrations below which biological effects would rarely occur.
2. Interim sediment quality guidelines – high. Probable effects concentrations below which biological effects would possibly occur. Concentrations above these values represent a probable-effects range within which effects would be expected to frequently occur.
+ Organochlorine pesticides (OPCP) assessment criteria below estimated quantitation limits of the laboratory.

7.6 Auditor Discussion on Sediment Quality

WSP considered that the Molonglo River sediments and dam sediments, did not indicate severe nutrient build up that may cause stress to ecological receptors. Generally, concentrations of analytes tested for sediment samples were below the laboratory limits of reporting (LORs) and the respective adopted site criteria for human health. Exceedances were noted for heavy metals, principally for zinc, lead and arsenic for ISQG falling with the low and high range with the exception of zinc. Clarification on the exceedances were provided by WSP as follows:

- Zinc exceedances were not considered significant risk due to the upstream catchment characteristics of Molonglo River and limitations of the ecotoxicology data used to derive the criteria.

- Exceedance of lead, arsenic and zinc in other sediment samples collected is attributed to be representative of the naturally occurring background levels of heavy metals in the environment.

The Auditor concurs with the general findings and conclusions when considering the data in totality, noting that the LOR for herbicides, OCPs and OPPs were above the assessment criteria for the ISQG. As there are no currently endorsed criteria for faecal coliform in Australia, WSP concluded that the concentrations of faecal coliform may represent the local nature of the catchment within the site and from upstream sources such as grazing lands, leading to the conclusion that the risk to human health and the environment is considered low within the Molonglo River riparian corridor.

The Auditor notes in ANZECC (2000) that for ammonia and other nutrients (such as phosphate and nitrate), there are no specific ISQG, however it is important to identify when these represent a threat to benthic communities.

ANZECC (2000) indicates that the major disturbance of ammonia is in pore waters, which should be sampled and compared against the ANZECC (2000) water quality guidelines. Ammonia (and sulphide) can potentially be released from sediments. Although pore waters were not specifically sampled in Area A, the quality of surface water samples (as shown in Table 7.2) reported ammonia below the freshwater guidelines (95% LOP). Concentrations appeared consistent between the two sampling points along the River.

Comparison can also be made to background/up gradient conditions.

Regarding the current characterisation works, the assessment of sediment quality (combined with surface water quality) was to form an opinion on protecting site conditions from algal or macrophtye blooms. WSP reported some algal blooms at the edges of the dams (as outlined in section 7.6), however the Auditor notes that these dams are most likely to be removed as part of future development, and therefore not posing a concern to any 'users' of the dam of environmental receptors.

7.7 Soil Aesthetics

No noticeable odours, with the exception of organic odours in several drainage lines were observed in the soil sampled within Area A. Buried infrastructure such as underground pipes and services were found at several locations, and considered to require removal (as part of future redevelopment works) as these were reported to contain asbestos (DP 2015). WSP indicated that buried former sewer construction wastes will not be suitable for surface use under any landuse scenario due to the metal, plastic and concrete debris within the fill. Natural soils were typically sandy and gravelly clays of orange to light brown which are suitable to remain on site from an aesthetic perspective.

7.8 Preliminary Waste Classification

Fill samples were collected for analysis and compared to the Environment ACT June 2000) ACT's Environmental Standards: Assessment &Classification of Liquid & Non-liquid Waste. Results from the preliminary waste classification assessment is presented in Appendix C of this report. The samples were analysed for heavy metals, TRH, BTEX, PAHs, Phenol, PCBs, OCP and OPP.

Results, when compared to the CT1 criteria for Inert Waste, without TCLP, indicated that a number exceeded for arsenic, total chromium, lead and nickel, for both fill and natural soil.

TCLP tests were undertaken on 12 samples to assess the leachability of fill and natural soil for heavy metals. Results indicated that heavy metals was generally not leachable, with the exception of 1 sample from TP87, with elevated concentrations of nickel. This was attributed to the constituent sample comprising greater mineral (rock materials) subsequently affecting the sampling and testing processes.

WSP reported that based on the available data and composition of materials sampled natural soil could be classified as VENM (Inert Waste), fill as Inert Waste, and segregated construction and demolition waste (in buried sewer lines) as Inert Waste. Bonded fibre cement piping, confirmed to contain Asbestos, would be classified as "Industrial Wastes".

The Auditor anticipate that as bulk earthworks occur as part of future redevelopment, any surplus materials will undergo waste classification for offsite disposal if deemed surplus to requirements or to address aesthetic issues identified at the site. This is addressed in the Construction Environmental Management Plan (CEMP) (WSP, 2016) and as discussed in Section 11 of this report.

7.9 Deviations from SAQP

WSP reported that site investigation works completed generally conformed with the SAQP (WSP, 2014) with regards to sampling numbers per location and analytical suites. Variations from the SAQP were due to the following factors:

- Reduced Investigation Boundary: AECs ROBA_AEC12, ROBA_AEC13, ROBA_AEC14 and ROBA_AEC15 (see Appendix A), were excised from the investigation works, due to access constraints. Therefore the investigation of these areas could not be completed (as instructed by LDA).
- TCLP Analysis: TCLP analysis was scheduled for soil samples that were considered to require leachate analysis for metals after initial receipt of laboratory results. Therefore, the original TCLP samples nominated were adjusted.
- Soil Physiochemical Parameters: Several soil physiochemical parameters such as pH, clay % and cation exchange capacity (CEC) were adjusted during the investigation to provide more representative data on the natural soil profiles encountered.

7.10 Auditor Discussion

Based on the investigation results, the Auditor considers that the site has been adequately characterised, with appropriately robust review of areas of environmental concerns and COPCs.

The contaminant conceptual site model developed for the site, based on the sampling and analytical results, indicated that contaminants in the soil, sediment and surface water were typically at or below the health based criteria applicable for residential landuse, with garden accessible soils, open space public landuse and ecological receptors.

WSP considered that no remedial action plan was required for Area A as no impact (chemical contamination) was identified.

To ensure that appropriate management of aesthetic issues and redundant infrastructure is undertaken, WSP prepared a construction environmental management plan (CEMP) outlining the process for the identification, control of and responsibilities for the management the identified fill material and any unexpected findings.

The Auditor concurs with the requirement of a CEMP for the future management of fill and natural soil with aesthetic issues, redundant infrastructure and potential unexpected findings. The CEMP is discussed in Section 11, and the document is appended to the Site Audit Statement.

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

The NSW EPA (2006) requires that an Auditor must check each of the following requirements:

- The Auditor confirms that the applicability and limitations of field sampling methodology were discussed and addressed in the consultant's reports;
- The Auditor confirms that WSP ensured adequate calibration of field instruments;
- The Auditor confirms that WSP have generally assessed the significance of the field determination of the results compared with the laboratory results and where not compatible, discussed in the report;
- The applicability and limitations of laboratory methodologies were not discussed in the consultant's reports. The Auditor is satisfied however, that NATA accredited methods and laboratories were used;
- The Auditor confirms that the methods used for site investigation were of sufficient precision and accuracy and sensitivity to achieve the assessment of risk;
- The laboratory results met the accuracy criteria specified by the WSP for each performance method; and
- The WSP indicated that the results generally met the criteria specified by the consultant in their DQO with some exceptions.
-

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

9. Compliance with Regulatory Guidelines

Guidelines currently approved by the ACT EPA for land contamination are listed in Section 1.3 of this SAR. Where relevant, the Auditor has used these in assessing the works conducted by WSP.

WSP's departures from the guidance has been discussed in the preceding sections of this SAR. The Auditor considers that these departures do not detract from the quality of the data set or any associated conclusions made for the objectives of this audit.

The Auditor considers that the work completed by WSP was of sufficient quality to achieve the objectives of the works completed and to assist the Auditor in preparing site audit documentation to form an opinion on site suitability.

10. Assessing Urban Redevelopment Sites

The NSW EPA (2006) Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition) describes that in assessing the suitability of a site for an existing or proposed land use in an urban context, Auditors should ensure that the contaminated land consultants have followed the decision process for assessing urban redevelopment sites (Page 50 and 51 of NSW EPA 2006).

For the purposes of this assessment, the proposed land use of the site is a mix of future urban residential, urban open space including recreation and nature reserve along the Molonglo River corridor with limited core commercial and transport services.

The Auditor provides the following comments:

- Departures from the relevant guidelines are listed in the preceding sections of the report. Where departures were noted these have been discussed in the SAR and comment made on any shortcoming or whether it was omitted from further consideration as it did not affect the outcome of the audit. Notwithstanding these departures, the Auditor considers there is sufficient information to enable a conclusion to be made on the suitability of the site for the proposed use.
- NEPM (2013) and OEH (2011) provides guidance on site contamination assessment and reporting requirements. WSP has considered past investigation works, in identifying and targeting source areas and potential contaminants of concern, with the appropriate sampling methodologies as outlined in NEPM (2013). Further the DSI report meets the requirements of OEH (2011) reporting guidelines.
- As required by NEPM (2013), aesthetic inspections were carried out by WSP during the completion of investigation activities, with appropriate record and documentation of findings.
- The soils have been assessed against the health-based investigation levels for mixed residential and urban open space, including recreational and nature reserve along the Molonglo River. These have comprised the most sensitive human health criteria of HIL A/HSL A as well as the assessment of data against the ecological criteria of EIL/ESL (for urban residential and open space) adopted from NEPM (2013). The surface water criteria comprised the ANZECC (2000) 95% LoP for freshwater. The Auditor is satisfied that the criteria was appropriate for site the environmental setting and future landuse.
- Any issues relating to local area background soil concentrations that exceeded appropriate site soil criteria have been addressed in the investigation report. No anomalous data was identified.
- To the extent practicable, human health impacts of chemical mixtures have been assessed.
- Although no chemical contamination was identified, a construction environmental management plan (CEMP) has been prepared for Area A to address ground conditions identified in isolated areas which are considered to pose an aesthetic issue (fill debris) for future residential redevelopment or redundant in-ground piping confirmed to contain asbestos, to be considered as part of future redevelopment works. This items have been addressed by the preparation of a Construction Environmental Management Plan (CEMP) which is discussed further in Section 11. .
- There is no evidence of migration of contaminants either onto or off the site.

11. Evaluation of Site Management Plans

WSP prepared a Construction Environmental Management Plan (CEMP)(25 November 2016) for MV3 Area A. The requirement for the CEMP is to manage potential areas of anthropogenic filling, and / or in situ residual asbestos piping (likely from for waste transfer) which were reported by WSP to occur within Area A. The CEMP is for implementation during the construction phase of the re-development.

WSP additionally prepared an Unexpected Finds Management Plan (UFMP) (8 February 2017) for the entire MV3 future urban area (Areas A and B inclusive). The requirement for the UFMP is to manage risks of encountering potential contaminated land, unexploded ordnance (UXO) and exploded ordnance waste (EOW) during future earthworks and construction activities, although based on the findings of the various contamination and UXO studies completed, the risk of occurrence in Area A is considered to be low.

The Auditor has reviewed the WSP CEMP and UFMP against the requirements of Section 3.4.5, 3.4.6 and 4.3.3 of the Guidelines for the NSW Site Auditor Scheme (2nd Edition).

A summary of the key considerations is provided in Table 11.1. and 11.2 below A copy of the CEMP and UFMP is attached to the SAS.

Table 11.1: Review of WSP (2016) Construction Environmental Management Plan (CEMP)

Requirement	CEMP	Auditor Comment
What is the nature and location of the contamination on site?	Based on the Stage 2 DSI, Area A is generally suitable for the proposed future urban residential and urban open space landuses with the exception of the following areas that require management: • An in-situ asbestos pipe identified at TP123 (Douglas Partners, 2015); • Fill materials identified at ROBA_AEC20, WSPA_AEC22 containing construction waste including rusted metal, broken concrete, plastics, rope and electrical wiring and hoses; and • Redundant underground pipes and services across the site. The Stage 2 DSI reports that there is no known chemical contamination in Area A.	The Auditor agrees with WSP on the areas that require further management largely from an aesthetics issue, or targeted removal of redundant in ground piping.
What are the objectives of the EMP?	The CEMP outlines measures required to manage aesthetic issues (and unexpected finds) in subsurface materials within Area A in a manner which protects human health/ the environment for the proposed future land uses.	The objectives as presented in the CEMP is considered to be appropriate for the requirements for site conditions.
How are the contaminants going to be managed?	The CEMP states the following: • Carry out segregation or offsite disposal of waste for the areas identified with anthropogenic wastes from an aesthetic contamination perspective; • Tracing and removal of any asbestos containing materials such as potential in situ piping and potential other redundant utility services installed across the Site; and	This is considered acceptable for Area A.

Requirement	CEMP	Auditor Comment
	• Ensure that any earthworks is carried out under the provision of the 'Unexpected Finds Management Plan' (WSP February 2017) that identifies any potential soil or water contamination during future development of the Site, and/or UXO / EOW which may be identified during construction works. The UFMP provides procedures to be followed during bulk earthworks to ensure any contamination or UXO/EOW issues are identified and dealt with by suitably qualified and experienced environmental consultants.	
Who is responsible for the implementation of the EMP?	CEMP lists LDA as the entity responsible for the CEMP and its implementation during redevelopment works. The responsibilities may be delegated where appropriate (such as Contractors during site preparation, development and bulk earthworks). An EPA accredited Site Auditor shall: • Approve any CEMP revisions; • Review any additional investigation reports, RAPs and validation works if they occur; • Provide Site Audit Statements where gross contaminant impacts are identified; • Provide site audit statement or advice, if required The EPA must: • approve any subsequent revisions of the CEMP • endorse validation reports where UFPs are identified (not requiring independent auditing): • approve the disposal or beneficial reuse of potentially impacted material from the site.	The listed responsibilities and details with regards to the designation of responsibilities are considered acceptable.
Over what timeframe will the EMP be implemented?	The CEMP shall remain applicable to the Site until such time as the conditions are deemed to no longer apply.	Acceptable. It is likely once site bulk earthworks are completed the CEMP becomes void.
Is the EMP capable of being made legally enforceable?	The CEMP states that it will be appended to the Site Audit Statement (SAS)) which will be recorded by the ACT EPA. The SAS will require implementation of the CEMP as part of future redevelopment works. The CEMP will be legally enforced via the development approval process, and contract terms for the Principal Contractor (specifically during earthworks). The Principal Contractor must also refer to the CEMP and known "soil management areas" that contain filling and the procedure for any unexpected finds	Acceptable, noting that the mechanism of enforcement must be made prior to the site development.

Requirement	CEMP	Auditor Comment
How will this EMP be publically notified?	As part of future planning approvals	The CEMP will be attached to the SAS for Area A and assumed to become a condition of future planning approval.
How is offsite migration of contamination being managed?	No contamination identified at the site. The CEMP addresses aesthetic issues associated with fill and redundant in-ground piping	
Does the remaining contamination affect groundwater quality?	No contamination identified at the site. The CEMP addresses aesthetic issues associated with fill and redundant in-ground piping	
How will the integrity of the cap be maintained in the long term?	Not applicable	
Is there any risk to human health in structures overlying the cap?	Not applicable.	

Table 11.2: Review of WSP (2017) Unexpected Finds Management Plan (UFMP)

Requirement	UFMP	Auditor Comment
What is the nature and location of potential 'unexpected finds'?	Unexpected finds that may be encountered, albeit the potential is considered to be low, include any unidentified land contamination or unexploded ordnance or exploded ordnance waste (EOW) within MV3 Area A.	The Auditor agrees with WSP on the potential unexpected finds for which the UFMP addresses, and considers the proposed strategy to manage such finds to be appropriate.
What are the objectives of the UFMP?	The UFMP outlines measures required to manage potential contamination or UXO/EOW finds that have not been identified during previous intrusive assessments at the site.	The objectives as presented in the UFMP are considered to be appropriate for the requirements for currently known site conditions.
How are the contaminants going to be managed?	Table 6.1 of the UFMP provides examples of contaminants that may be encountered during site redevelopment works. Section 7.2 of the UFMP provides a procedure to follow should an unexpected find of potential contamination, UXO or EOW be encountered, including: • stop works, and move to a designated meeting / safe point; • contact person in control of the workplace • assess risk posed to human health and the environment and assess if emergency services should be contacted. • Delineate an exclusion zone. • Follow designated Health and Safety protocols. • Procedures for assessing and remediating / validating / area.	This is considered acceptable for Area A.
Who is responsible for the implementation of the UFMP?	The UFMP states that the LDA and the future redevelopment principal contractor must ensure that the UFMP is implemented.	The listed responsibilities and details with regards to the designation of responsibilities are considered acceptable.

Requirement	UFMP	Auditor Comment
Over what timeframe will the UFMP be implemented?	The UFMP shall until redevelopment works are completed.	Acceptable. It is likely that once site bulk earthworks are completed the UFMP becomes void.
Is the UFMP capable of being made legally enforceable?	The UFMP will be appended to the Site Audit Statement (SAS)) which will be recorded by the ACT EPA. The SAS will require implementation of the UFMP as part of future redevelopment works.	Acceptable, noting that the mechanism of enforcement must be made prior to site development.
How will this UFMP be publically notified?	As part of future planning approvals	The UFMP will be attached to the SAS for Area A and assumed to become a condition of future planning approval.
How is offsite migration of contamination being managed?	No contamination has been identified at the site. The UFMP addresses potential unexpected finds associated with fill and historical military use across the greater MV3 future area.	
Does the remaining contamination affect groundwater quality?	No contamination identified at the site. Unlikely, given site history and findings of the detailed investigations, that groundwater quality could be impacted.	
How will the integrity of the cap be maintained in the long term?	Not applicable	
Is there any risk to human health in structures overlying the cap?	Not applicable.	

12. Auditor's Assessment of Risk

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

The Auditor concludes that no unacceptable risk to human health, structures and the environment have been identified in respect of actual or potential contamination of the site, based on the findings and results of the assessments conducted in Area A.

Given the large area (464ha) covered by the investigations and this Audit, a CEMP has been prepared to address residual (low risk) issues at the site largely as a result of aesthetics. The CEMP also provides an unexpected finds protocol should, during redevelopment (including bulk earthworks and site preparation activities), conditions different to those encountered in the DSI (WSP, 2016) or if other contamination sources are identified.

12.2 Potential for offsite migration of contamination

Whilst no groundwater assessment was conducted for the site, the site has been assessed in terms of soil leachability, extensive review of geology and hydrogeology and site history, and site observations for groundwater during the site investigation stages:

- The Silurian sequence underlying the site is well fractured and contains low salinity water capable of producing stock and domestic water supplies at depths ranging from 25 to 60 metres below grade. Aquifer yields are expected to be generally less than 0.5 L/s.
- Historical landuse (principally as forestry plantation prior to destruction in the 2001 and 2003 bushfires and subsequent regrowth)
- No free groundwater or saturated layers were observed at any sampling locations including deeper test pits.
- Leachate (TCLP) tests for 12 samples indicated that soils (for heavy metals) were of low leachability.

The factors above provide evidence that groundwater is not at risk from soil conditions. Given the low contamination profile for the site investigated the potential for migration of contamination is considered to be low.

12.3 Requirement for any ongoing management of residual contamination

No chemical contamination was identified within Area A with the investigations completed to date. As such, there is no requirement for site remediation.

However investigations did encounter isolated areas which are considered to pose an aesthetic issue (containing fill debris) for future residential redevelopment or redundant in-ground piping confirmed to contain asbestos. A Construction Environmental Management Plan (CEMP) (WSP November 2016) and Unexpected Finds Management Plan (UFMP) (WSP February 2017) has been prepared for implementation during the redevelopment of the site. The CEMP and UFMP will be appended to the SAS for Area A.

13. Site Audit Conclusions

The investigation works conducted and reported by WSP (and others) are generally considered to have been completed in accordance with ACT EPA endorsed land contamination guidelines and the procedures outlined in the ACT EPP (November 2009).

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

On this basis a Section A SAS will be issued certifying that, in the opinion of the Auditor, the site is suitable for the proposed mixed residential use, provided that the WSP (25 November 2016) Construction Environmental Management Plan (CEMP), Molonglo Valley Stage 3 (Area A) is implemented during site redevelopment works, as well as the WSP (8 February 2017) Unexpected Finds Management Plan for Contaminated Land and Unexploded Ordnance (UXO) / Exploded Ordnance Waste (EOW), within Molonglo Valley Stage 3 (Future Urban Area).

The Auditor notes that Area A in entirety meets the most sensitive land use criteria 'Urban Residential and Public Open Space' in addition to 'Residential with garden/accessible soil (HIL- A)' as defined in the NEPC (2013). Based on the available data there are no restrictions on permissible uses from a human health or environmental perspective identified subject to the implementation of the above CEMP to address aesthetic issues remaining.

The CEMP and UFMP will be appended to the SAS.

14. Other Relevant Information

This site audit relates only to those matters relevant to the EP Act 1997, which describes that the general object of this Act is to establish a process for the investigation and (where appropriate) remediation of land where contamination presents a significant risk of harm to human health or some other aspect of the environment. Not all environmental issues as stated in the EP Act 1997 have been audited, only soil, surface water, groundwater and odour issues. The SAS and SAR do not seek to provide an opinion regarding other aspects of the environment not related to site contamination, to the suitability of the site in regard to the occupational health and safety legislation, or in regards to the suitability of the engineering design.

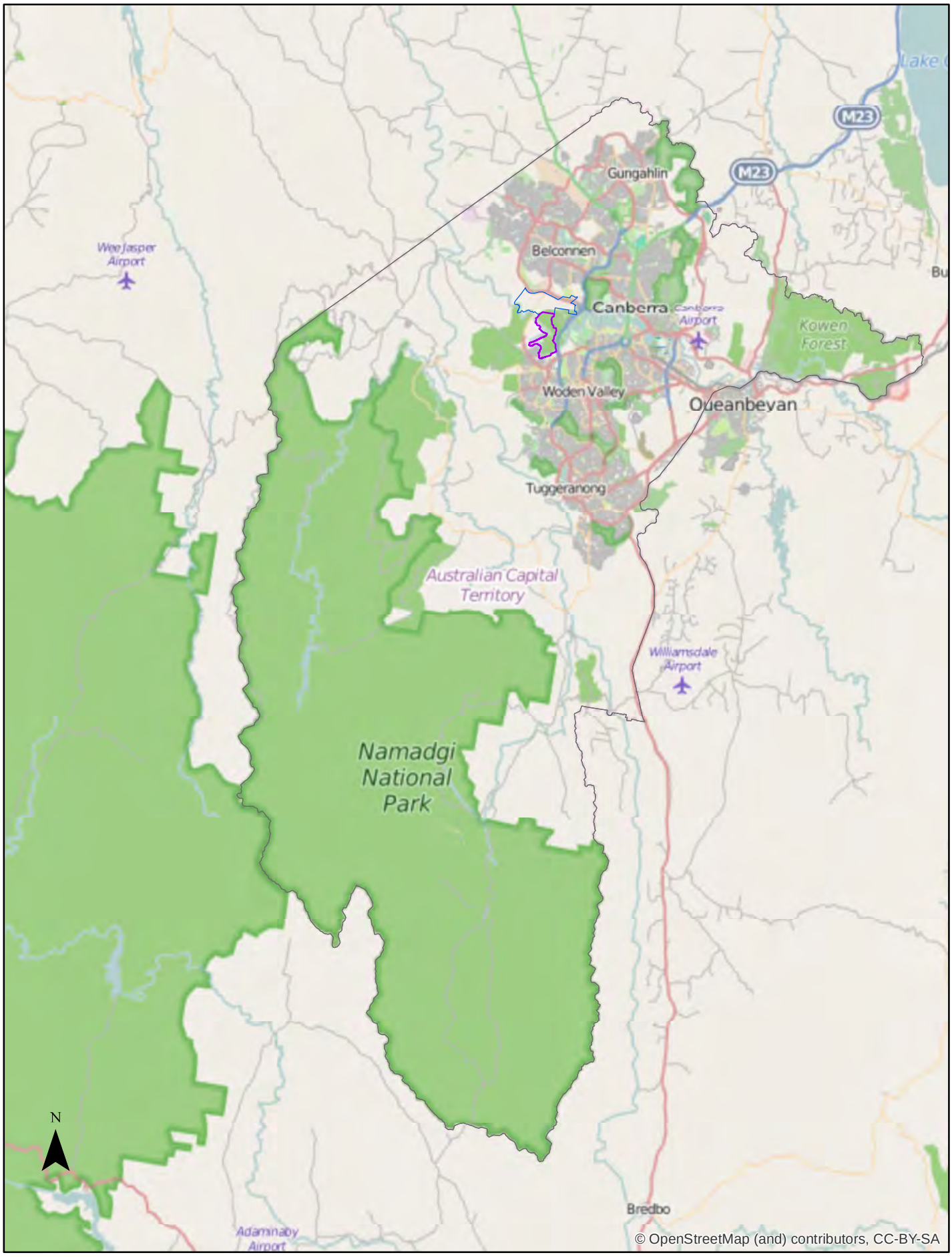
By definition, auditing involves the review and critique of Consultants' work, including site histories, site surveys, subsurface investigations, chemical and physical analyses, risk assessments and modelling. Accordingly, the Site Auditor relies on the experience, expertise and integrity of the relevant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

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

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

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

Appendix A Figures



10 5 0 10 Kilometers

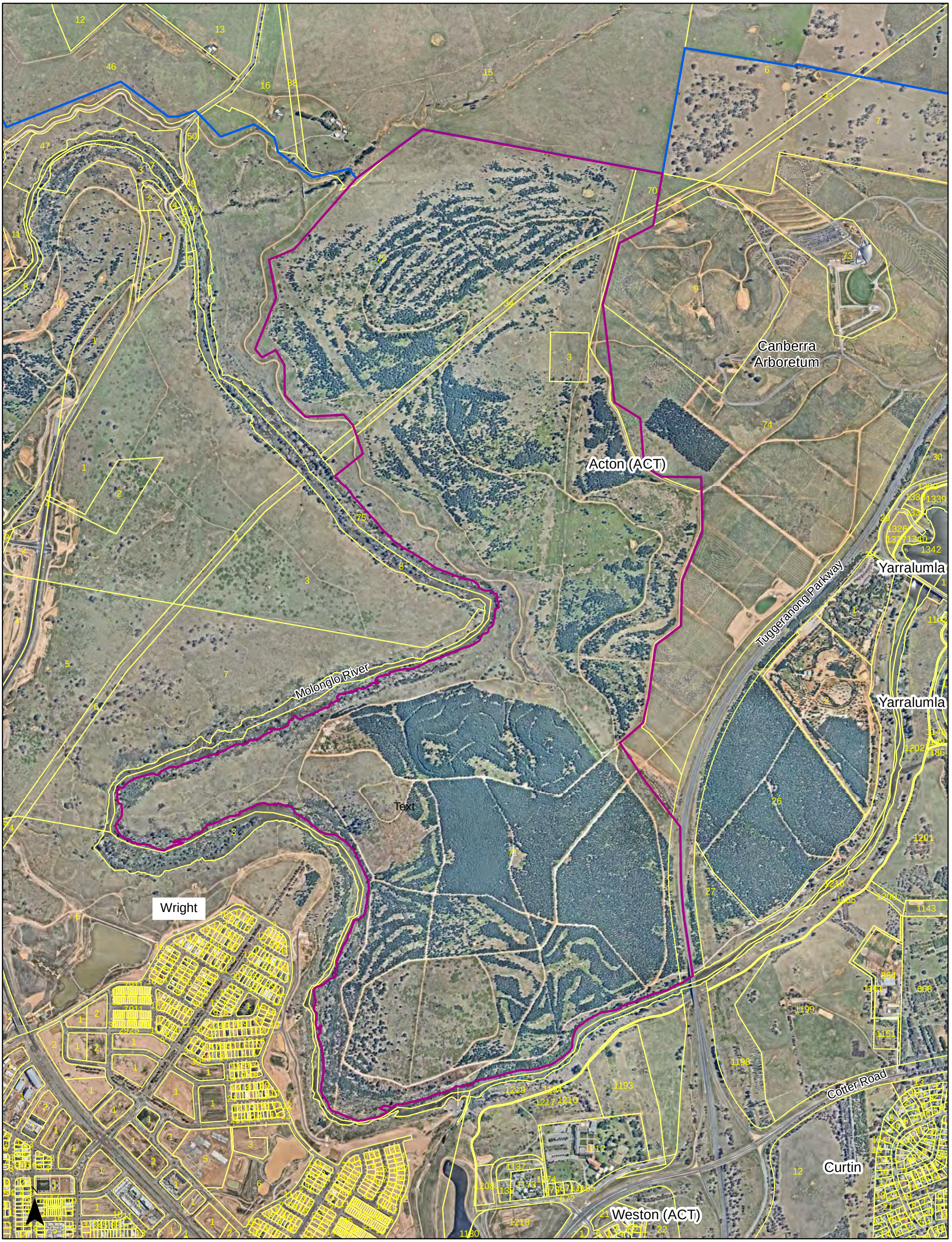
Molonglo Valley Area A

Molonglo Valley Area B

ACT Boundary

FIGURE 1 - Site Location

00039275 Phase 2 Detailed Site Investigation (Contamination) Molonglo Valley Stage 3



Molonglo Valley Area A

Molonglo Valley Area B

Cadestre

550 275 0 550 Meters

Image Source: Nearmap.
Aerial dated 17 January 2015

FIGURE 2 - Site Layout

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3

AreaA

AreaB

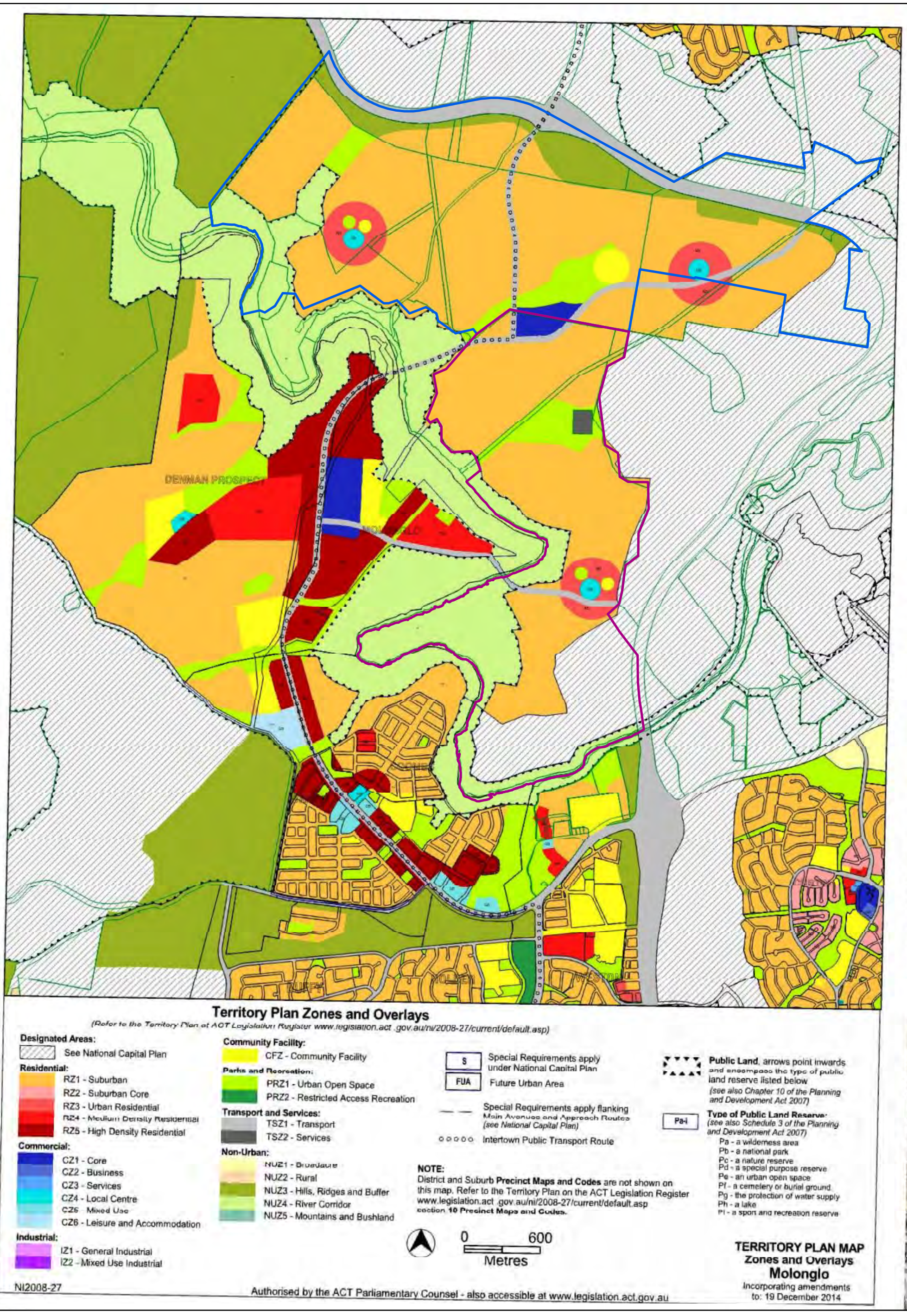
Contours_10m

Image Source: Nearmap.
Aerial dated 17 January 2015

500 250 0 500 Meters

FIGURE 3 - Site Contours / Topography

00039275 Phase 2 Detailed Site Investigation (Contamination) Molonglo Valley Stage 3



Legend

- Molonglo Valley Area A
- Molonglo Valley Area B

1,000 500 0 1,000 Meters

Background Image Source: Nearmap.
Aerial dated 17 January 2015

WSP

FIGURE 4 - Current and Future Land Zoning

00039275 Phase 2 Detailed Site Investigation (Contamination) Molonglo Valley Stage 3

WSPA_AEC29
WSPA_AEC50
RobA_AEC28
RobA_AEC23
RobA_AEC27
RobA_AEC26
RobA_AEC22
WSPA_AEC51
RobA_AEC25
RobA_AEC21
RobA_AEC24
RobA_AEC20
WSPA_AEC6
WSPB_AEC6
RobA_AEC13
RobA_AEC14
RobA_AEC15
WSPA_AEC22
RobA_AEC18
RobA_AEC17
RobA_AEC16

AEC	Consultant Report and Date	Description of AEC
6	WSP, 2012	Dam
22	WSP, 2012	Stockpiled soil, with empty 205L Castrol drum partly exposed, for hydrocarbon products
29	WSP, 2012	*Linear Along Eastern Boundary:* Pesticide use on the adjacent and topographically upgradient property: Canberra International Arboretum
13, 14	Robson, 2014	*Excised from Study Area:* Parts of Forests 103 and 104 of National Arboretum Canberra
15	Robson, 2014	*Excised from Study Area:* Area of approximately 65 stockpiles of mulch
16, 17, 18	Robson, 2014	Individual stockpiles of soil and mulch
20	Robson, 2014	Large flat area of fill at mouth of gully
21	Robson, 2014	Dam
22, 23	Robson, 2014	Two (2) concrete driveway structures
24, 25, 26, 27, 28	Robson, 2014	Five (5) drains used to control surface water runoff from up-gradient land uses
31	WSP, 2012	*General Areas of Forestry (no marker point):* Herbicide and pesticide usage from current and historical land use
33	WSP, 2012	*Former Burnt Timber Stockpiles (no marker point):* Stockpiles and isolated occurrences of burnt timber, likely resulting from the 2003 bushfires
50	WSP, 2014	Dam
51	WSP, 2014	Dam
Molonglo River Water	WSP, 2014	River Channel (no marker point)
Molonglo River Sediment	WSP, 2014	River Channel (no marker point):

AreaA_AEC_Points
AreaA
AreaB

Image Source: Nearmap.
Aerial dated 29 October 2014

500 250 0 500 Meters

FIGURE 5 - Area A Areas of Environmental Concern (AECs)

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3

A2 A3
B1 B2 B3
C1 C2 C3
D2 D3
E2 E3
F1 F2 F3
G1 G2 G3
H2 H3
I2 I3
N

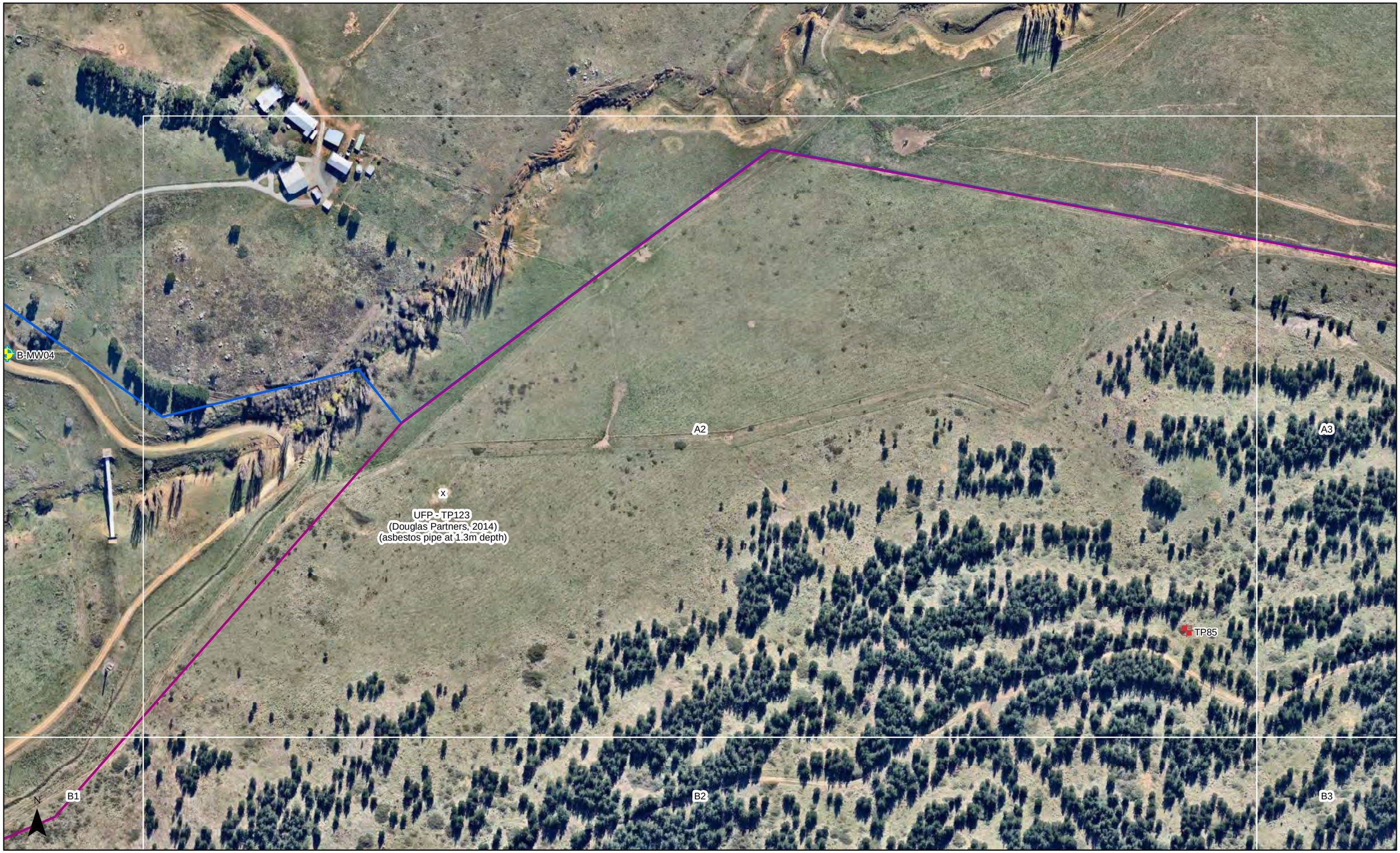
AreaA
AreaB

500 250 0 500 Meters

Image Source: Nearmap.
Aerial dated 17 January 2015

FIGURE 6 - Area A Grids

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3



AreaA_AEC_Points
AreaA_TestPits
SedimentSamples
SurfacewaterSamples
Inaccessible_Tracks

Excised_TAMS_Area
AreaA
AreaB

Image Source: Nearmap.
Aerial dated 17 January 2015

100 50 0 100 Meters

WSP

FIGURE 6_A2 - Sampling Locations

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3

AreaA_AEC_Points
AreaA_TestPits
SedimentSamples
SurfacewaterSamples
Inaccessible_Tracks

Excised_TAMS_Area
AreaA
AreaB

Image Source: Nearmap.
Aerial dated 17 January 2015

100 50 0 100 Meters

WSP

FIGURE 6_A3 - Sampling Locations

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3

AreaA_AEC_Points
AreaA_TestPits
SedimentSamples
SurfacewaterSamples
Inaccessible_Tracks

Excised_TAMS_Area
AreaA
AreaB

Image Source: Nearmap.
Aerial dated 17 January 2015

100 50 0 100 Meters

WSP

FIGURE 6_B1 - Sampling Locations

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3

AreaA_AEC_Points
AreaA_TestPits
SedimentSamples
SurfacewaterSamples
Inaccessible_Tracks

Excised_TAMS_Area
AreaA
AreaB

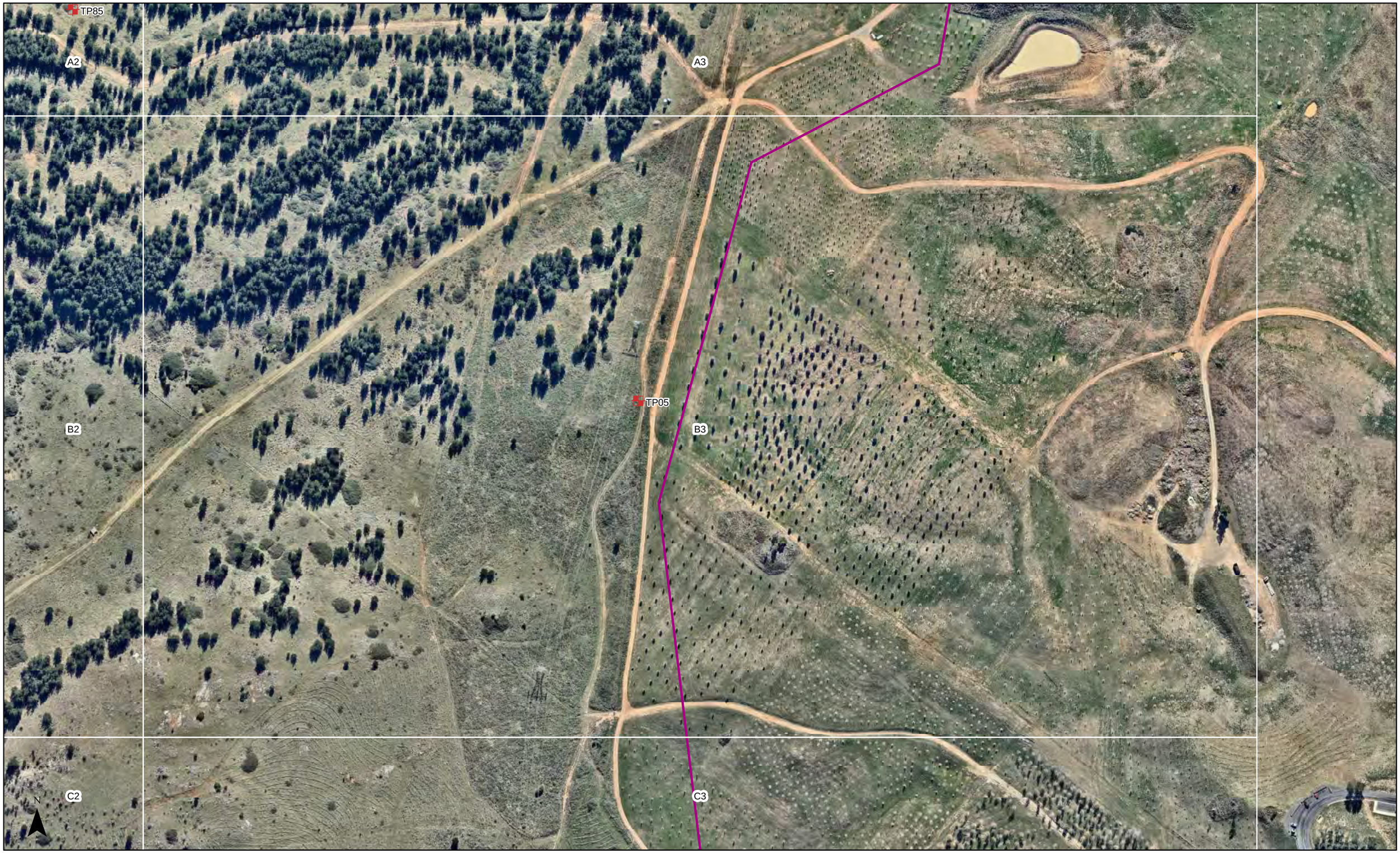
Image Source: Nearmap.
Aerial dated 17 January 2015

100 50 0 100 Meters

WSP

FIGURE 6_B2 - Sampling Locations

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3



AreaA_AEC_Points
AreaA_TestPits
SedimentSamples
SurfacewaterSamples
Inaccessible_Tracks

Excised_TAMS_Area
AreaA
AreaB

Image Source: Nearmap.
Aerial dated 17 January 2015

100 50 0 100 Meters

WSP

FIGURE 6_B3 - Sampling Locations

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3

- AreaA_AEC_Points
- AreaA_TestPits
- SedimentSamples
- SurfacewaterSamples
- Inaccessible_Tracks
- Excised_TAMS_Area
- AreaA
- AreaB

Image Source: Nearmap.
Aerial dated 17 January 2015

100 50 0 100 Meters

WSP

FIGURE 6_C1 - Sampling Locations

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3

AreaA_AEC_Points
AreaA_TestPits
SedimentSamples
SurfacewaterSamples
Inaccessible_Tracks

Excised_TAMS_Area
AreaA
AreaB

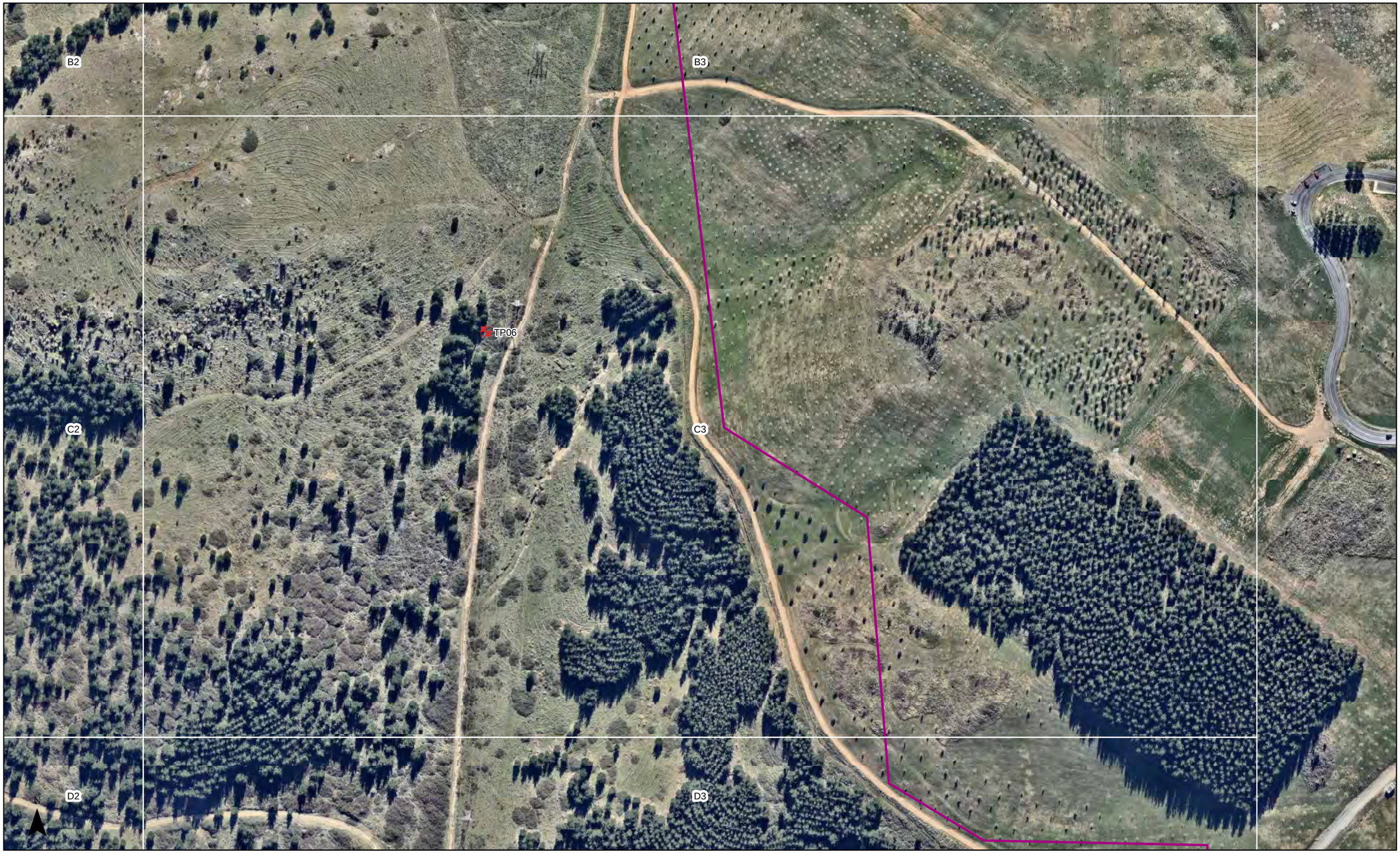
Image Source: Nearmap.
Aerial dated 17 January 2015

100 50 0 100 Meters

WSP

FIGURE 6_C2 - Sampling Locations

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3



AreaA_AEC_Points
AreaA_TestPits
SedimentSamples
SurfacewaterSamples
Inaccessible_Tracks

Excised_TAMS_Area
AreaA
AreaB

Image Source: Nearmap.
Aerial dated 17 January 2015

100 50 0 100 Meters

WSP

FIGURE 6_C3 - Sampling Locations

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3

AreaA_AEC_Points
AreaA_TestPits
SedimentSamples
SurfacewaterSamples
Inaccessible_Tracks

Excised_TAMS_Area
AreaA
AreaB

Image Source: Nearmap.
Aerial dated 17 January 2015

100 50 0 100 Meters

WSP

FIGURE 6_D2 - Sampling Locations

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3

AreaA_AEC_Points
AreaA_TestPits
SedimentSamples
SurfacewaterSamples
Inaccessible_Tracks

Excised_TAMS_Area
AreaA
AreaB

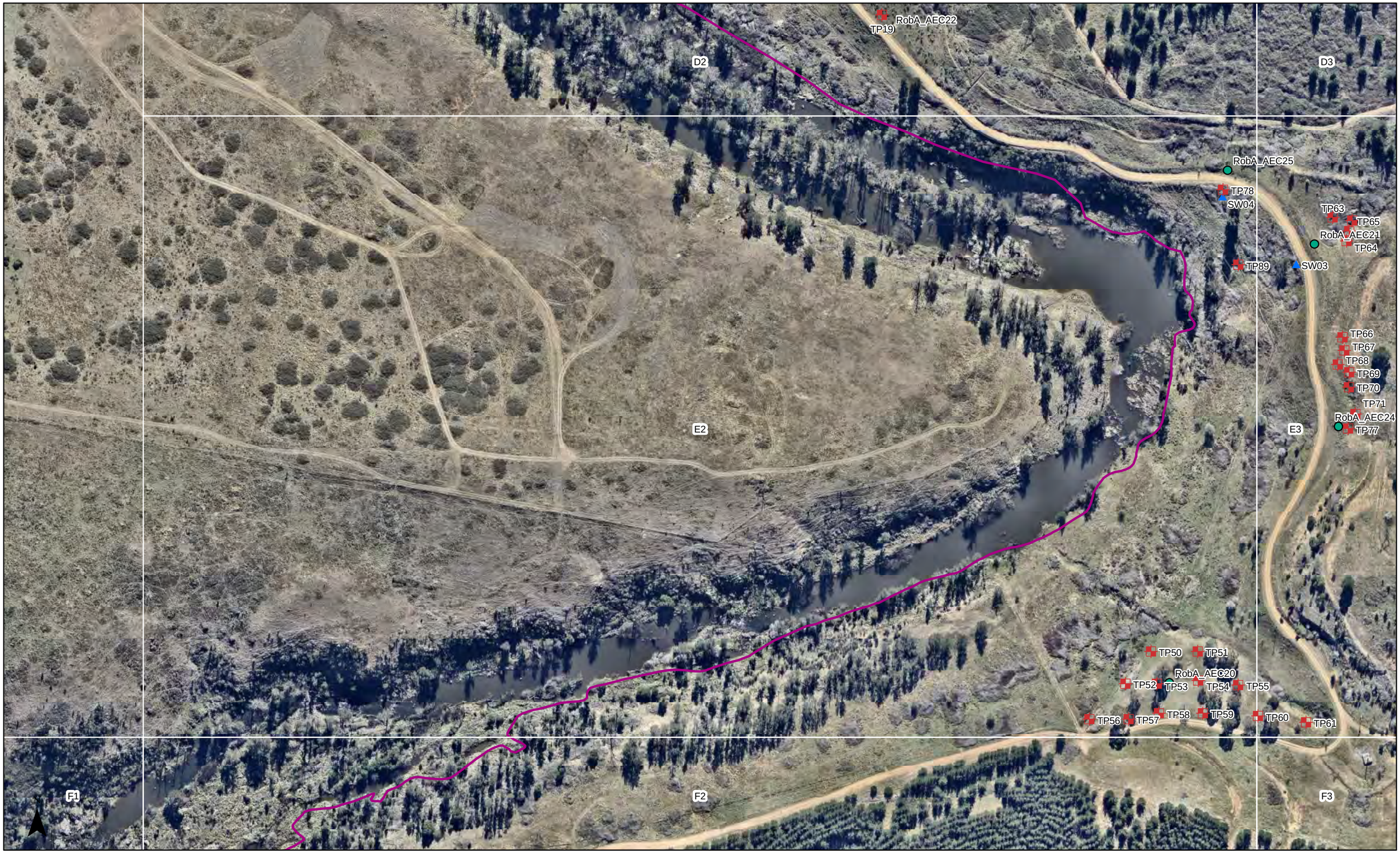
Image Source: Nearmap.
Aerial dated 17 January 2015

100 50 0 100 Meters

WSP

FIGURE 6_D3 - Sampling Locations

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3



AreaA_AEC_Points
AreaA_TestPits
SedimentSamples
SurfacewaterSamples
Inaccessible_Tracks

Excised_TAMS_Area
AreaA
AreaB

Image Source: Nearmap.
Aerial dated 17 January 2015

100 50 0 100 Meters

WSP

FIGURE 6_E2 - Sampling Locations

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3

AreaA_AEC_Points
AreaA_TestPits
SedimentSamples
SurfacewaterSamples
Inaccessible_Tracks

Excised_TAMS_Area
AreaA
AreaB

Image Source: Nearmap.
Aerial dated 17 January 2015

100 50 0 100 Meters

WSP

FIGURE 6_E3 - Sampling Locations

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3

AreaA_AEC_Points
AreaA_TestPits
SedimentSamples
SurfacewaterSamples
Inaccessible_Tracks

Excised_TAMS_Area
AreaA
AreaB

Image Source: Nearmap.
Aerial dated 17 January 2015

100 50 0 100 Meters

WSP

FIGURE 6_F1 - Sampling Locations

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3

AreaA_AEC_Points
AreaA_TestPits
SedimentSamples
SurfacewaterSamples
Inaccessible_Tracks

Excised_TAMS_Area
AreaA
AreaB

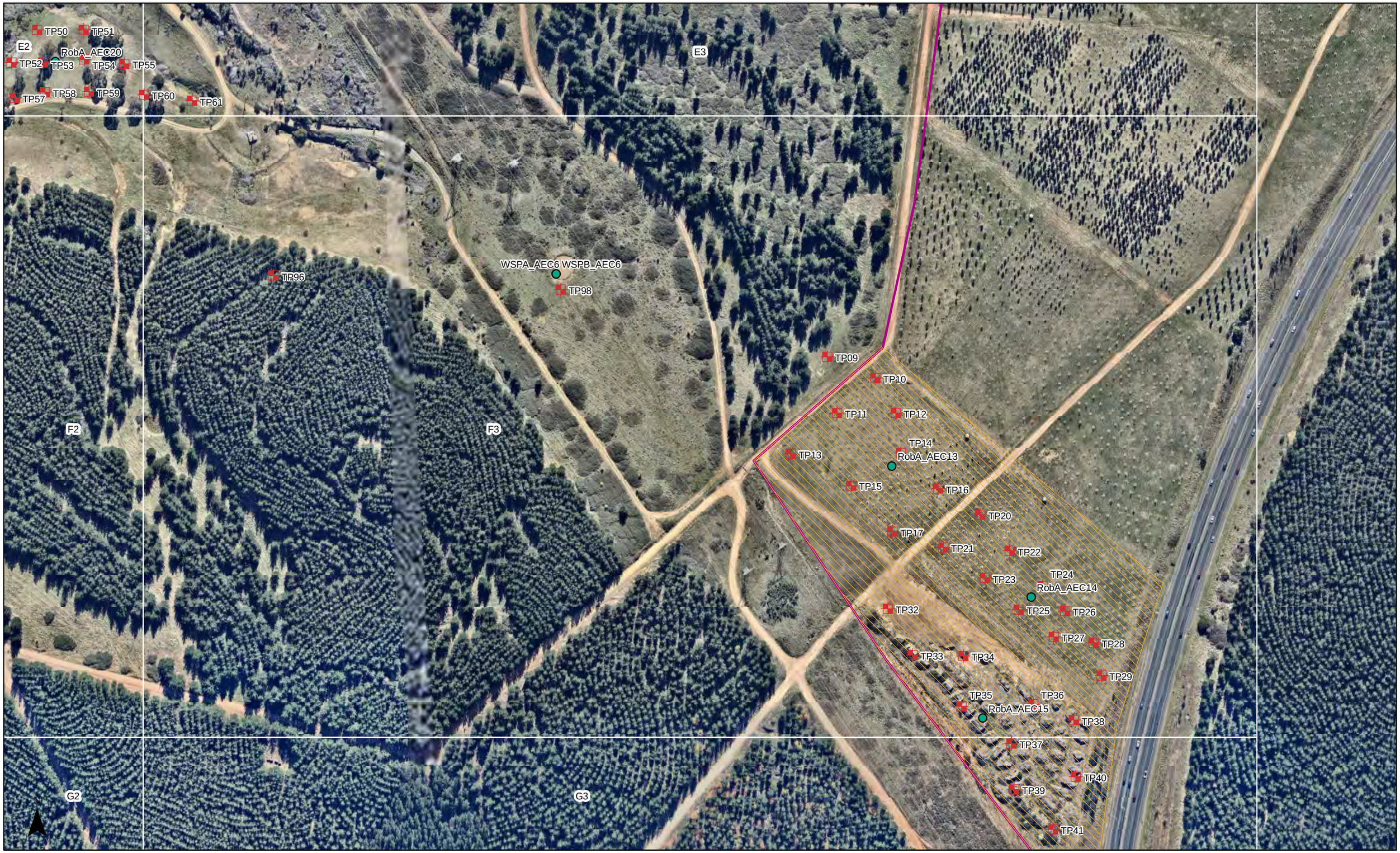
Image Source: Nearmap.
Aerial dated 17 January 2015

100 50 0 100 Meters

WSP

FIGURE 6_F2 - Sampling Locations

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3



AreaA_AEC_Points
AreaA_TestPits
SedimentSamples
SurfacewaterSamples
Inaccessible_Tracks

Excised_TAMS_Area
AreaA
AreaB

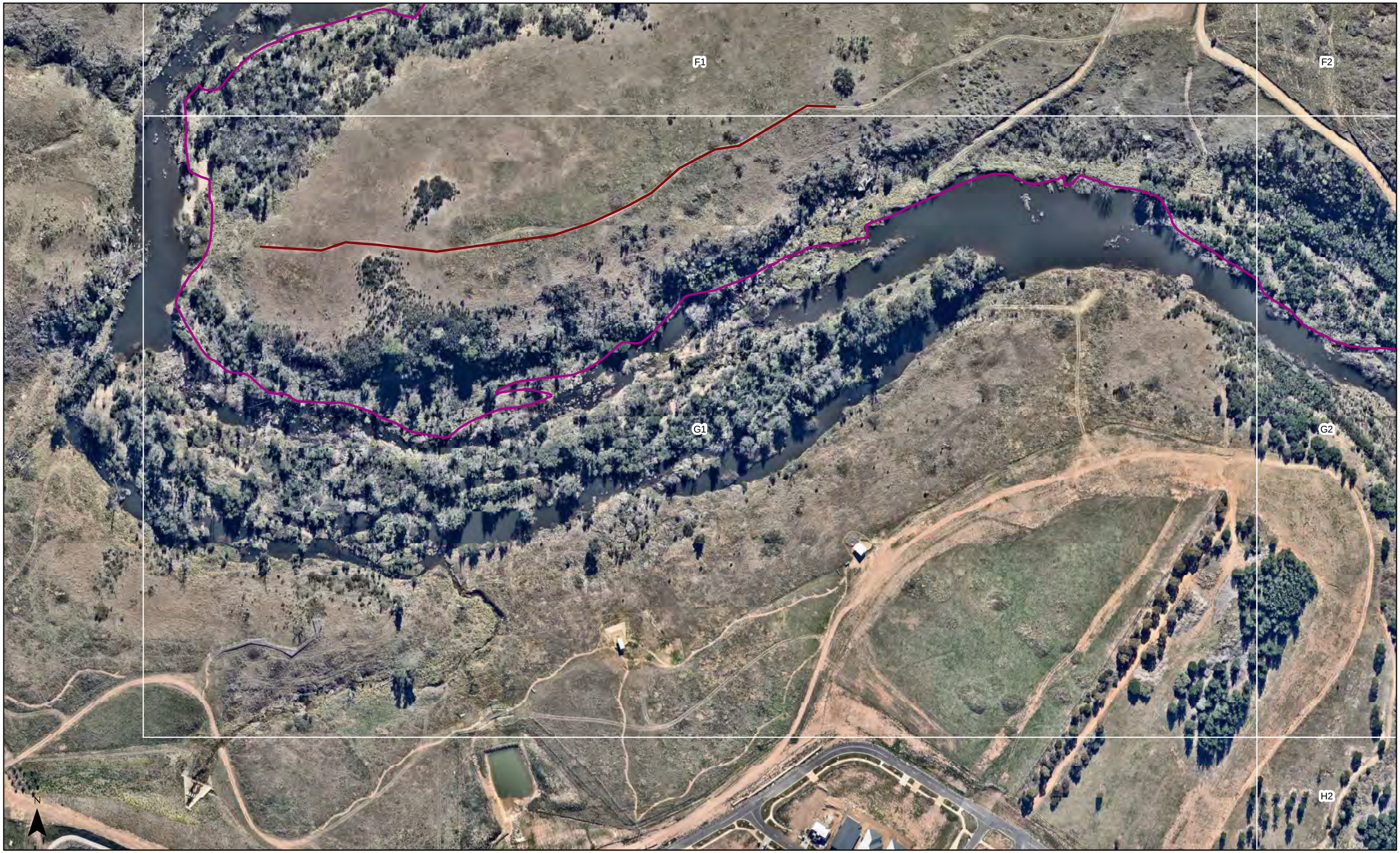
Image Source: Nearmap.
Aerial dated 17 January 2015

100 50 0 100 Meters

WSP

FIGURE 6_F3 - Sampling Locations

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3



- AreaA_AEC_Points
- AreaA_TestPits
- SedimentSamples
- SurfacewaterSamples
- Inaccessible_Tracks
- Excised_TAMS_Area
- AreaA
- AreaB

Image Source: Nearmap.
Aerial dated 17 January 2015

100 50 0 100 Meters

WSP

FIGURE 6_G1 - Sampling Locations

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3

AreaA_AEC_Points
AreaA_TestPits
SedimentSamples
SurfacewaterSamples
Inaccessible_Tracks

Excised_TAMS_Area
AreaA
AreaB

Image Source: Nearmap.
Aerial dated 17 January 2015

100 50 0 100 Meters

WSP

FIGURE 6_G2 - Sampling Locations

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3

AreaA_AEC_Points
AreaA_TestPits
SedimentSamples
SurfacewaterSamples
Inaccessible_Tracks

Excised_TAMS_Area
AreaA
AreaB

Image Source: Nearmap.
Aerial dated 17 January 2015

100 50 0 100 Meters

WSP

FIGURE 6_G3 - Sampling Locations

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3

- AreaA_AEC_Points
- AreaA_TestPits
- SedimentSamples
- SurfacewaterSamples
- Inaccessible_Tracks
- Excised_TAMS_Area
- AreaA
- AreaB

Image Source: Nearmap.
Aerial dated 17 January 2015

100 50 0 100 Meters

WSP

FIGURE 6_H2 - Sampling Locations

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3

AreaA_AEC_Points
AreaA_TestPits
SedimentSamples
SurfacewaterSamples
Inaccessible_Tracks

Excised_TAMS_Area
AreaA
AreaB

Image Source: Nearmap.
Aerial dated 17 January 2015

100 50 0 100 Meters

WSP

FIGURE 6_H3 - Sampling Locations

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3

- AreaA_AEC_Points
- AreaA_TestPits
- SedimentSamples
- SurfacewaterSamples
- Inaccessible_Tracks
- Excised_TAMS_Area
- AreaA
- AreaB

Image Source: Nearmap.
Aerial dated 17 January 2015

100 50 0 100 Meters

WSP

FIGURE 6_I2 - Sampling Locations

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3

AreaA_AEC_Points
AreaA_TestPits
SedimentSamples
SurfacewaterSamples
Inaccessible_Tracks

Excised_TAMS_Area
AreaA
AreaB

Image Source: Nearmap.
Aerial dated 17 January 2015

100 50 0 100 Meters

WSP

FIGURE 6_I3 - Sampling Locations

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3

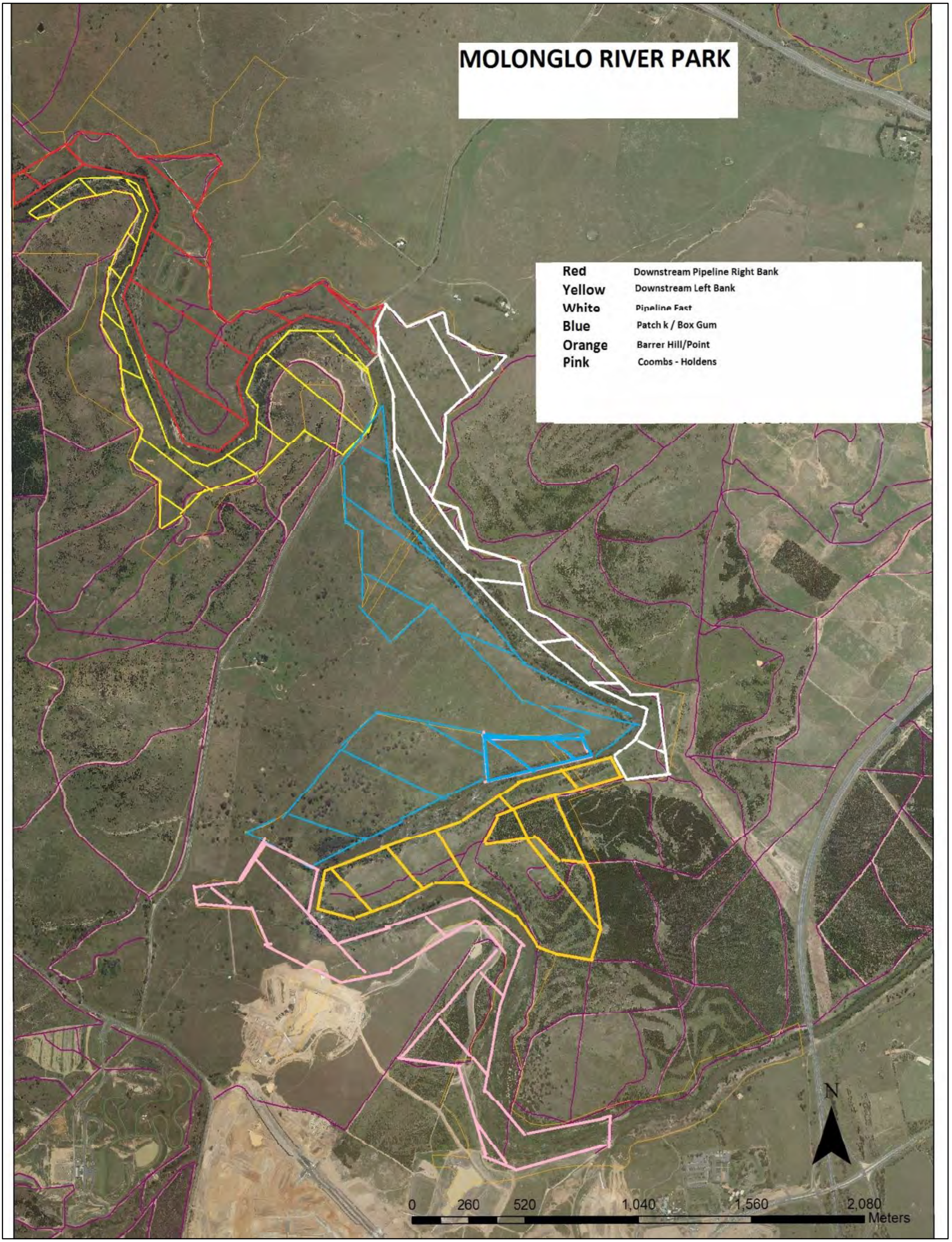


Image Source: ACT Parks and Conservation Service

FIGURE 7
Blackberry Spraying and Treatment Areas

00039275 Phase 2 Detailed Site Investigation (Contamination) Molonglo Valley Stage 3

100 50 0 100 Meters

AreaA_AEC_Points

AreaA_Soil Management Areas

Image Source: Nearmap.
Aerial dated 29 October 2014

FIGURE 8a - Area A Soil Management Areas

00039275 Phase 2 Detailed Site Investigation (Contamination) Molonglo Valley Stage 3

A2

B1

B2

N

AreaA_AEC_Points

AreaA_Soil Management Areas

AreaA

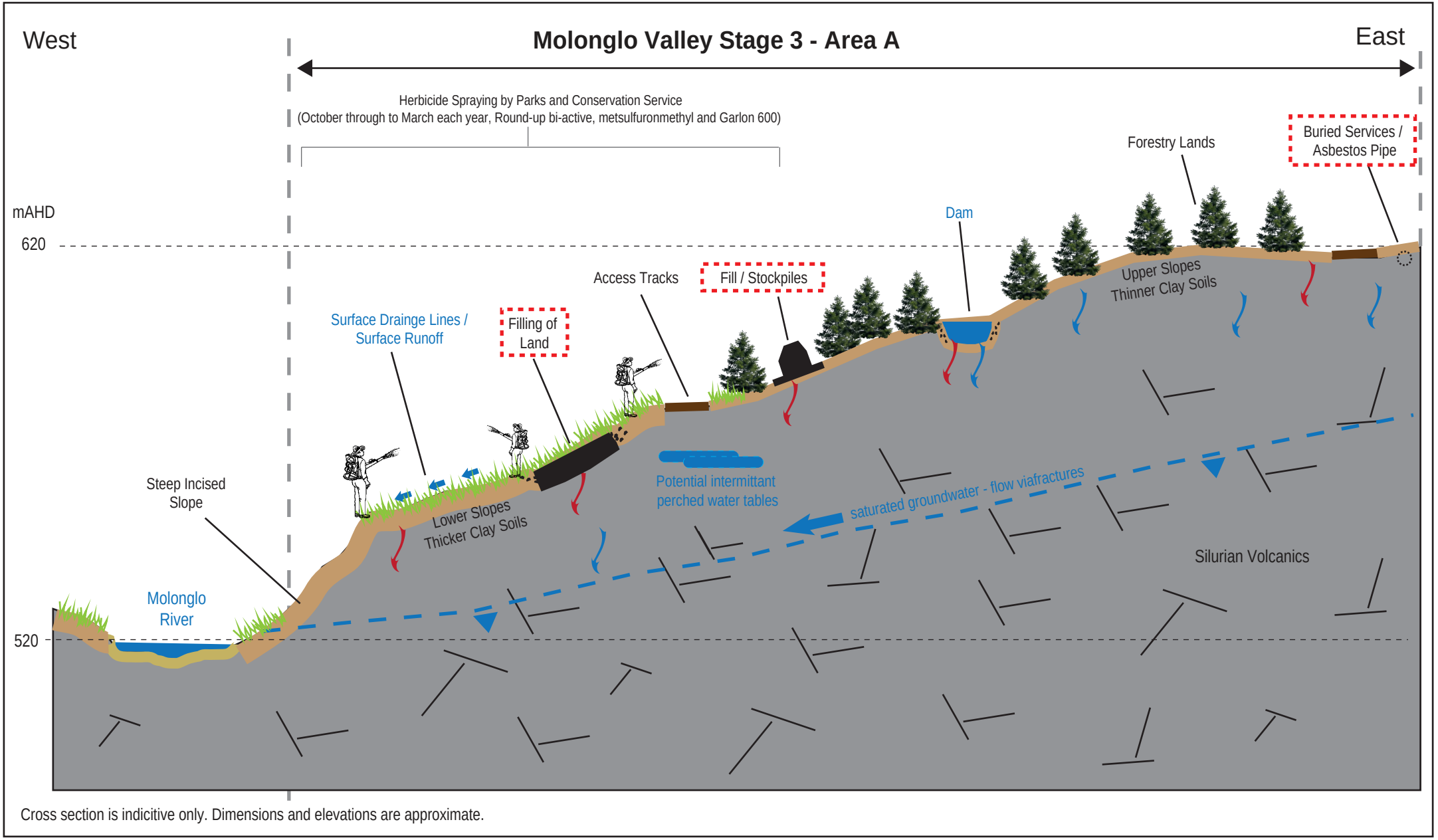
AreaB

100 50 0 100 Meters

Image Source: Nearmap.
Aerial dated 17 January 2015

FIGURE 8b - Area A Soil Management Areas

00039275 Phase 2 Detailed Site Investigation
(Contamination) Molonglo Valley Stage 3



Cross section is indicitive only. Dimensions and elevations are approximate.

KEY

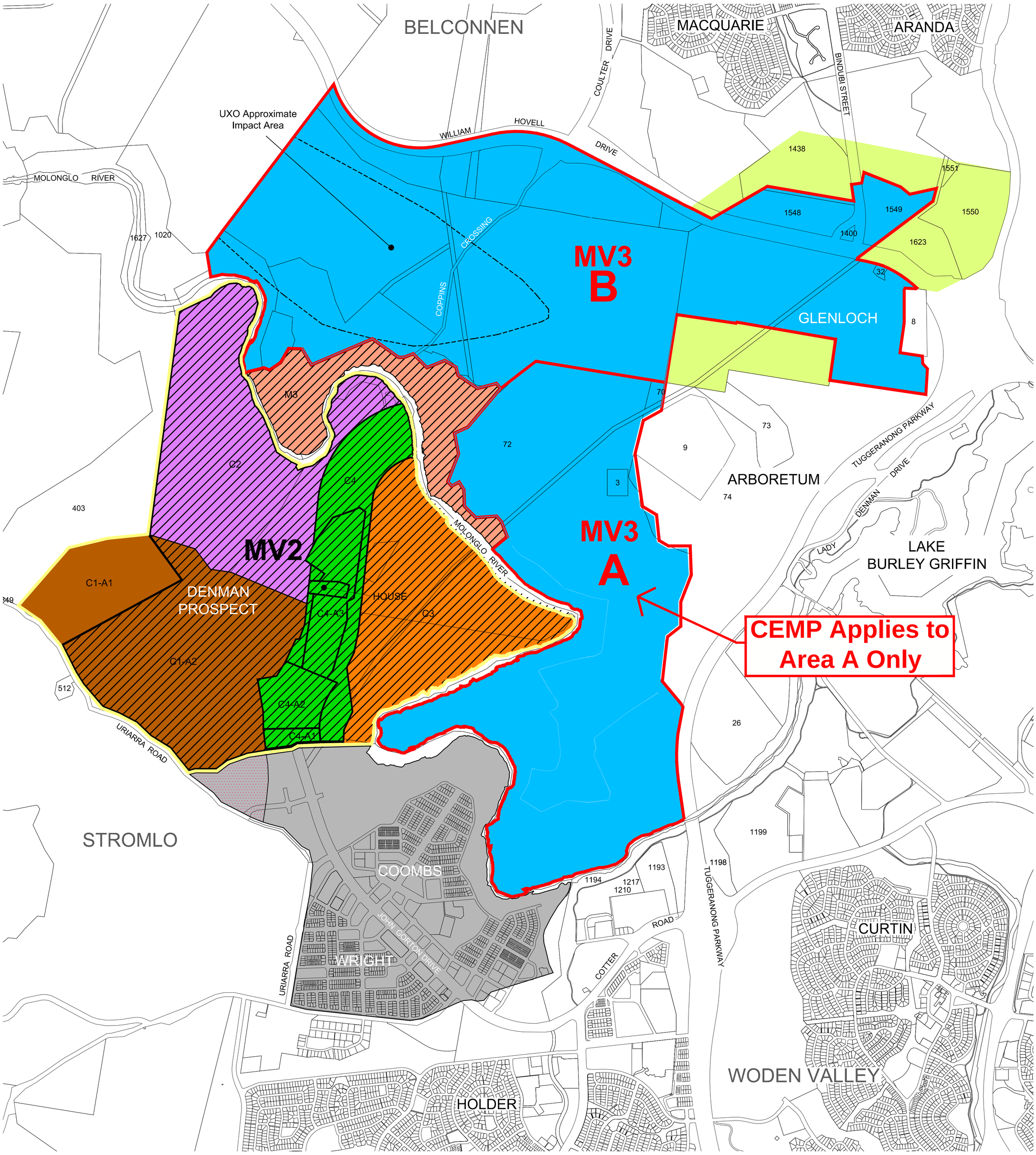
- Fill Material / Stockpiles
- Natural clayey residual soils
- Alluvium and Sediments
- Silurian Volcanics
- Fractures
- Forestry Lands
- Grasslands and Riparian Zones
- Site Boundary
- Horizontal groundwater flow
- Potential vertical infiltration of groundwater
- Potential Leaching of Contaminants
- Soil Management Areas / Buried Wastes

Conceptual Site Model

00039275 Phase 2 Detailed Site Investigation (Contamination) Molonglo Valley Stage 3 - Area A

FIGURE 9

WSP



LEGEND

- MOLONGLO 2 STUDY AREA BOUNDARY
- MOLONGLO 3 STUDY AREA BOUNDARY
- AECOM MV2-C1 EXTENT (ENVIRON)
- ROBSON PHASE 1
- COOMBS/WRIGHT STUDY AREA
- AECOM MV2-C2 EXTENT (ENVIRON)
- WSP PHASE 2 (ZOIC)
- AURECON PHASE 1
- AECOM MV2-C3 EXTENT (ENVIRON)
- AECOM PHASE 2 (M3) (ENVIRON)
- AUDITED
- AECOM MV2-C4 EXTENT (ENVIRON)
- UXO Approximate Impact

FIGURE 3 - Molonglo Valley Stages, Previous Audited Areas and Consultant Reports
Project 00039275
Construction Environment management Plan

REVISIONS			
No.	Approved by	Drawn by	Date

SCALE/NORTHPOINT

N

0 250 500 750 1000 1250

1:30000@A3 1:15000@A1

DIRECTORATE/DEPARTMENT

ACT Government | Land Development Agency CANBERRA FIRST

PROJECT

MOLONGLO 3

DRAWING TITLE

MOLONGLO VALLEY
CONTAMINATION STAGE PLAN

PROJECT NUMBER	DRAWING NUMBER	AMENDMENT
P00192E	01	
AutoCAD Saved: 19/09/2016	Plotted: 19/09/2016 11:00:14 AM	By: ----

G:\LDA\5. LRP g-z\Molonglo 3\9. Maps and Figures\P00192 MV Contamination Stage Plan\P00192E.dwg

Appendix B Audit Correspondence

ZOIC Environmental Pty Ltd
Suite 4, Level 3, 105 Pitt Street Sydney NSW 2000
P: 02 9231 1045
www.zoic.com.au
ABN 23 154 745 525

23 July 2014

Mr Steven Gianakis
Strategic Planning
Environment and Sustainable Development Directorate
ACT Government
GPO Box 1908
Canberra ACT 2601

Via Email: Steven.Gianakis@act.gov.au
cc. Kerry.Browning@act.gov.au

Dear Mr Gianakis,

Site Auditor Interim Advice No.1 - Review of Existing Investigation Reports and Phase 1 Environmental Site Assessments (Robson, 2014) for Molonglo Valley Stage 3 Future Urban Area.

1. INTRODUCTION

The ACT Government Environment and Sustainable Development Directorate (ESDD) Land and Infrastructure Group has appointed Rebeka Hall as the Site Auditor for Molonglo Valley Stage 3 Future Urban Area Contaminated Site Investigation project.

The Molonglo Stage 3 Future Urban Area (the Site) occupies an area of approximately 1420 hectares and has predominantly been used for rural residential and grazing (northern portion) and forestry (southern portion). The attached **Drawing 01a** indicates the boundary of the current Audit.

Much of the area has been cleared of trees and there are numerous dams scattered across the study area. The proposed land use is a mixture of urban residential and urban open space including recreational and nature reserve along the Molonglo River corridor.

This Interim Audit Advice completes the Preliminary Review Tasks 2, 3 and 5 of the Auditor's appointment as outlined in Contract no. 2012.20844.210.

The key findings of this review are to be considered by the appointed Environmental Assessor in finalising the Sampling, Analysis and Quality Plan (SAQP) for Phase 2 Environmental Site Assessment (ESA) for the Molonglo Stage 3 study area. The Phase 2 ESA proposed for the Site should aim to better define areas that may require remediation and to obtain sufficient data on site characterisation to assist in the development of a robust remedial action plan (if required) to render the Site suitable for the proposed land use.

2. NATURE OF INTERIM ADVICE

ESDD has engaged Rebeka Hall, a New South Wales Environment Protection Authority accredited Contaminated Land Site Auditor (accreditation number 0802), currently employed by Zoic Environmental Pty Ltd (Zoic). The final outcome of this engagement is a (non-statutory) Site Audit Statement (SAS) and associated Site Audit Report (SAR) to:

- Confirm the nature and extent of contamination; and
- Determine the appropriateness of a detailed Phase 2 environmental investigation conducted by the appointed Environmental Assessor.

3. SCOPE OF AUDITS

This site audit is being conducted in accordance with the contaminated land provisions of the Environment Protection Act 1997 (EP Act), the ACTEPA (2000) Contaminated Sites Environment Protection Policy and relevant policies, and guidelines approved by the New South Wales Environment Protection Authority (NSW EPA) relating to contaminated land site audits.

Sections 91C (5) and 91D (5) of the EP Act describe that in preparing site audits reports, ACTEPA approved Site Auditors must take the following matters into account:

- The provisions of the EP Act and the EP Regulations;
- The permitted and approved uses of the land to which the assessment relates;
- The degree or extent of contamination;
- Any relevant environment protection policies; and
- Any relevant environment protection measures.

NSW DEC (2006) Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd Edition), which is approved by the ACT EPA, describes the site assessment and audit process as:

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

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

4. CURRENT INTERIM AUDIT ADVICE

In preparing this Interim Advice for the Molonglo Valley Stage 3 Future Urban Area, the Auditor has conducted a review of the following primary documents:

i. Coffey Geosciences (2005) Molonglo Valley, Preliminary Geotechnical and Contamination Constraints Study.

ii. Coffey Geosciences (2006) Gungahlin Drive Extension – Preliminary Assessment of Spoil Construction over sludge ponds at Coppins Crossing.

iii. AECOM (June 2012) Phase 1 Environmental Site Assessment, Molonglo Stage 3, (for Land Development Agency).

iv. WSP Environmental (September 2012) Phase 1 Environmental Site Assessment, Molonglo Valley Stage 3 ACT (for ACT ESDD).

v. WSP Environmental (September 2012) Sampling and Analysis Quality Plan (SAQP) for Phase 2 Environmental Site Assessment, Molonglo Valley Stage 3 ACT (for ACT ESDD).

vi. Milsearch Pty Ltd (May 2014) Post Activity Report UXO Contamination Assessment Molonglo Development Stage 3 (prepared for LDA).

vii. Robson Environmental Pty Ltd (May 2014) Phase 1 Environmental Site Assessment Area C, Molonglo Valley Stage 3, ACT.

viii. Robson Environment Pty Ltd (May 2014) Phase 1 Environmental Site Assessment Areas A and B, Molonglo Valley Stage 3, ACT.

The following additional reports were made available to the Site Auditor which provided background information for the greater area:

ix. Coffey Geosciences (2006) Phase 1 Environmental Site Assessment, Former Weston Creek Sewage Treatment Plant, Adjacent Landfill and night spoil area, Weston District, ACT.

x. SMEC (2009) Final Phase 1 Environmental Site Assessment Report for the precinct of North Weston in Weston Creek.

xi. SMEC (2009) Final Phase 1 Environmental Site Assessment Report for Coombs and Wright, Molonglo.

xii. AECOM (2010) Phase 1 Environmental Site Assessment, Stage 2 Molonglo (West) ACT.

5. SUMMARY OF KEY INFORMATION

Various historical investigations have been prepared for the Audit Area. The most recent documentation which is relevant to meet the objective of the Audit of proposing an acceptable sampling and analysis plan for site characterisation include the following:

- AECOM (June 2012) Phase 1 Environmental Site Assessment, Molonglo Stage 3.
- WSP (September 2012) Phase 1 Environmental Site Assessment.
- WSP (September 2012) Sampling and Analysis Quality Plan (SAQP) for Phase 2 ESA;
- Milsearch Pty Ltd (May 2014) Post Activity Report UXO Contamination Assessment Molonglo Development Stage 3 (prepared for LDA).
- Robson Environmental Pty Ltd (May 2014) Phase 1 Environmental Site Assessment Areas A and B, Molonglo Valley Stage 3, ACT; and
- Robson Environmental Pty Ltd (May 2014) Phase 1 Environmental Site Assessment Area C, Molonglo Valley Stage 3, ACT.

These reports have been reviewed in accordance with the requirements in the NSW DEC (2006) Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd edition), the reporting checklist in the NSW OEH (2011) Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites; and the current requirements outlined in Schedule B2 Guidelines on Site Characterisation in ASC NEPM (May 2013).

5.1. AECOM (2012) Phase 1 Environmental Site Assessment

The site assessed by AECOM comprised 64Ha of irregular shaped land located on the northern side of the Molonglo River. The legal description of the land is: Blocks 47, 49 and 50, Part Blocks 11, 36, 37, 45, 46 and 60 Molonglo Valley; and Part Block181 Belconnen.

The study area is bordered by the following:

- North: former Sewage Ponds, a Trunk Sewer access track and cleared agricultural land;
- South: The Molonglo River followed by the Molonglo Stage 2 future urban area (former agricultural land)
- East: cleared agricultural land
- West: The Molonglo River followed by the Molonglo Stage 2 future urban area (former agricultural land)

Based on desktop review of historical records, review of publicly available information and a site inspection, AECOM identified the following Areas of Environmental Concern (AEC):

- AEC1 – sewage sludge ponds located adjacent and to the north;
- AEC2 – former pine plantation;
- AEC3 – unsealed pad;
- AEC4 – existing unsealed roads;

- AEC5 – abandoned vehicle and old drums;
- AEC6 - sheep dip located (adjacent) offsite to the north east;
- AEC7 – former pine plantation.

AECOM recommended that a targeted Phase 2 environmental site assessment be completed to evaluate the potential vertical and lateral extent of any contamination in the AECs identified.

It is the Auditor's understanding, and as shown in **Drawing 01a** attached, the land covered by the AECOm Phase 1 has already been further evaluated, remediated and Audited (by Environ), and therefore is excluded from the current Molonglo 3 investigation area. However, AECs1 and 6 which lie within the current area require further investigation as part of future Phase 2 works.

5.2. WSP (2012) Phase 1 Environmental Site Assessment

5.2.1. Site Identification

The WSP report included an irregular study area, occupying a total area of 1,028 hectares which is bordered by:

- North: William Hovell Drive;
- East: Glenloch Station and the Canberra International Arboretum as well as Tuggeranong Parkway;
- West: banks of the Molonglo River;
- South: partially bound by banks of Molonglo River and by Block 1419 District of Belconnen.

Coppins Crossing road bisects the Study Area, running from William Hovell Drive in the north to Coppins Crossing over the Molonglo River. Refer to blue shading as shown in **Drawing 01a** attached.

WSP report that the Molonglo Stage 3 Development is divided in three areas A, B and C. Within the Stage 3 area, the Future Urban Area (FUA) is the primary area of focus for proposed residential development. It is noted that Block 3 Molonglo Valley was excluded from the Study Area as it was leased land for a future substation to ACTEW (ACT Government owned company for water, wastewater, electricity and gas assets). It is additionally noted that land identified as Designated Land by the Territory Plan is part of the Study Area.

Property descriptions of the WSP Study Area were reported as (WSP 2012):

Privately leased land:	Blocks 4, 5 and 41 (Mr Maurice Tully).
Unleased land with grazing:	Blocks 12, 13, 14, 15, part of 37, 42, 43 and part 46.
Former Pine Plantation:	Part Blocks 36, 37 and 46.
Infrastructure corridors:	Blocks 34, 38, 39, 40 and roads (Coppins Crossing Road)
Molonglo River and banks:	Blocks 11, part 45, 47, 49, 60, 66, part 1214, Weston Ck.
Coppins Crossing and sludge pond:	Block 10

5.2.2. Site History and Operations

The northern and central portions of the WSP Area A consist of grazing land for cattle, while the southern portion was a former pine plantation that was destroyed in the 2001 and 2003 bushfires. Specific features in the Study Area include:

- Horse paddocks in the northwestern portion of Area A along William Hovell Drive.
- One farm is present with several sheds (409 Coppins Crossing Road).
- Two occupied dwellings: one near the farm and one across Coppins Crossing Road on the boundary of Blocks 13 and 46.
- Coppins Crossing Sludge Ponds. Four (4) derelict ponds in the western portion of the Study Area, located adjacent to Molonglo River.
- Several corridors for high voltage power lines and trunk sewer line run across the Study Area.

Surrounding land uses are predominantly agricultural grazing land, Kama Nature Reserve, the Arboretum and construction sites for residential developments across Molonglo River (Stage 2 development).

Historical aerial photographs were reviewed by WSP for the years 1944, 1968, 1985, 1998 and 2009. Major changes to landform and presence of built structures were described over the years. The activities observed are consistent with known land uses registered for the site.

5.2.3. Overview of Past Reports & Contamination Status of Site

WSP (2012) completed a comprehensive review of existing reports prepared for the greater Molonglo Valley Future Urban Area. Notable information is presented in Table 5.2 which WSP used to identify AECs and propose a sampling strategy.

Table 5.2 Review of Past Reports as Summarised by WSP (2012)

Previous Report	Overview of WSP Review Findings
Coffey (May 2005)	Coffey completed a Preliminary Geotechnical and Contamination Constraints Study. The report identified the following: ▶ Sheep Dips in Area A (a plunge sheep dip and a spray sheep dip on Molonglo Valley Block 16); ▶ Sheep Dip is Area C (Plunge sheep dip on Molonglo Valley Block 6); ▶ Rural activities. Records indicated that other potential areas of environmental concern may exist, including potential fuel storage and dispensing facilities, waste disposal and hazardous building materials; ▶ Forestry Plantation. A considerable portion of the Study Area has been historically used for forestry plantation prior to destruction in the 2001 and 2003 bushfires. Environment ACT records indicate that chemicals may have been used in these areas for the purpose of pest control. Information from ACT Forest indicated that herbicide triazine was used. A limited soil sampling program was completed by Coffey, with results for heavy metals reported below adopted guidelines and OCP, OPP and triazine herbicides reported below the adopted guidelines or limit. ▶ Landfill Areas. Landfill areas are mainly concentrated in the southern portion of the Molonglo Area. However it is noted that in the current Molonglo Stage 3 Study Area no landfill areas were identified. ▶ Sewage Sludge Ponds. Major sewage sludge ponds or sludge dry beds are located on Block 10 Molonglo Valley. The ponds are no longer in use. Contaminants of Potential Concern (COPCs) are nitrogen, phosphorous, faecal coliforms, heavy metals and PAH. ▶ Weston Creek Sewage Treatment Plant (WCSTP). The WCSTP was constructed in 1925, decommissioned in 1977 and demolished between 1977 and 1979. COPCs were identified as nitrogen, phosphorous, faecal coliforms and heavy metals. A Phase 1 ESA for the WCSTP is summarised below.
Coffey (February 2006)	Coffey completed a Phase 1 Environmental Site Assessment, Former Weston Creek Sewage Treatment Plant (WCSTP), Adjacent Landfill and Night Spoil Area, Weston District. The report included a desktop review of site history, walkover, and preliminary sampling from 33 test pits and analysis of soil and groundwater. The results identified the following: ▶ The WCSTP partially overlapped the western part of Area B (park Block 1214). The overlapping portion extended in a north-south orientation from Molonglo River for approximately 200m. WSP noted that the previous test pitting by Coffey (2006) did not include sampling locations in the overlapping area. ▶ WSP reported that a sewage overflow pond is located in the overlapping portion with the current Study Area, and as such is a potential source for nitrogen, phosphorus and faecal coliforms contamination of surface waters, soil and groundwater. Reportedly the sewage sludge may also contain heavy metal contamination. ▶ Anecdotal evidence points to grease pits or grease trenches being present directly up-gradient of the current Study Area boundary. Contaminants of concern include total petroleum hydrocarbons, BTEX and polycyclic aromatic hydrocarbons.
Coffey (July 2006)	Coffey completed a Preliminary Assessment of Spoil Construction over Sludge Ponds at Coppins Crossing. The report identified the following: ▶ The Sludge Ponds received sludge from the WCSTP between 1970 and 1978. Sludge depths were reported to be greater than 1.5m in Pond 1, about 1.0m in Pond 2, about 0.8m in Pond 3 and 1.5m in Pond 4. The ponds have a clay liner. ▶ Concentrations of contaminants were summarised from a 1993 report by Bill Guy & Partners, indicating concentrations above the detection limit for Dieldrin, Chlordane, Heptachlor, HCB, DDT, DDE, DDD and PCB. Also elevated concentrations were found for heavy metal.

	▪ The sludge caught fire during the bushfires of January 2003. ▪ The report proposed to cover the ponds with at least two metres of clean fill and subsequently construct ponds or playing fields on top. These proposed works had not been undertaken.
AECOM (August 2010)	AECOM completed a Phase 1 Environmental Site Assessment, for Stage 2 Molonglo (West), ACT. The report identified the following: ▪ The Stage 2 Molonglo Area is to the south west of the current Study Area across Molonglo River, and generally has a similar environmental setting and land use to the current Study Area. ▪ Multiple potential sources of contamination were identified and AECOM recommended that a detailed Phase 2 ESA be undertaken targeting these sources and a wider grid based sampling program to assess the potential for contamination within the cleared agricultural lands. Additionally, groundwater monitoring wells were recommended to be installed at locations of two sheep dips, two illegal tip areas and at a septic tank location and shed areas.
SMEC (February 2009)	SMEC prepared a 'Final Phase 1 ESA for Coombs and Wright, Molonglo' and report 'Final Phase 1 ESA for the precinct of North Weston in Weston Creek'. Detailed Geotechnical Investigations and Environmental Site Assessment D North Weston and proposed Molonglo Suburbs 1 & 2. The report identified the following: ▪ The project related to land to the south of the current Study Area generally has a similar environmental setting and land use to the current Study Area. ▪ Multiple potential sources of contamination were identified and intrusive investigations were undertaken to assess them. Laboratory analysis showed no exceedances of the adopted residential HIL A criteria. Phosphorus concentrations from all shallow soil samples in excavated hay/feed store pits did exceed the USEPA Region IX Residential Soil Screening Level.

5.2.4. ACT EPA Contaminated Land Search

WSP completed a Contaminated Land Search and identified the following areas:

- Block 10 Molonglo Valley (Coppins Crossing Sludge Ponds).
  - Presence of several discussed sewage treatment ponds. WSP stated that there may be associated land contamination which may pose a risk to human health and environment.
- Block 15 Molonglo Valley.
  - Areas of environmental concern associated with rural activities may exist on the block (as part of Block 181). These may include fuel storage and dispensing facilities, waste disposal associated with municipal and chemical waste disposal, hazardous materials storage (eg. Pesticides/herbicides, lubricants etc.) and hazardous materials contained in building structures and fittings (eg. Asbestos, PCB's, lead etc).
- Block 16 – Molonglo Valley.
  - The block is not recorded on the Register of contaminated sites under section 21(A) of the Environment Protection Act 1997 but is noted on the EPA GIS database.
- There are two sheep dips and a cattle dip located on the block:
  - Spray sheep spray dip (identification codes SD117 and 80A) E 685914 N 6093621
  - Plunge sheep dip (identification codes SD118 and 80B) E 685890 N 6093607
  - Spray cattle dip (identification code: SD 152) E 685842 N 6093589
- WSP noted that the cattle spray dip was included in the records of Block 15 only. Also the dip coordinates in the records of Block 15 were confirmed to be more precise than those in the records for Block 16.
- 36 and 37 – Molonglo Valley.
  - The blocks were formerly occupied by a commercial Forestry Plantation (Radiata Pine) which was destroyed in the 2001 bushfires and partly again in the 2003 bushfires. Application of chemicals may have been undertaken in the area for the purpose of pest control.

5.2.5. Areas of Environmental Concern (AECs)

Following the review of previous reports, government records, historical aerial photographs, site walkover inspection and anecdotal interviews, WSP identified 29 specific AECs requiring further detailed assessment:

- AEC1 to AEC7: a total of seven dams were identified across the Study Area, which may be constructed with imported fill material. Dams may also act as 'sinks' for any applied localised chemicals.
- AEC8: Homestead with associated sheds and stockyards. The homestead may be associated with building materials such as asbestos and lead paint and there may be current or historic storage of small quantities of farming chemicals.
- AEC9: Some localised dumped rubbish in an excavated area.
- AEC10: Sludge Ponds located on Block 10 which received sludge from the former Weston Creek Sewerage Treatment Plant between 1970 and 1978.
- AEC11: Localised suspected asbestos containing materials (ACM) were identified in a small area (5m x 1m x 1m) near the Sludge Ponds (AEC10).
- AEC12: Excavation for burial of kangaroo carcasses from previous culling activities.
- AEC13: Hay shed with various stockpiles including steel barrels, tyres, wood, plastic.
- AEC14: Occupied homestead with associated diesel shed and stockyards.
- AEC15: localised soil staining around a 44 gal oil drum (within homestead of AEC14).
- AEC16: disused old shed and livestock holding yards.
- AEC17: Derelict plunge sheep dip, adjacent to disused shed (AEC16).
- AEC18: Derelict sheep dip spray.
- AEC19: Cattle spray dip
- AEC20: Abandoned car bodies in creek bed.
- AEC21: Scrap metal in multiple locations along the creek (barrels, steel, containers etc.).
- AEC22: Mounded soil with half buried 44 gal drum (potential for other buried material within the mound).
- AEC23: Former building structure as identified in 1968 aerial photograph (but no longer present).
- AEC24: Derelict concrete lined sewage overflow pond and related infrastructure, which was part of the former Weston Creek Sewage treatment Plant (Area B).
- AEC25: Former grease pits located just outside and up gradient of the Study Area (Area B), which were associated with former Sewage Treatment Farm.
- AEC26: Shed with corrugated steel roof and wooden columns.
- AEC27: Location of a former pioneer's house (exact location not known).
- AEC28: Rubbish dump area.
- AEC29: Pesticide use on the adjacent and topographically up gradient Arboretum.

In addition to the above specific AECs, WSP also identified 4 diffuse AECs, for which the exact location within the Study Area could not be determined:

- AEC30. Presence of artillery shells (as both Exploded Ordnance Waste (EOW) and Unexploded Ordnance (UXO). Potential occurrence throughout the Study Area, with the possible exception the most southern portion. Based on the interview with Mr Maurice Tully, an artillery range was present in the area until approximately 1923. Ammunition was fired westward from the Arboretum (Green Hills). Anecdotally when live shells (UXO) were found in the field, they were buried at 2 feet depth (below plough depth). The shells contained white phosphor that would no longer be reactive and a detonation charge that potentially remained active. Mr Tully had collected multiple empty shells as shown in Photo 1 Appendix F of WSP's report. Shells have been found as far as west of the Study Area, across Molonglo River and to the north west of the Study Area.

- AEC31. Herbicides and pesticides associated with agricultural land use, pine plantation operations and nature conservation. Anecdotal information from interviews indicated that historical spraying in both the pine plantations and the grazing lands was limited but regular spraying occurs in the river corridor and the grazing land. Based on information from ACT Forests, Coffey (2005) reported that herbicides containing triazine had been used in the former pine plantations in the larger Molonglo Valley development area. Based on the interview with Mr Darren Roso of Nature District, the following products had been used in the river corridor: 2.4D Amine, Dicamba, Roundup (glyfosate), Grazon (picloram, tryclopir) and Brushoff (metsulfuron-methyl).

- AEC32. Burial locations of kangaroo carcasses. During the site inspection one burial location was identified (AEC12). It is considered possible that multiple similar locations exist. Burial locations are likely to be located in the north west corner of the Study Area in the portion of 'lower angle slopes

underlain by Walker volcanics'. This geotechnical terrain has relatively deep soil to 4 metres (Coffey, 2005) and is the area where a burial location was identified during the field inspection by WSP.

- AEC33. Stockpiles and isolated occurrences of burnt timber, likely resulting from the 2001 and 2003 bushfires.

5.2.6. WSP Preliminary Soil Sampling

WSP completed a limited soil investigation as part of Phase 1 works, at five of the identified AECs. These included the sheep dips on Block 16 (AEC 17 and 18), the Coppins Crossing Sludge Ponds (AEC10), suspected ACM in AEC11, and the former pine plantation area (AEC31).

Shallow soil samples were collected to a maximum depth of 0.5m bgl with a hand auger. The analytical suite for the samples was targeted to the nature of the activities in each AEC.

The following soil results were reported:

- AEC17 and AEC18 – Sheep Dips. All OCP/OPP were below detection limit for 10 samples analysed. Metals were generally below site criteria, with the exception of two exceedances of arsenic.
- AEC10 – Coppins Crossing Sludge Ponds. TPH was detected in two of the Sludge Ponds, with one concentration exceeding the site criteria. Copper concentrations were above site criteria in all four Sludge Ponds. Lead and cadmium concentrations were also elevated and exceeded in one or more ponds.
- AEC11 – Suspected ACM. The analytical results confirmed the presence of chrysotile and amosite asbestos in the fragment.
- AEC31 – Former Pine Plantation Area. No exceedances were identified.

5.2.7. WSP Phase 1 Conclusions and Recommendations

Based on the work completed in the Phase 1 WSP considered the potential for broad-scale significant contamination across the Study Area was low. However there was the potential for contamination associated with former and current landuses as identified in the 33 AECs as listed above.

Based on the results of the Phase 1 ESA, WSP recommended that:

- Targeted sampling be conducted across the AECs identified and subsequent development of appropriate remedial action plan and/or management strategy if required;
- A hazardous material survey be conducted of various buildings, sheds and structures across the Study Area. Depending on the results, an asbestos management plan may be required;
- A protocol be developed to address unexpected findings during the later phases in the study area development.

5.3. WSP (2012) Sampling and Analysis Quality Plan (SAQP) for Phase 2 ESA

The WSP SAQP was prepared for 1028ha of the Molonglo Stage 3 Area. The document provides a (draft) sampling strategy to investigate the 33 AECs identified by WSP.

The DQOs and DQIs presented in Section 3 are appropriate for the objective of characterising contamination across the AECs identified, however given recent amendments to current guidelines these sections will require updating to comply with current requirements.

The methodology presented is brief and should be expanded to address acceptable investigation techniques for contaminants of concern and compliance with Schedule B2 of ACS NEPM (2013). This is particularly important when assessing asbestos (ACM, FA, AF) contamination.

Any updated SAQP should present methodologies for groundwater installation and sampling (if proposed) as well as methods for surface water and sediment collection.

5.4. Summary of Milsearch (May 2014) UXO Contamination Assessment Molonglo Development Stage 3

The UXO assessment was conducted across 265 ha of the 1400ha Molonglo Stage 3 FUA. Milsearch report that the survey area was bound by William Hovell Drive to the north, Kama Nature Reserve to the north east, Molonglo River to the south, Coppins Crossing Road to the east and a fence line to the west (which is the boundary of the current Molonglo 3 Audit Area).

Reportedly Milsearch completed a UXO survey and AECOM a Phase 2 site investigation of land between the southern survey boundary of the current Molonglo 3 area, to the northern banks of the Molonglo River. LDA has advised that this land has been previously Audited and is excluded from the current Audit area (refer to Drawing 01a attached).

Milsearch also reported that 11.1ha of land near William Hovell Drive (which had recently been reforested/rehabilitated) and the Australian Federal Police Training Ground (8.1 ha) (also known as sludge ponds) were exempt from the survey.

Milsearch state 'that the survey task was a planned single phase operation covering 10% of the site'. The survey method included the use of a Minelab F3 metal detector which is only suitable for completing a shallow search for a broad spectrum of metals. The investigation area was surveyed using 10m transects with 1m sweeps. During the completion of works, the survey area extended further east and west, but on a more relaxed transect interval of 20m separation.

Conclusions and recommendations of the survey were as follows:

- In Milsearch's opinion significant volumes of explosive ordnance waste (EOW) was encountered in the initial study area as well as land further eastward.
- The absence of finds south of Molonglo River (which comprises Molonglo Stage 2 FUA) strongly suggested that the artillery activities were confined to land north of Molonglo River.
- No items of UXO were discovered within the survey area; however an UXO is reported on the western boundary suggesting further contamination outside of the assessed land may be present.
- The area of impact has not been delineated to the east.
- It was recommended that a 100% geophysical UXO survey (and where necessary remediation) be conducted for Molonglo Stage 3. Further assessment is also required in land to the west which is under the control of ACT Parks and Conservation.
- Land excluded from the May 2014 survey should be assessed.
- Install appropriate warning signs and conduct appropriate training of staff/contractors/consultants who will be conducting works across Molonglo Stage 3.

The Auditor considers the recommendations to be appropriate given the potential 'contamination' risk associated with historical military training activities, and given the proposed urban development of the land. Anecdotal evidence indicates the potential burial of live shells at depths > two feet (below plough depth) (as reported by WSP 2012) which warrants further geophysical surveys using methods that can detect buried items.

5.5. Summary of Phase 1 Environmental Site Assessment (ESA) Areas A and B, Molonglo Valley Stage 3, ACT (Robson, 2014)

The Land Development Agency (LDA) engaged Robson Environmental Pty Ltd (Robson) to complete a Phase 1 for two parcels of land within Molonglo 3.

The Auditor notes that these two areas form part of the Study Area covered by WSP (i.e. part of 1028 ha). However it is noted that WSP's Phase 1 was limited to the land considered as 'developable'. For completeness

Areas A and B (both located within land dedicated as River corridor future use) were subsequently reviewed for potential contamination.

Areas A and B comprise the following Blocks:

- Area A – Parts of Blocks 10, 12, 45, 46 and 66 Molonglo Valley, and part of Block 8 Section 3 Denman Prospect;
- Area B – Parts of Blocks 71 and 75 Molonglo Valley.

Area A is located on, and north of, the Molonglo River, located to the west of Coppins Crossing. Area B is located on, and north of, the Molonglo River in the area between the residential estates of Coombs and North Weston, the Tuggeranong Parkway and the National Arboretum Canberra. The combined area of the two Areas is approximately 249.4 hectares (ha).

Based upon the review of the site history and a site walkover, Robson identified the following AECs (it is noted that some of these were identified by WSP in 2012):

Area A

- The decommissioned Coppins Crossing Sewage Treatment Works is located on Block 10. The facility includes four sewage settlement ponds and is currently used by the Australian Federal Police (AFP) for explosive detonation and training. ACM fragments were also observed. There are several concrete spill points on the western side of the facility which direct surface overflow from the site onto the adjacent Block 25;
- Robson report that all Blocks on Area A have previously been utilised as part of artillery fining range. Area A (as referred to Figure 7 in the report) is located down range of three target areas, and is within the maximum firing range. As such, Robson report that there is the potential for unexploded ordnance (UXO) and explosive ordnance waste (EOW) to be present as a result of ricochet and overshot from the former military firing ranges;
- The area was formerly part of commercial forestry plantations and may have been subjected to weed and pest control;
- There are at least four drains and associated feeder channels used to control surface water flow which receive runoff from up-gradient areas;
- A sewer easement traverses the area. Most of the pipe-work is subsurface however there is a sub aerial pipe spanning the lower portion of the Deep Creek gully. Other associated infrastructure includes vent pipes, and a control box with associated subsurface concrete pit.

Area B

- Several forests of the National Arboretum Canberra are present in the northeast portion of Area B. Chemicals may have been applied to these areas for the purposes of weed and pest control, and for horticultural activities;
- Most of Area B has previously been used for commercial forestry plantations, and the application of chemicals may have taken place for the purposes of weed and pest control;
- Numerous (estimated at 68) stockpiles of soil and mulch were observed;
- There is the potential for unexploded ordnance (UXO) and explosive ordnance waste (EOW) to be present as a result of ricochet and overshot from the former military firing ranges in the northern portions of Area B. Robson report that firing points were located just north of Area B (located 1-2km east of the northern portion, with targets located 1.5km to the northwest (as shown in Figure 7);
- Similar to Area A, a sewer easement traverses the area and the pipe-work is subsurface. Associated sub aerial infrastructure includes vent pipes, and two concrete driveway slabs (potentially used for deliveries, storage of goods, and industrial activities associated with the construction of the sewer);
- At least five drains and associated feeder channels, and a dam were observed. Robson report that drains and dams have the potential to be receptors of surface drainage from up gradient areas including run-off from agricultural and forestry land uses. Material may have been imported to construct the dam wall;

- A flat area containing potentially 24,000m3 of fill was observed near the mouth of a gully discharging in the Molonglo River (coordinates 686722 mE 6091423 mN referenced as AEC20). The material observed mostly comprised boulders of volcanic rock, likely to be material excavated during the installation of the subsurface sewer infrastructure, however there is the potential for imported material to be present within the fill.

Robson recommended that a DSI be completed to target the point source AECs and to provide a general screen of areas with diffuse AECs. Robson stated that an SAQP should be prepared prior to implementation of the DSI to ensure that the data collected during the additional assessment works is representative and provides a robust basis for site assessment decisions.

The report included an SAQP for each AEC identified within Areas A and B. In the absence of a conceptual site model (CSM), the Auditor is unable to effectively assess the appropriateness of the proposed SAQP for Areas A and B.

It is recommended that:

- A concise CSM is formulated based on the existing site information;
- An assessment of the relative risk for each AEC be conducted. This may result in more rigorous sampling in high risk AECs, with a relaxed and targeted sampling regime proposed for low risk AECs;
- For the analytical suite proposed consider the persistency for each likely contaminant and if it could be reasonably expected with the AEC (for example OPPs degrade relatively quickly).
- Review of AECs against proposed future land use;
- Consider and comment on the necessity and practicality of the scope of the proposed environmental assessment works and whether the project objectives can be achieved with a refined and targeted SAQP (refer to Schedule B2 ASC NEPM (2013) for guidance).

5.6. Summary of Phase 1 Environmental Site Assessment (ESA) Area C, Molonglo Valley Stage 3, ACT (Robson, 2014)

LDA engaged Robson to undertake a Phase 1 for a parcel of land within the Molonglo Stage 3. The parcel of land is referred to as Area C and comprises 24 Blocks of registered land (whole and parts of Blocks), plus the roads and adjacent verges in the vicinity of the intersections of William Hovell Drive, Coppins Crossing Road and Bindubi Street, in the Molonglo Valley.

Area C is approximately 400 hectares (ha), of which part of the site falls within the area investigated by WSP (2012).

Based upon the review of the site history and a site walkover, Robson identified the following AECs:

- Most of the site has previously and is currently used for rural purposes. AECs associated with rural activities identified were as follows:
  - ‘Numerous’ AECs associated with the ‘Glenloch’ property including a plunge sheep dip, homestead and cottage, shearing shed, garages, sheds and other storage areas, septic tanks, former orchard area, livestock loading ramp made of compacted soil, carcass burial pits, and stockpiles of fencing wire, posts and tyres;
  - A hayshed, area of former pioneers homestead, and potential fill for surfacing at a horse dressage paddock;
  - At least twenty seven (27) small earth farm dams are present on the site. Dams have the potential to be receptors of surface drainage from up gradient areas including run-off from agricultural land, nearby roads (particularly William Hovell Drive, Coppins Crossing Road, Bindubi Street and Caswell Drive) and other potential AECs (for example, plunge sheep dip);
- Portions of the site have been or are currently used for horticultural and / or forestry purposes including the following:
  - The Cook Community Garden and a plantation of shrubs on the northern portion of the site;

- A part of Forest 35 of the National Arboretum Canberra is present in the southern extent of the southern portion of the site;
- Parts of Blocks 7, 34 and 70 Molonglo Valley, all within the southern portion of the site, were previously occupied by commercial forestry plantations of Radiata pine;

- A small area of dumped rubbish on road verges including the southeast corner of the intersection of Coppins Crossing Road and William Hovell Drive;
- Two (2) former potential quarries / fill areas in the northeast portion of the site, in an area now occupied by a part of the Aranda Bushland Nature Reserve;
- The blocks to the south of William Hovell Drive (west and southern portions of the site) have previously been used as part of an artillery firing range by the Department of Defence (circa 1914 and 1920 / 1921). Two (2) gun firing points were potentially located in the east of the southern portion of the site. Though the target for the range was off-site (to the south of the west portion of the site) it is considered that there is the potential for unexploded ordnance (UXO) and explosive ordnance waste (EOW) to be present elsewhere on the site, particularly to the south of William Hovell Drive, as a result of ricochet, overshot or undershot;
- Significant quantities of fill material appear to have been used for the construction of William Hovell Drive, and possibly also on portions of Bindubi Street and Caswell Drive. The fill material may be contaminated as the source of the material is not known.

In addition to the above, Robson considered that there is the potential for off-site sources of contamination to impact the site, particularly off-site chemical application on the adjacent forests of the National Arboretum Canberra and the nearby commercial forestry plantations. Robson assessed that the migration of contaminants onto the site may have occurred via wind drift of sprays, surface run-off and blown dust. Robson recommended a DSI be completed for the land.

The report included an SAQP for each AEC identified within Area C. In the absence of a conceptual site model (CSM), the Auditor is unable to effectively assess the appropriateness of the proposed SAQP for Area C.

It is recommended that:

- A concise CSM is formulated based on the existing site information;
- An assessment of the relative risk for each AEC be conducted. This may result in more rigorous sampling in high risk AECs, with a relaxed and targeted sampling regime proposed for low risk AECs;
- For the analytical suite proposed consider the persistency for each likely contaminant and if it could be reasonably expected with the AEC (for example OPPs degrade relatively quickly).
- Review of AECs against proposed future land use;
- Consider and comment on the necessity and practicality of the scope of the proposed works and whether the project objectives can be achieved with a refined and targeted SAQP (refer to Schedule B2 ASC NEPM (2013) for guidance).

6. KEY CONSIDERATIONS FOR AN UPDATED SAQP

The key objective of the pending detailed Phase 2 environmental site assessment is to determine the nature and extent of any potential contamination for AECs identified by WSP and Robson for the overall Study Area.

The scope of work for the Phase 2 must be sufficiently robust so that an appropriate Remedial Action Plan (RAP) and/or Environmental Management Plan (EMP) can be prepared to render to site suitable for the proposed land use. It is anticipated that following the completion of the Phase 2 estimates of volumes of material requiring remediation or management will be calculated and presented in the report.

Based on the Auditor's review of available information, the following should be considered by the appointed Environmental Assessor in preparing a Phase 2 SAQP prior to the commencement of onsite intrusive works. The updated SAQP should cover the entire land that falls within the area being Audited (see Drawing 01a attached) and should be endorsed by the Auditor prior to commencing works:

i. The Assessor should liaise with the Client and UXO specialist to consider recommendations (as outlined in section 5.4 of this advice) for clearances prior to the completion of intrusive Phase 2 works as well as to assist with the identification of any UXO/EOW impact. Any proposed geophysical survey should achieve the appropriate penetration depth to detect the size of likely buried objects.

ii. Prior to intrusive works commencing the Assessor should also ensure that they have considered any Heritage items and/or ecologically sensitivity communities that may be present in the investigation areas by reviewing any available studies that may have been completed for the land;

iii. The SAQP should provide a discussion on the CSM (see Auditor comments in sections 5.5 and 5.6)

iv. The SAQP needs to be prepared in accordance with the ACT EPA endorsed Guidelines, including information to be provided on DQOs, DQIs, rationale behind sample numbers, analytical suite and sampling densities. A detailed methodology should be presented for sampling various media and which are appropriate for contaminants of potential concern.

v. An unexpected finds protocol should also be included in the SAQP detailing how such finds will be recorded, communicated and, if necessary, sampled.

vi. A figure should be included in the SAQP which presents all Block descriptors. It is also recommended that for each AEC, the Assessor notates the plan indicating sample locations.

vii. Historical aerials should be reviewed with the purpose of identifying any historical dams or excavations which may no longer exist, which indicate backfilling;

viii. The SAQP should include targeted sampling of selected dams where anthropogenic material is observed, as well as any former (filled) dams identified from the review of aerial photographs.

ix. All available existing environmental data should be assessed against the current ACT EPA endorsed guidelines (in particular ASC NEPM (2013)) which will assist in understanding areas that are known to exceed land use criteria and that may require further delineation.

x. Groundwater wells should form part of the investigation. In particular groundwater contamination potentially arising from registered sheep dip site needs to be considered. The Assessor should make their own enquiries as to whether other sheep dip sites occur within or adjoining the study area, and then amend the SAQP appropriately.

xi. Consideration should also be given to assessing water (and sediment) quality in Molonglo River and any other significant surface water bodies present within Molonglo Stage 3 area.

xii. Test pitting and trenching is preferred approach for assessing shallow filled areas, however boreholes should be drilled for well installation or to investigate thick fill material.

xiii. Sampling densities sufficient to delineate extent of burial grounds and sludge ponds;

xiv. Ensuring that all media is sampled including surface waters and groundwater, as appropriate, in target AECs where contaminants may be mobile or transported across the study area or beyond boundaries;

xv. Consideration for biological contaminants (or indicators) in AECs including the sludge ponds, and animal carcasses in various environmental media;

xvi. Consideration for waste classification for materials/spoil requiring removal from the study area, which will assist RAP development;

xvii. Review of proposed methodology to ensure compliance with sampling procedures outlined in ACT EPA endorsed guidelines including as amended, ASC NEPM (2013) (and including WA (2009) asbestos assessment guidelines).

xviii. The SAQP prepared is to incorporate currently endorsed criteria for soils, groundwater, surface water, and asbestos as required.

xix. It is recommended that the Assessor conduct a thorough site walkover to confirm access and sampling locations (in consultation with the Auditor).

xx. It is noted in Area C (Robson 2014) that "Sampling of likely VENM embankment is not proposed". The Auditor seeks clarification on what is meant by the VENM embankment. All material, including any historically imported material, will need to be shown as suitable for the proposed end land use.

7. CONCLUSION

The information contained in this Interim Advice should be considered by the appointed Environment Assessor in refining and proposing an updated Sampling and Analysis Quality Plan for Molonglo Stage 3 Study Area. Any amended SAQP should be provided to the Auditor for endorsement prior to Phase 2 works commencing.

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

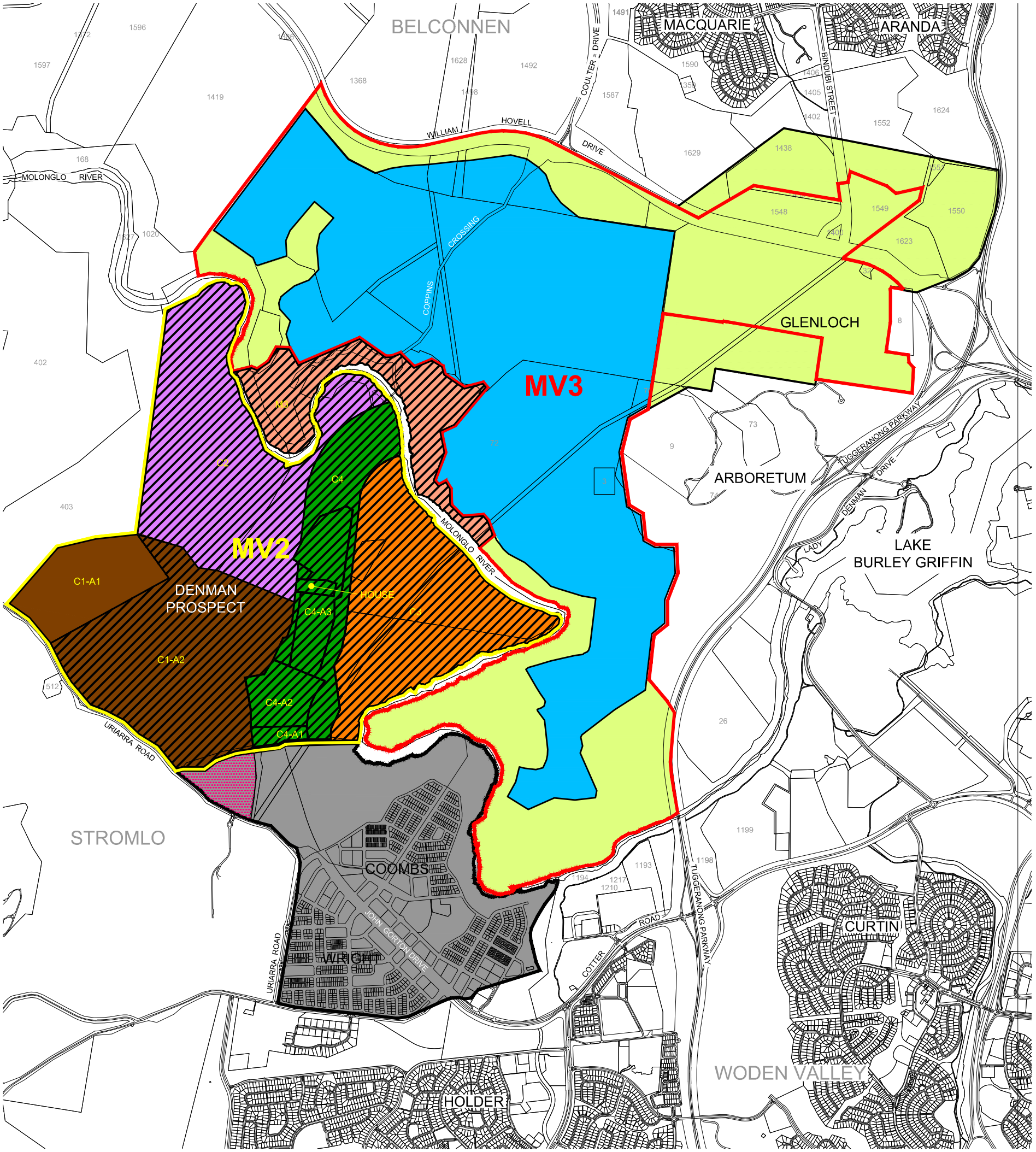
We trust that the Interim Advice outlined herein meets your immediate requirements. However, should you have any queries or wish to discuss any points in greater detail please do not hesitate to contact the undersigned.

Yours sincerely,

Rebeka Hall
NSW EPA Accredited Site Auditor (0802)

Diana Turner
Senior Audit Assistant

Attachment: Drawing 01a – Molonglo Stage 3 Audit Area



LEGEND

- MOLONGLO 2 STUDY AREA BOUNDARY
- MOLONGLO 3 STUDY AREA BOUNDARY
- AECOM MV2-C1 EXTENT (ENVIRON)
- ROBSON PHASE 1 (ZOIC)
- COOMBS/WRIGHT STUDY AREA
- AECOM MV2-C2 EXTENT (ENVIRON)
- WSP PHASE 1 SIGNED OFF (ZOIC)
- AURECON PHASE 1
- AECOM MV2-C3 EXTENT (ENVIRON)
- AECOM PHASE 2 COMPLETE
- AUDITED
- AECOM MV2-C4 EXTENT (ENVIRON)

REVISIONS			
No.	Drawn by	Checked by	Date

SCALE/NORTHPOINT

N

0 250 500 750 1000 1250

1:30000@A3 1:15000@A1

DIRECTORATE/DEPARTMENT

ACT Government | Land Development Agency CANBERRA FIRST

PROJECT

MOLONGLO 3

DRAWING TITLE

MOLONGLO VALLEY
CONTAMINATION STAGE PLAN
Phase 2 Audit Area

PROJECT NUMBER	DRAWING NUMBER	AMENDMENT
P00192C	01a	

DATE ISSUED: 23/05/2014 Plot Time/Date: Friday, 20 June 2014 2:47:17 PM

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20 November 2014

Mr Steven Gianakis
Strategic Planning
Environment and Sustainable Development Directorate
ACT Government
GPO Box 1908
Canberra ACT 2601

Via Email: Steven.Gianakis@act.gov.au
cc. Kerry.Browning@act.gov.au

Dear Mr Gianakis,

Site Auditor Interim Advice No.4 - Review of Draft Sampling, Analysis and Quality Plan (SAQP) (WSP, 2014) for Area A, Molonglo Valley Stage 3 Land release

1. INTRODUCTION

The ACT Government Environment and Sustainable Development Directorate (ESDD) Land and Infrastructure Group has appointed Rebeka Hall as the Site Auditor for Molonglo Valley Stage 3 (MV3) Future Urban Area Contaminated Site Investigation project.

The Molonglo Stage 3 Future Urban Area (the Site) has predominantly been used for rural residential and grazing (northern portion) and forestry (southern portion). Much of the site area has been cleared of trees and there are numerous dams scattered across the study area. The proposed land use is a mixture of urban residential and urban open space including recreational and nature reserve along the Molonglo River corridor.

The study area has been divided into two investigation areas and are referred to as follows (see attached figure):

- Area A (southern portion) occupying an area of 465 Ha;
- Area B (northern portion) occupying an area of 680 Ha

The Auditor understands that the MV3 Phase 2 Environmental Site Assessment (ESA) will be investigated in two stages. The ESAs should aim to better define areas that may require remediation and to obtain sufficient data on site characterisation.

2. CURRENT INTERIM AUDIT ADVICE

In preparing this Interim Advice (IA) for MV3, the Auditor has conducted a review of the following document:

- WSP Environment & Energy (11 November 2014) DRAFT Molonglo Valley Stage 3 (Area A) Sampling, Analysis and Quality Plan (SAQP) (Ref SAQP MV3 Area A-00039275)

Reference is made to Site Auditor IA No.1 (23 July 2014) which outlined gaps in the currently available site information and items which were to be considered by the Assessor in developing the Phase 2 SAQP.

This advice solely relates to the proposed investigation works on MV3 Area A.

3. SUMMARY OF KEY INFORMATION FOR MV3 AREA A

The 'Area A' study area was a former pine plantation that was destroyed in the 2001 and 2003 bushfires. WSP reported the following specific features across Area A:

- Several dams;
- Former commercial forestry plantations of Radiata pine and regrowth forestry;
- Dirt tracks traversing the area for forestry access;
- Several stockpiling areas for mulch;
- Drainage lines that typically drain from west to east towards the Molonglo River; and
- Several corridors for high voltage power lines and trunk sewer line which run across the Study Area.

WSP report that the surrounding land uses are predominantly agricultural grazing land, nature reserves, Canberra National Arboretum and construction sites for residential developments (Molonglo Valley Stages 1 and 2) across Molonglo River to the south.

4. KEY CONSIDERATIONS FOR THE UPDATED SAQP

The scope of work for the Phase 2 must be sufficiently robust so that an appropriate Remedial Action Plan (RAP) and/or Environmental Management Plan (EMP) can be prepared to render to site suitable for the proposed land use. It is anticipated that following the completion of the Phase 2 estimates of volumes of material requiring remediation or management will be calculated and presented in the report.

Based on the review of works proposed in the SAQP (WSP November 2014), the Auditor provides the following comments:

1. Please confirm the total area for MV3 and for investigation Areas A and B.
2. The Auditor notes section 7.2 of the SAQP details the concurrent surveys and investigation works proposed for the site between November 2014 and February 2015. These works include geotechnical and UXO surveys. It is noted that these investigations are reportedly wholly within Area B. The Auditor considers that in the absence of a detailed UXO survey for Area A, although the likelihood is low, consideration should still be given within the SAQP and UFP for location clearance confirmation in relation to UXO or EXO.
3. The Auditor notes that no groundwater wells are proposed for Area A. It is noted that should contamination be identified during the Area B investigation, additional wells may be required within Area A to delineate any identified impact. If during investigation, impact in a perched zone is identified, WSP should consider whether a groundwater well is required.
4. As per point (3) above, WSP discuss that potential impact from sheep dip sites along the north western boundary of Area A would likely discharge into the drainage line, and further into Molonglo River. Previous Auditor comments stated that consideration should be given to assessing water (and sediment) quality in Molonglo River and any other significant surface water bodies present within Molonglo Stage 3 area. Please include an allowance for this to be completed as part of the Phase 2 scope.
5. In previous Auditor correspondence, it was recommended that the Assessor conduct a thorough site walkover to confirm access and sampling locations. The Auditor notes that limited access was available at the time of the site inspection completed by Zoic and WSP (on 15 October 2014). Sufficient allowance should be made in the Phase 2 schedule for access to required sampling locations, as well as for the possibility of unexpected finds. Given the lapse in time since the previous Phase 1 investigations (WSP and Robson), WSP should ensure areas not intrusively investigated are confirmed as low risk by conducting walkovers.
6. It was additionally noted during the 15 October 2014 site walkover that significant areas of blackberry management are occurring on the site. Information regarding the processes being

conducted and potential impact for the proposed end land use of the site should be considered as part of the Phase 2 assessment and reporting.

7. The Auditor provides the following comments for inclusion on Table B1:
    a. relevant Figure 2 grid reference;
    b. reference to proposed test pit number/s;
    c. sample ratio being achieved for each area / proposed land use;
8. The Auditor provides the following comments regarding Figure 2:
    d. Inclusion of unnecessary grid references outside of Area A (including D1, H1 and I1).
    e. TP05 and TP77 appear to be located directly beneath overhead power lines.

5. CONCLUSION

The Auditor considers that providing the above information is adopted, the SAQP provides adequate guidance for the proposed Phase 2 works for 'Area A'.

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

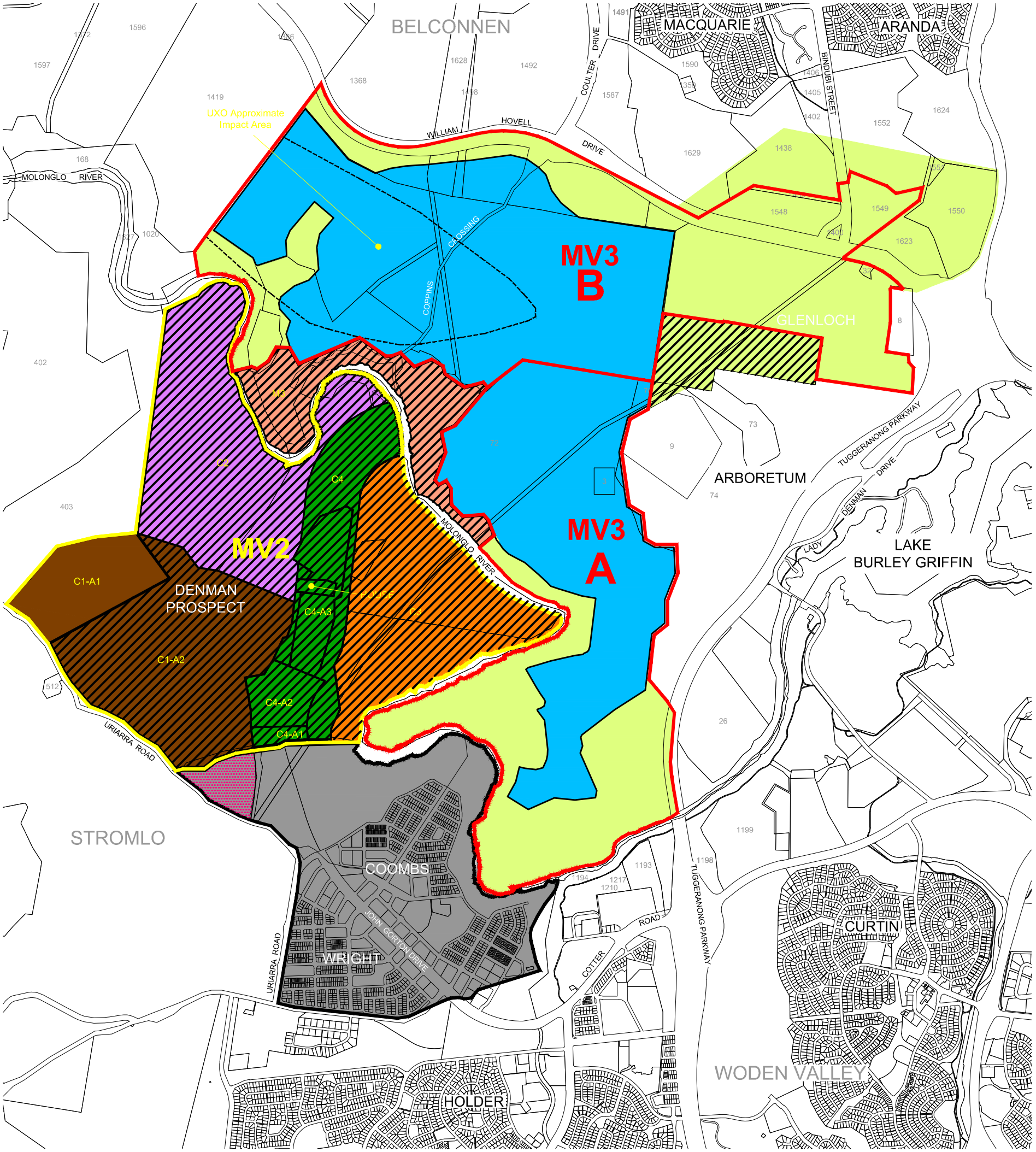
We trust that the Interim Advice outlined herein meets your immediate requirements. However, should you have any queries or wish to discuss any points in greater detail please do not hesitate to contact the undersigned.

Yours sincerely,

Rebeka Hall
NSW EPA Accredited Site Auditor (0802)

Diana Turner
Senior Audit Assistant

Attachment: Figure of MV3 A and MV3 B (LDA, 2014)



LEGEND

- MOLONGLO 2 STUDY AREA BOUNDARY
- MOLONGLO 3 STUDY AREA BOUNDARY
- AECOM MV2-C1 EXTENT (ENVIRON)
- ROBSON START PHASE 1 (ZOIC)
- COOMBS/WRIGHT STUDY AREA
- AECOM MV2-C2 EXTENT (ENVIRON)
- WSP PHASE 1 SIGNED OFF (ZOIC)
- AURECON PHASE 1
- AECOM MV2-C3 EXTENT (ENVIRON)
- AECOM PHASE 1 COMPLETE, PHASE 2 UNDERWAY
- AUDITED
- AECOM MV2-C4 EXTENT (ENVIRON)
- UXO Approximate Impact

REVISIONS			
No.	DRAWN BY	CHECKED BY	DATE

SCALE

N

0 250 500 750 1000 1250

1:30000@A3 1:15000@A1

DIRECTORATE/DEPARTMENT

ACT Government Economic Development

Land Development Agency CANBERRA FIRST

PROJECT

MOLONGLO 3

DRAWING TITLE

MOLONGLO VALLEY
CONTAMINATION STAGE PLAN

PROJECT NUMBER	DRAWING NUMBER	DATE ISSUED	AMENDMENT
P00192C	01	23/05/2014	

G:\LDA\5. LRP g-z\Molonglo 3\9. Maps and Figures\FIGURES\P00192 MV Contamination Stage Plan\P00192D.dwg

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12080L06_IntAdv06

16 July 2015

Mr Steven Gianakis
Strategic Planning
Environment and Sustainable Development Directorate
ACT Government
GPO Box 1908
Canberra ACT 2601

Via Email: Steven.Gianakis@act.gov.au
cc. Kerry.Browning@act.gov.au

Dear Mr Gianakis,

Site Auditor Interim Advice No.6 - Review of Draft Report for Molonglo Valley Stage 3 (Area A) Stage 2 Detailed Site Investigation (WSP, June 2015)

1. INTRODUCTION

The ACT Government Environment and Sustainable Development Directorate (ESDD) Land and Infrastructure Group has appointed Rebeka Hall as the Site Auditor for Molonglo Valley Stage 3 (MV3) Future Urban Area Contaminated Site Investigation project.

The Molonglo Stage 3 Future Urban Area (the Site) has predominantly been used for rural residential and grazing (northern portion) and forestry (southern portion). Much of the site area has been cleared of trees and there are numerous dams scattered across the study area. The proposed land use is a mixture of urban residential and urban open space including recreational and nature reserve along the Molonglo River corridor.

The study area for MV3 has been divided into two investigation areas and are referred to as follows (see attached Figure 1):

- Area A (southern portion) occupying an area of 465 Ha;
- Area B (northern portion) occupying an area of 680 Ha.

2. CURRENT INTERIM AUDIT ADVICE

In November 2014, the Site Auditor issued Interim Advice (IA) (no.4) providing comment on the Consultant's Sampling, Analysis and Quality Plan (SAQP) for the detailed investigation of Area A.

Field investigations have been completed and this IA provides Auditor feedback following the review of the investigation report:

- WSP Environmental Pty Ltd (24 June 2015) DRAFT Molonglo Valley Stage 3 (Area A) Stage 2 Detailed Site Investigation (Ref 00039275_Molonglo_Area_A_DSI_Draft)

This advice solely relates to the investigation findings for MV3 Area A.

3. SUMMARY OF SCOPE OF WORK COMPLETED

The 'Area A' study area was a former pine plantation that was destroyed in the 2001 and 2003 bushfires. WSP reported the following features in Area A were targeted with the current investigation:

- Several dams;
- Former commercial forestry plantations of Radiata pine and regrowth forestry;
- Dirt tracks traversing the area for forestry access;
- Several stockpiling areas for mulch;
- Drainage lines that typically drain from west to east towards the Molonglo River; and
- Several corridors for high voltage power lines and trunk sewer line which run across the Study Area.

The scope of work completed by WSP can be summarised as follows:

- Site investigation works were on 8, 9 and 10 December 2014 and 20 and 21 January 2015.
- Thirty two (32) sample points (TP01 – TP09, TP44 – TP49 and TP82 – TP98) and two sediment samples (SS01 and SS02) were collected using hand tools (in December 2014). The sampling locations were generally in accordance with the SAQP (WSP, December 2014) with minor changes due to access restrictions (such as fencing) and where a more representative location was considered appropriate after the detailed Site walkover;
- Twenty seven (27) test pits (TP18 and TP19, TP50 – TP71 and TP77 - TP81) were completed using a backhoe in locations that required deeper assessment of fill material. This was typically concentrated in the central western portion of the Site, near the Molonglo River channel; and
- Collection of surface water samples (SW01 – SW05) at five (5) locations across the Site.

4. SUMMARY OF KEY INVESTIGATION FINDINGS

A summary of the key investigation findings and the contamination status of Area A is as follows:

- The test pits encountered variable subsurface conditions generally associated with the undulating Site topography. Soils were typically characterised as gravelly and sandy clays, with a covering of topsoil and shallow weathered, low strength bedrock (dactite).
- Fill material was encountered in TP01 – TP03 (stockpiled soil), TP44 – TP61 (stockpiled soil and filled ground), and TP82 (dam sediment). The largest volume of fill material was encountered at ROBA_AEC20 at the mouth of a gully. No odorous materials, saturated rock or soil, or signs of gross contamination were observed with the exception of buried construction debris and waste at ROBA_AEC20.
- No obvious signs of fibre cement sheeting or ACM were noted to occur and several bulk soil samples were collected for asbestos analysis. No detection of asbestos reported.
- Reworked natural soils were identified typically in dam and earthen embankments (i.e. ROBA_AEC21 at TP66 – TP71) and dam walls. The reworked natural soils did not include anthropogenic or building debris and were considered to be made up of natural site-sourced soils.
- One test pit location, undertaken by Douglas Partners geotechnical assessment in November 2014 (TP123), identified an asbestos pipe at 1.3m depth. No asbestos containing materials (bonded fibre cement fragments or similar) were observed during the Site works in any of the test pits or surface sampling locations with the exception of the piping identified.
- No groundwater or saturated layers were observed at any sampling locations including deeper test pits to a maximum depth of 3.0m below ground level.
- Concentrations for all analytes (Heavy Metals 8, TRH, BTEX, PAHs, Phenols, PCBs, OCPs, OPPs, Herbicides and asbestos) were below the laboratory Limits of reporting (LORs) and / or the respective

adopted Site criteria for the protection of human health under a residential landuse scenario. Heavy metals were detected above the LOR although below the adopted Site criteria.

- There were three (3) soil samples with minor exceedance of the ecological investigation levels (EILs) (for zinc and nickel) and were related to filling at ROBA_AEC20. Surface vegetation (grasses) and large trees within the ROBA_AEC20 area appeared to be in relatively good health with no obvious signs of distress.
- No bonded or friable asbestos was detected in bulk samples (500g) and during sieving of the 10L samples for the twelve (12) samples analysed. No asbestos fines (AF) or fibrous asbestos (FA) were identified above the laboratory detection limit in any of the samples analysed. No exceedances of adopted criteria for asbestos were reported.
- WSP reported that the soils across the Site did not have any noticeable odours except for organic odours in several drainage lines (such as TP78 and TP79 sampling locations). Fill materials identified at ROBA_AEC20, WSPA_AEC22 and the in situ asbestos pipe at TP123 (Douglas Partners, 2015) are not considered suitable to remain on the Site within any future residential land uses.
- WSP stated that all asbestos materials such as underground pipes and services would need to be excavated and disposed off-site to a licensed waste disposal facility. Additionally any buried former sewer construction wastes, at ROBA_AEC20, will not be suitable for any land use scenario due to the metals, plastics and concrete contained within the fill for aesthetic reasons.

5. AUDITOR COMMENTS

The Auditor considers that the scope of work completed was in general accordance with the endorsed SAQP, and where it was deviated, appropriate justification was provided by WSP.

The Auditor understands that the following actions are recommended by WSP, to be addressed during the proposed future development works, to ensure any unexpected finds are managed according to best environmental practice:

- *Carry out 'Soil Management' for the areas identified with anthropogenic wastes from an aesthetic contamination perspective.*
- *Tracing and removal of asbestos containing materials such as in situ piping and potential other utility services installed across the Site.*
- *Ensuring that any earthworks is carried out under the provision of an 'Unexpected Findings' protocol that identifies any potential soil or water contamination during development. This may also require the need for a 'watching brief' to be undertaken during bulk earthworks to ensure any minor contamination issues are identified and dealt with by suitably qualified and experienced environmental consultants.*

To assist WSP in finalising the Stage 2 report for MV3 Area A, the following comments should be addressed and the report appropriately updated:

- Based on information provided in the report, the Auditor is unclear how the above recommended actions are to be enforced during future development works. The preparation of a site specific Construction Environment Management Plan, including guidance on the management of the identified areas of concern should be incorporated as an Appendix to the Stage 2 report. The CEMP should be issued under separate cover to the Auditor for review prior to inclusion in the final Stage 2 report.
- The Auditor notes the following, and considers that these items should be incorporated into the CEMP prepared for the site or further discussion provided in the Stage 2 report:
    i. TP01, TP02, TP03 are located within the vicinity of WSPA_AEC22 (stockpile soil with empty metal drum). The three test pits excavated in this location did not penetrate the fill material, and no discussion on the potential contents of the drum were provided.
    ii. The Auditor notes that TP58 was located within the vicinity of ROBA_AEC20 (large volume of construction waste filling including pneumatic pump device). TP58 extended to 1.5m into fill, with three samples collected, however the fill at this location was not penetrated.

iii. It is noted that at locations TP01, TP02, TP03, TP44, TP45, TP46, TP47, TP48, TP49, TP82, TP84 – all reported shallow excavations into fill (approx. 0.3m bgl). The fill was not penetrated at any of these locations.

iv. TP50, TP51, TP54, TP58 – deep fill (1.5 – 2.7m). Fill not penetrated at these locations.

v. TP56 reported a concentration of zinc exceeding the EIL (0.0-0.1m). The Auditor notes that fill at this location extended to 1.9m bgl. A natural sample was collected at 2.0-2.2m, however this sample does not appear to have been analysed.

vi. The Douglas Partners TP123 identified an asbestos pipe at 1.3m depth. An appropriate identification and unexpected finds protocol for services at should be incorporated into the CEMP.

6. AUDITOR CONCLUSIONS

The Auditor concurs with WSP's conclusion that a remedial action plan (RAP) is not required for MV3 Area A, however a Construction Environment Management Plan (including an unexpected finds protocol) should be prepared to manage areas of anthropogenic waste and any additional fill during the construction phase.

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

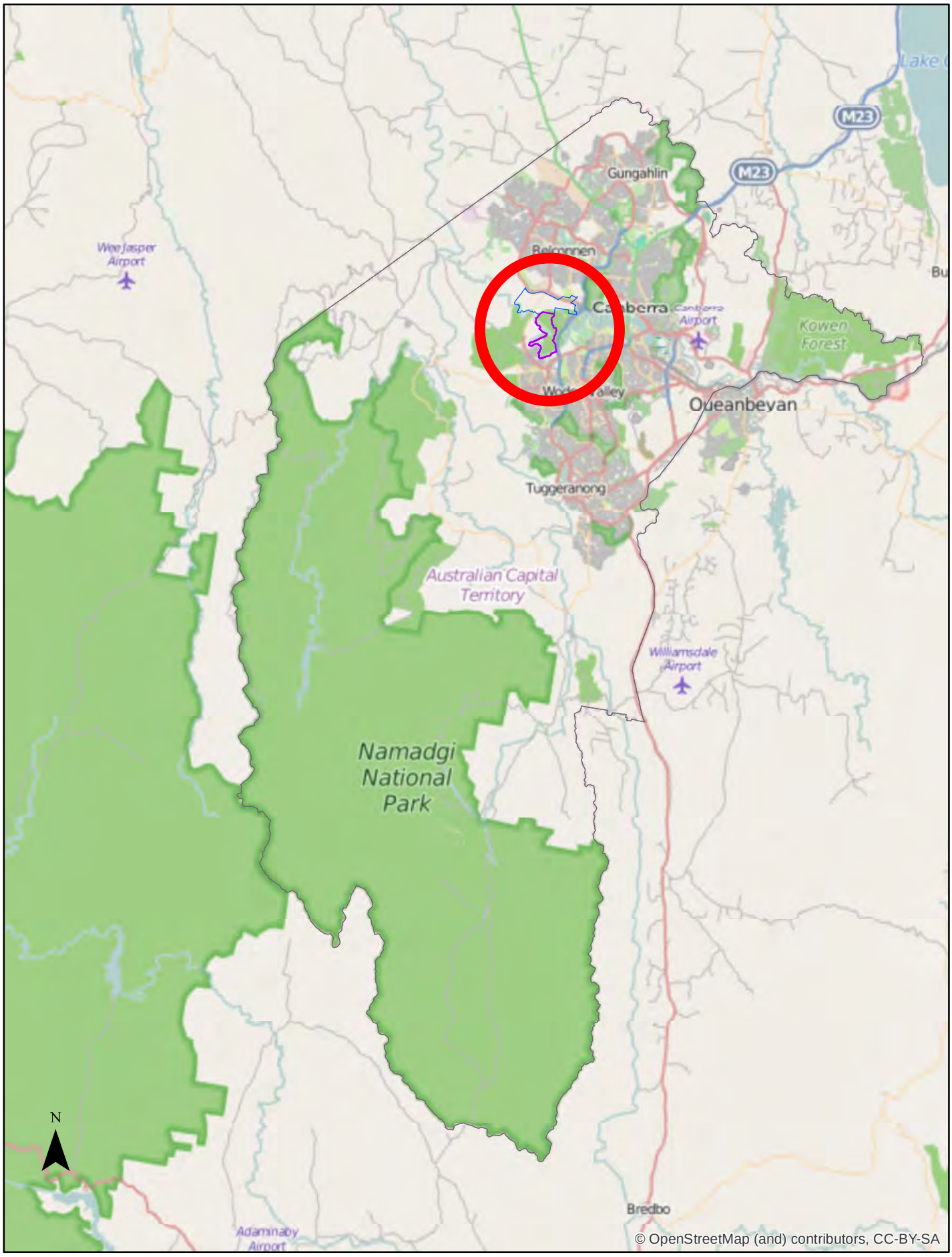
We trust that the Interim Advice outlined herein meets your immediate requirements. However, should you have any queries or wish to discuss any points in greater detail please do not hesitate to contact the undersigned.

Yours sincerely,

Rebeka Hall
NSW EPA Accredited Site Auditor (0802)

Diana Turner
Senior Audit Assistant

Attachment: Figure of MV3 A – Figure 1



10 5 0 10 Kilometers

Molonglo Valley Area A

Molonglo Valley Area B

ACT Boundary

FIGURE 1 - Site Location

00039275 Phase 2 Detailed Site Investigation (Contamination) Molonglo Valley Stage 3

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12080L08_IntAdv08

16 June 2016

Mr Steven Gianakis
Strategic Planning
Environment and Sustainable Development Directorate
ACT Government
GPO Box 1908
Canberra ACT 2601

Via Email: Steven.Gianakis@act.gov.au
cc. Kerry.Browning@act.gov.au
blake.dickson@wspgroup.com

Dear Mr Gianakis,

Site Auditor Interim Advice No.8- Review of Draft Contamination – Environmental Management Plan (CEMP)

1. INTRODUCTION

The ACT Government Environment and Sustainable Development Directorate (ESDD) Land and Infrastructure Group has appointed Rebeka Hall as the Site Auditor for Molonglo Valley Stage 3 (MV3) Future Urban Area Contaminated Site Investigation project.

The Molonglo Stage 3 Future Urban Area (the Site) has predominantly been used for rural residential and grazing (northern portion) and forestry (southern portion). Much of the site area has been cleared of trees and there are numerous dams scattered across the study area. The proposed land use is a mixture of urban residential and urban open space including recreational and nature reserve along the Molonglo River corridor.

The study area for MV3 has been divided into two investigation areas and are referred to as follows:

- Area A (southern portion) occupying an area of 465 Ha;
- Area B (northern portion) occupying an area of 680 Ha.

The appointed environmental consultant, WSP Environmental Pty Ltd, completed a Stage 2 Detailed Site Investigation of Area A (final report issued 22 April 2016) and Area B (final report issued 18 May 2015). The objective of the Stage 2 works was to assess the suitability of the forestry, rural and grazing land for the Molonglo Stage 3 Future Urban Area. The proposed future mixed use redevelopment is to include residential, core commercial and transport, open space, recreational and nature reserves.

Based on the WSP investigation no contamination was identified in Area A and isolated areas of contamination were identified in Area B. In summary, Area A was reported to have several areas of filling (with anthropogenic inclusions potentially posing aesthetic issues) and some in situ asbestos piping (water transfer piping). Area B was reported to have areas of filling and two (2) areas were identified as requiring soil remediation (AEC10: Former Sludge Ponds and AEC18: Livestock Plunge Dip) due to elevated heavy metals (such as arsenic) and petroleum hydrocarbons.

2. CURRENT INTERIM AUDIT ADVICE

Following the review of the Stage 2 reports (findings documented in Interim Advices No. 6 and 7), the Auditor considered that a Construction Environment Management Plan (CEMP) (with an Unexpected Finds Protocol) be prepared to manage areas of anthropogenic fill identified, contamination associated with localised surface staining, and any additional fill that may be encountered during the construction phase.

The Auditor also concurred with WSP's conclusion that a remedial action plan (RAP) was required to manage contamination identified in Area B namely AEC18 (livestock plunge dip), AEC10 (sludge ponds), as well as localised TRH impacts.

This IA provides Auditor feedback following the review of the following report:

- WSP Environmental Pty Ltd (22 April 2016) DRAFT Contamination – Environmental Management Plan (CEMP): Molonglo Valley Stage 3 (Area A and Area B) (Ref 00039275_WSP_MV3_Stage 3_CEMP_DRAFT)

3. AUDITOR COMMENTS

The outcome of the Audit process, based on the current site characterisation information and discussions with LDA, is the preparation of a:

- Section A Site Audit Statement for Area A confirming it is suitable for the proposed used noting that a CEMP is required to address aesthetics associated with anthropogenic fill material, and the remaining in ground asbestos piping (as well as any unexpected finds during site preparatory and bulk earth works; and
- Section B Site Audit Statement for Area B confirming that the site has been satisfactorily investigation and the site can be made suitable with the implementation of a Remedial Action Plan.

Given the above, the Auditor has the following comments on the current CEMP (WSP, April 2016) which is considered relevant for Area A only:

Table 4.1: Review of WSP (2016) draft CEMP

Requirement	WSP Report	Auditor Comment
What is the nature and location of the contamination on site?	**Area A** Based on the Stage 2 DSI Area A is generally reported to be suitable for the proposed mixture of future urban residential and urban open space with the exception of the following areas that require management: 1. An in situ asbestos pipe identified at TP123 (Douglas Partners, 2015); 2. Fill materials identified at ROBA_AEC20, WSPA_AEC22 containing aesthetic inclusions of construction waste including rusted reo bar, broken concrete, plastics, rope and electrical wiring and hoses; and 3. Redundant underground pipes and services across the Site.	The Auditor agrees with WSP on the areas that require further management or remediation. The Auditor considers that the 'Construction' EMP (CEMP) should be a standalone document to be appended to the SAS for Area A.
	Area B Based on the Stage 2 DSI Area B is generally reported to be suitable for the proposed mixture of future urban residential and urban open space with the exception of the following areas that require management or remediation: 1. Livestock plunge dip (WSP_AEC18) and WSP_AEC10 (former Sludge Ponds); 2. Redundant underground pipes and services across the Site that contain asbestos; 3. Segregation of anthropogenic wastes within fill identified at the following locations: - WSP_AEC7 (farm dam): B-TP014, brick fragments and glass. - WSP_AEC8 (farmhouse): B-TP017, B-TP019 and B-TP020 pieces of plastic, likely incineration, rusted metals.	Given that Area B requires a RAP, aspects of environmental management are required to be incorporated into a RAP as per the EPA reporting guidelines. In preparing the RAP for Area B, WSP should outline the requirements to address areas excluded from the Milsearch UXO survey notably fence lines and the farmhouse/fill area. The RAP should also consider the intended future use for AEC10 sludge ponds (currently managed by TAMS) which may comprise open space, but which may be remediated separately to the greater Area B site and potentially by another party. The RAP should outline any requirements if a cap and contain strategy is adopted and the requirement for a long term EMP.

Requirement	WSP Report	Auditor Comment
	- WSP_AEC10 (sludge ponds): Test pits undertaken within the AEC. - WSP_AEC12 (kangaroo burial pit): Test pits undertaken within the AEC. - WSP_AEC18 (livestock plunge dip): B-TP094, fragments of brick. - RobA_AEC5 (AFP training area): Test pits undertaken within the AEC. - UFP1 (former sewer construction vehicle maintenance depot): B-TP300 to B-TP321.	
What are the objectives of the CEMP?	The CEMP outlines measures required to manage potential contamination impacts identified (and unexpected finds) in subsurface materials within MV3, in a manner which protects human health/ the environment for the proposed future land uses.	As outlined above the document should be termed a Construction EMP since no chemical 'contamination' was identified in Area A. The document is to address aesthetic issues, redundant infrastructure and potential UF.
How are the contaminants going to be managed?	The CEMP states the following: • Carry out segregation or offsite disposal of waste for the areas identified with anthropogenic wastes from an aesthetic contamination perspective; • Tracing and removal of any asbestos containing materials such as potential in situ piping and potential other redundant utility services installed across the Site; and • Ensure that any earthworks is carried out under the provision of an 'Unexpected Findings' protocol that identifies any potential soil or water contamination during future development of the Site. This may also require the need for a 'watching brief' to be undertaken during bulk earthworks to ensure any minor contamination issues are identified and dealt with by suitably qualified and experienced environmental consultants.	This is considered acceptable for Area A.
Who is responsible for the implementation of the CEMP?	CEMP has listed LDA as the entity responsible for the CEMP and its implementation prior to any development works occurring. The responsibilities may be delegated where appropriate but this must be done in writing and notified to all affected parties.	The stated responsibilities are noted that these may be assigned to contractors who are engaged to implement the CEMP during site preparation and bulk earthworks.
Over what timeframe will the CEMP be implemented?	The CEMP is for implementation during the construction and earthworks at the site associated with the redevelopment of MV3.	Acceptable, noting that once the works are completed a CEMP will no longer be required.
Is the CEMP capable of being made legally enforceable?		No discussion included regarding the enforceability of the CEMP. The Auditor notes that the CEMP will be appended to the SAS for Area A. WSP are requested to provide a discussion on how measures in the CEMP will be implemented.
How will this CEMP be publically notified?		No discussion. WSP are requested to provide comment.
How is off site migration of contamination being managed?	Potential environmental impacts during construction have been identified, with relevant management procedures listed in section 8.	Appropriate noting that contamination migration potential in Area A is considered to be negligible given the site characterisation data.
Does the remaining contamination affect groundwater quality?	Groundwater is not expected to be intercepted as a part of site works.	WSP should have stated that soil and groundwater contamination was not identified on Area A.
How will the integrity of the cap be maintained in the long term?	Not applicable for the site to which the CEMP applies	

Requirement	WSP Report	Auditor Comment
Is there any risk to human health in structures overlying the cap?	Not applicable for the site to which the CEMP applies	
Is the CEMP a standalone document?	Included as an Appendix in the DSI	Required to be a standalone report to be appended to the SAS for Area A.

4. AUDITOR CONCLUSIONS

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

We look forward to receiving the revised CEMP for Area A addressing the comments above, and a copy of the draft RAP for Area B. In the interim, should you have any queries or wish to discuss any points in greater detail please do not hesitate to contact the undersigned.

Yours sincerely,

Rebeka Hall
NSW EPA Accredited Site Auditor (0802)

Diana Turner
Senior Audit Assistant

Our ref: 00039275_WSP_Response_ZOIC_MV3_AreaA Interim Adv 6

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22 April 2016

Kerry Browning | Snr Project Manager
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By Email Only

Via Email To: kerry.browning@act.gov.au

CC: rebeka.hall@zoic.com.au; diana.turner@zoic.com.au

Dear Kerry

WSP | Parsons Brinckerhoff Response to Site Auditor (ZOIC Environmental Pty Ltd) Interim Advice No.6 - Review of Draft Report for Molonglo Valley Stage 3 (Area A) Stage 2 Detailed Site Investigation (WSP, June 2015)

1. Introduction

WSP Environmental Pty Ltd (now trading as WSP | Parsons Brinckerhoff (WSP I PB)) has been commissioned by the Land Development Agency to undertake Detailed Site Investigations (DSI) within the Molonglo Valley 3 (MV3) – Area A (southern) future urban area. ZOIC (Site Auditor – Rebeka Hall) has been commissioned by the ACT Government Environment and Sustainable Development Directorate (ESDD) Land and Infrastructure Group to review and provide comment on the report.

The auditors comments solely relate to the investigation findings for MV3 Area A and WSP Environmental Pty Ltd (24 June 2015) *DRAFT Molonglo Valley Stage 3 (Area A) Stage 2 Detailed Site Investigation* (Ref 00039275_Molonglo_Area_A_DSI_Draft). A separate DSI report was prepared for MV3 – Area B.

Section 2 of this report provides WSP | PB responses to the Site Auditor interim advice. It should be noted that responses to this advice (No. 6) were delayed until the Auditor comments to the MV3 - Area B (northern) report were received in February 2016 to ensure consistency in reporting for the entire MV3 future urban area.

2. Response to Auditor Comments

No.	Auditor Comment (Interim Advice No. 6)	WSP Response
1	▪ The Auditor considers that the scope of work completed was in general accordance with the endorsed SAQP, and where it was deviated, appropriate justification was provided by WSP. The Auditor understands that the following actions are recommended by WSP, to be addressed during the proposed future development works, to ensure any unexpected finds are managed according to best environmental practice: - Carry out 'Soil Management' for the areas identified with anthropogenic wastes from an aesthetic contamination perspective. - Tracing and removal of asbestos containing materials such as in situ piping and potential other utility services installed across the Site. - Ensuring that any earthworks is carried out under the provision of an 'Unexpected Findings' protocol that identifies any potential soil or water contamination during development. This may also require the need for a 'watching brief' to be undertaken during bulk earthworks to ensure any minor contamination issues are identified and dealt with by suitably qualified and experienced environmental consultants.	▪ Noted.

No.	Auditor Comment (Interim Advice No. 6)	WSP Response
2	To assist WSP in finalising the Stage 2 report for MV3 Area A, the following comments should be addressed and the report appropriately updated: ▪ Based on information provided in the report, the Auditor is unclear how the above recommended actions are to be enforced during future development works. The preparation of a site specific Construction Environment Management Plan, including guidance on the management of the identified areas of concern should be incorporated as an Appendix to the Stage 2 report. The CEMP should be issued under separate cover to the Auditor for review prior to inclusion in the final Stage 2 report.	▪ WSP has prepared a Contamination – CEMP document (refer to **Appendix H**) for auditor review and comment that outlines the actions to be implemented. The finalised CEMP will then be included in the final DSI report for MV3 – Area A.
3	▪ The Auditor notes the following, and considers that these items should be incorporated into the CEMP prepared for the site or further discussion provided in the Stage 2 report: ▪ i. TP01, TP02, TP03 are located within the vicinity of WSPA_AEC22 (stockpile soil with empty metal drum). The three test pits excavated in this location did not penetrate the fill material, and no discussion on the potential contents of the drum were provided.	▪ Although the soil logs for TP01, TP02, and TP03 nominate the soils as a 'fill', based on photographs of the AEC it appears to be a reworked natural soil with partially exposed oil drum. The exposed drum was described as '*empty*' and the origin was likely to be from '*contractors working in the pine forest leaving the materials'* as stated in the WSP, *Phase 1 ESA*, report dated September 2012. It is considered low risk, and not likely to be a more extensive tip or landfill area based on observations during fieldworks. The AEC will be addressed in the future development within the CEMP document.
4	▪ ii. The Auditor notes that TP58 was located within the vicinity of ROBA_AEC20 (large volume of construction waste filling including pneumatic pump device). TP58 extended to 1.5m into fill, with three samples collected, however the fill at this location was not penetrated.	▪ ROBA_AEC20 contained a large volume of cobble sized fill (natural rock), likely from sewer line blasting in the mid 1970's. Due to this, several test pits collapsed during excavation and penetrating fill depths could not be achieved due to safety concerns and instability. TP58 in particular encountered very large concrete members that traversed the test pit laterally and could not be removed by the backhoe after repeated attempts. WSP is confident, based on the other 11 test pits and local topography that fill at this location does not extend materially past the annotation shown in Figure 8a, Appendix A of the report.
5	▪ iii. It is noted that at locations TP01, TP02, TP03, TP44, TP45, TP46, TP47, TP48, TP49, TP82, TP84 – all reported shallow excavations into fill (approx. 0.3m bgl). The fill was not penetrated at any of these locations.	▪ Detailed review of the bore logs indicates that many of the shallow hand auger locations encountered what is considered to be 'reworked natural soils' with no landfill type inclusions. These include dam embankments (TP82) and cleared areas in the pine forest (TP46 and TP47). It is considered, based on deeper soil investigations across the entire Area A, that these shallow sample points are similar to soil profiles across Area A consisting of a reworked natural soil profile followed by *in situ* natural soils and extremely weathered igneous rock at depth.

No.	Auditor Comment (Interim Advice No. 6)	WSP Response
6	▪ iv. TP50, TP51, TP54, TP58 – deep fill (1.5 – 2.7m). Fill not penetrated at these locations.	▪ As above, ROBA_AEC20 encountered deep and loose rock cobbles that precluded deeper excavations on occasion due to safety and instability. WSP is confident based on the other test pits and local topography that fill at this location does not extend materially past the annotation shown in Figure 8a, Appendix A of the report.
7	▪ v. TP56 reported a concentration of zinc exceeding the EIL (0.0-0.1m). The Auditor notes that fill at this location extended to 1.9m bgl. A natural sample was collected at 2.0-2.2m, however this sample does not appear to have been analysed.	▪ The elevated Zinc concentration was slightly above the adopted EIL criteria (273 mg/kg with criterion of 280 mg/kg). Vegetation in the immediate area appeared healthy including both grasses and larger gum trees. The slight exceedance is not considered significant and ROBA_AEC20 is considered to have been suitably characterised for heavy metals concentrations. In addition if a 95% UCL calculation for the entire dataset was undertaken it would make this result insignificant against the EIL criterion.
8	▪ vi. The Douglas Partners TP123 identified an asbestos pipe at 1.3m depth. An appropriate identification and unexpected finds protocol for services should be incorporated into the CEMP.	▪ Noted. The CEMP will contain a UFP and discussion on the identification of services that may contain hazardous materials such as fibre cement containing asbestos.

Please do not hesitate to contact the undersigned should you have any queries.

Blake Dickson
Senior Environmental Scientist

Peter Moore
Principal Engineer

Attached:

Attachment A: *ZOIC Environmental Pty Ltd, July 2015. Interim Advice No.6 - Review of Draft Report for Molonglo Valley Stage 3 (Area A) Stage 2 Detailed Site Investigation.*

Attachment A:

ZOIC Environmental Pty Ltd, July 2015. Interim Advice No.6 - Review of Draft Report for Molonglo Valley Stage 3 (Area A) Stage 2 Detailed Site Investigation.

ZOIC Environmental Pty Ltd
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www.zoic.com.au
ABN 23 154 745 525

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16 July 2015

Mr Steven Gianakis
Strategic Planning
Environment and Sustainable Development Directorate
ACT Government
GPO Box 1908
Canberra ACT 2601

Via Email: Steven.Gianakis@act.gov.au
cc. Kerry.Browning@act.gov.au

Dear Mr Gianakis,

Site Auditor Interim Advice No.6 - Review of Draft Report for Molonglo Valley Stage 3 (Area A) Stage 2 Detailed Site Investigation (WSP, June 2015)

1. INTRODUCTION

The ACT Government Environment and Sustainable Development Directorate (ESDD) Land and Infrastructure Group has appointed Rebeka Hall as the Site Auditor for Molonglo Valley Stage 3 (MV3) Future Urban Area Contaminated Site Investigation project.

The Molonglo Stage 3 Future Urban Area (the Site) has predominantly been used for rural residential and grazing (northern portion) and forestry (southern portion). Much of the site area has been cleared of trees and there are numerous dams scattered across the study area. The proposed land use is a mixture of urban residential and urban open space including recreational and nature reserve along the Molonglo River corridor.

The study area for MV3 has been divided into two investigation areas and are referred to as follows (see attached Figure 1):

- Area A (southern portion) occupying an area of 465 Ha;
- Area B (northern portion) occupying an area of 680 Ha.

2. CURRENT INTERIM AUDIT ADVICE

In November 2014, the Site Auditor issued Interim Advice (IA) (no.4) providing comment on the Consultant's Sampling, Analysis and Quality Plan (SAQP) for the detailed investigation of Area A.

Field investigations have been completed and this IA provides Auditor feedback following the review of the investigation report:

- WSP Environmental Pty Ltd (24 June 2015) DRAFT Molonglo Valley Stage 3 (Area A) Stage 2 Detailed Site Investigation (Ref 00039275_Molonglo_Area_A_DSI_Draft)

This advice solely relates to the investigation findings for MV3 Area A.

3. SUMMARY OF SCOPE OF WORK COMPLETED

The 'Area A' study area was a former pine plantation that was destroyed in the 2001 and 2003 bushfires. WSP reported the following features in Area A were targeted with the current investigation:

- Several dams;
- Former commercial forestry plantations of Radiata pine and regrowth forestry;
- Dirt tracks traversing the area for forestry access;
- Several stockpiling areas for mulch;
- Drainage lines that typically drain from west to east towards the Molonglo River; and
- Several corridors for high voltage power lines and trunk sewer line which run across the Study Area.

The scope of work completed by WSP can be summarised as follows:

- Site investigation works were on 8, 9 and 10 December 2014 and 20 and 21 January 2015.
- Thirty two (32) sample points (TP01 – TP09, TP44 – TP49 and TP82 – TP98) and two sediment samples (SS01 and SS02) were collected using hand tools (in December 2014). The sampling locations were generally in accordance with the SAQP (WSP, December 2014) with minor changes due to access restrictions (such as fencing) and where a more representative location was considered appropriate after the detailed Site walkover;
- Twenty seven (27) test pits (TP18 and TP19, TP50 – TP71 and TP77 - TP81) were completed using a backhoe in locations that required deeper assessment of fill material. This was typically concentrated in the central western portion of the Site, near the Molonglo River channel; and
- Collection of surface water samples (SW01 – SW05) at five (5) locations across the Site.

4. SUMMARY OF KEY INVESTIGATION FINDINGS

A summary of the key investigation findings and the contamination status of Area A is as follows:

- The test pits encountered variable subsurface conditions generally associated with the undulating Site topography. Soils were typically characterised as gravelly and sandy clays, with a covering of topsoil and shallow weathered, low strength bedrock (dactite).
- Fill material was encountered in TP01 – TP03 (stockpiled soil), TP44 – TP61 (stockpiled soil and filled ground), and TP82 (dam sediment). The largest volume of fill material was encountered at ROBA_AEC20 at the mouth of a gully. No odorous materials, saturated rock or soil, or signs of gross contamination were observed with the exception of buried construction debris and waste at ROBA_AEC20.
- No obvious signs of fibre cement sheeting or ACM were noted to occur and several bulk soil samples were collected for asbestos analysis. No detection of asbestos reported.
- Reworked natural soils were identified typically in dam and earthen embankments (i.e. ROBA_AEC21 at TP66 – TP71) and dam walls. The reworked natural soils did not include anthropogenic or building debris and were considered to be made up of natural site-sourced soils.
- One test pit location, undertaken by Douglas Partners geotechnical assessment in November 2014 (TP123), identified an asbestos pipe at 1.3m depth. No asbestos containing materials (bonded fibre cement fragments or similar) were observed during the Site works in any of the test pits or surface sampling locations with the exception of the piping identified.
- No groundwater or saturated layers were observed at any sampling locations including deeper test pits to a maximum depth of 3.0m below ground level.
- Concentrations for all analytes (Heavy Metals 8, TRH, BTEX, PAHs, Phenols, PCBs, OCPs, OPPs, Herbicides and asbestos) were below the laboratory Limits of reporting (LORs) and / or the respective

adopted Site criteria for the protection of human health under a residential landuse scenario. Heavy metals were detected above the LOR although below the adopted Site criteria.

- There were three (3) soil samples with minor exceedance of the ecological investigation levels (EILs) (for zinc and nickel) and were related to filling at ROBA_AEC20. Surface vegetation (grasses) and large trees within the ROBA_AEC20 area appeared to be in relatively good health with no obvious signs of distress.
- No bonded or friable asbestos was detected in bulk samples (500g) and during sieving of the 10L samples for the twelve (12) samples analysed. No asbestos fines (AF) or fibrous asbestos (FA) were identified above the laboratory detection limit in any of the samples analysed. No exceedances of adopted criteria for asbestos were reported.
- WSP reported that the soils across the Site did not have any noticeable odours except for organic odours in several drainage lines (such as TP78 and TP79 sampling locations). Fill materials identified at ROBA_AEC20, WSPA_AEC22 and the in situ asbestos pipe at TP123 (Douglas Partners, 2015) are not considered suitable to remain on the Site within any future residential land uses.
- WSP stated that all asbestos materials such as underground pipes and services would need to be excavated and disposed off-site to a licensed waste disposal facility. Additionally any buried former sewer construction wastes, at ROBA_AEC20, will not be suitable for any land use scenario due to the metals, plastics and concrete contained within the fill for aesthetic reasons.

5. AUDITOR COMMENTS

The Auditor considers that the scope of work completed was in general accordance with the endorsed SAQP, and where it was deviated, appropriate justification was provided by WSP.

The Auditor understands that the following actions are recommended by WSP, to be addressed during the proposed future development works, to ensure any unexpected finds are managed according to best environmental practice:

- *Carry out 'Soil Management' for the areas identified with anthropogenic wastes from an aesthetic contamination perspective.*
- *Tracing and removal of asbestos containing materials such as in situ piping and potential other utility services installed across the Site.*
- *Ensuring that any earthworks is carried out under the provision of an 'Unexpected Findings' protocol that identifies any potential soil or water contamination during development. This may also require the need for a 'watching brief' to be undertaken during bulk earthworks to ensure any minor contamination issues are identified and dealt with by suitably qualified and experienced environmental consultants.*

To assist WSP in finalising the Stage 2 report for MV3 Area A, the following comments should be addressed and the report appropriately updated:

- Based on information provided in the report, the Auditor is unclear how the above recommended actions are to be enforced during future development works. The preparation of a site specific Construction Environment Management Plan, including guidance on the management of the identified areas of concern should be incorporated as an Appendix to the Stage 2 report. The CEMP should be issued under separate cover to the Auditor for review prior to inclusion in the final Stage 2 report.
- The Auditor notes the following, and considers that these items should be incorporated into the CEMP prepared for the site or further discussion provided in the Stage 2 report:
    i. TP01, TP02, TP03 are located within the vicinity of WSPA_AEC22 (stockpile soil with empty metal drum). The three test pits excavated in this location did not penetrate the fill material, and no discussion on the potential contents of the drum were provided.
    ii. The Auditor notes that TP58 was located within the vicinity of ROBA_AEC20 (large volume of construction waste filling including pneumatic pump device). TP58 extended to 1.5m into fill, with three samples collected, however the fill at this location was not penetrated.

iii. It is noted that at locations TP01, TP02, TP03, TP44, TP45, TP46, TP47, TP48, TP49, TP82, TP84 – all reported shallow excavations into fill (approx. 0.3m bgl). The fill was not penetrated at any of these locations.

iv. TP50, TP51, TP54, TP58 – deep fill (1.5 – 2.7m). Fill not penetrated at these locations.

v. TP56 reported a concentration of zinc exceeding the EIL (0.0-0.1m). The Auditor notes that fill at this location extended to 1.9m bgl. A natural sample was collected at 2.0-2.2m, however this sample does not appear to have been analysed.

vi. The Douglas Partners TP123 identified an asbestos pipe at 1.3m depth. An appropriate identification and unexpected finds protocol for services at should be incorporated into the CEMP.

6. AUDITOR CONCLUSIONS

The Auditor concurs with WSP's conclusion that a remedial action plan (RAP) is not required for MV3 Area A, however a Construction Environment Management Plan (including an unexpected finds protocol) should be prepared to manage areas of anthropogenic waste and any additional fill during the construction phase.

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

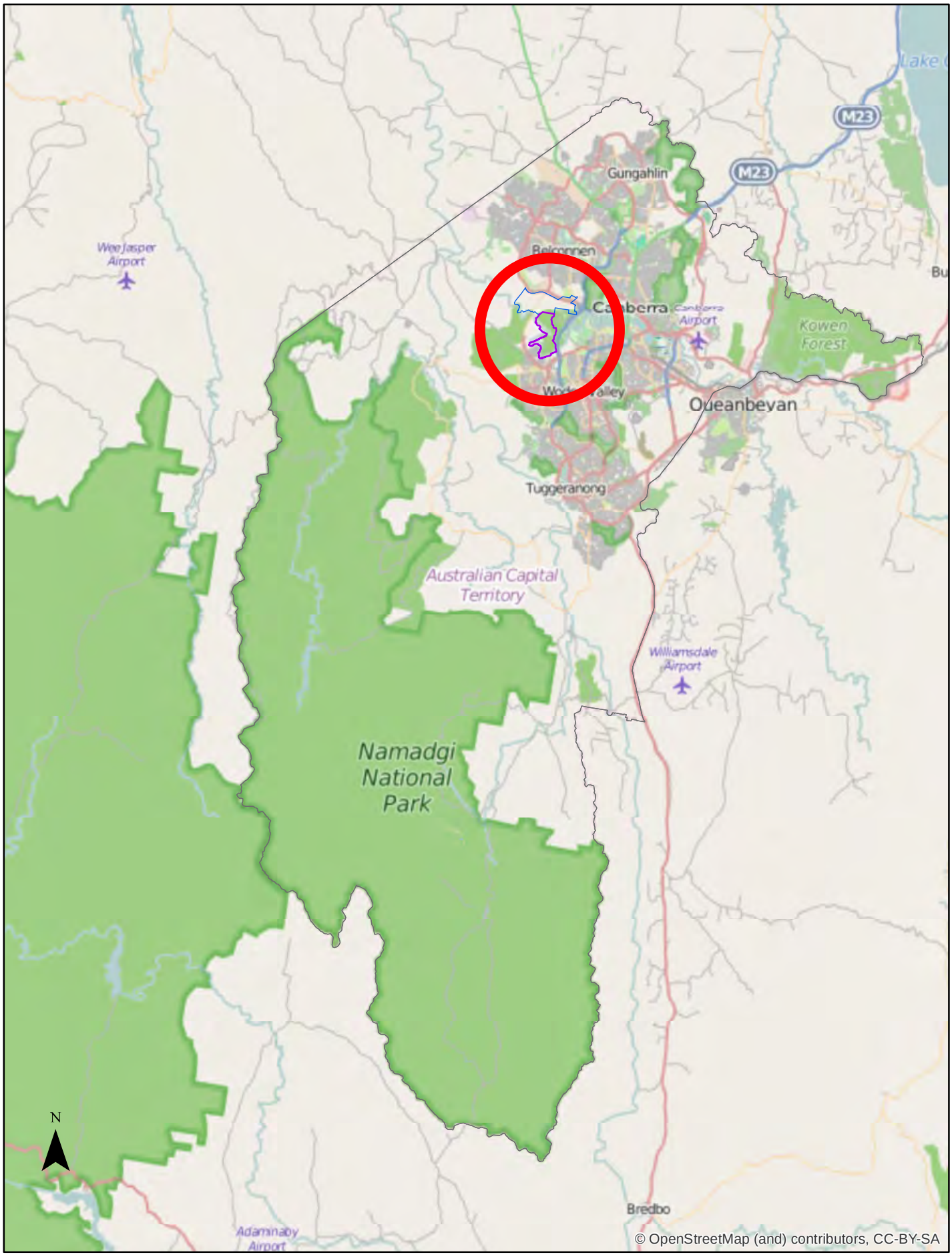
We trust that the Interim Advice outlined herein meets your immediate requirements. However, should you have any queries or wish to discuss any points in greater detail please do not hesitate to contact the undersigned.

Yours sincerely,

Rebeka Hall
NSW EPA Accredited Site Auditor (0802)

Diana Turner
Senior Audit Assistant

Attachment: Figure of MV3 A – Figure 1



10 5 0 10 Kilometers

Molonglo Valley Area A

Molonglo Valley Area B

ACT Boundary

FIGURE 1 - Site Location

00039275 Phase 2 Detailed Site Investigation (Contamination) Molonglo Valley Stage 3

Appendix C Result Summary Tables

Table B1
Pre Start SAQP (December 2014)

Molonglo Valley Stage 3
(Area A)

AEC	Approx. Area (m^2) or m^3 if noted	Indicative Future Proposed Landuse^	Test Pit IDs	Appendix A, Figure 6 Grid Reference	Approx. Sampling Points / AEC Ratio	Block ID	Phase 2 DSI Sampling			Contaminants of Potential Concern (CoPC)														Soil Parameters			Water Physical Parameters		
							Media	Number of Locations	Samples Analysed	Heavy metals	TCLP/ASLP	OCPs	OPPs	Triazine Herb's	TRH	PAH	Silica Clean-up	BTEX	PCB, phenols	Nutrients	Faecal coliforms	Asbestos	pH	% Clay	CEC	pH	Electrical Conductivity	Dissolved Oxygen
WSPA_AEC6	250	Urban Development	TP98	F3	1:250m^2	71	Dam sediment	1	1	1	-	1	1	1	1	1	-	-	-	1	-	-	-	-	-	-	-	-
	-	Urban Development	-	F3	-	71	Water	1	1	1	-	1	1	1	1	1	-	-	-	1	-	-	-	-	-	1	1	1
WSPA_AEC22	30	Urban Development	TP01 - TP03	G2	1:10m^2	71	Soil	3	3	3	1	-	-	-	3	3	-	3	-	-	-	1	1	-	-	-	-	-
WSPA_AEC29	2.5 km along boundary	Urban Development	TP04 - TP09	A3, B3, C3, D3, E3, F3	1:400m	70, 71, 34, 74	Soil	6	6	-	1	6	6	-	-	-	-	-	-	-	-	-	3	1	1	-	-	-
ROBA_AEC13, 14	12,500	Open Space	TP10 - TP17	F3	1:1,562m^2	71	Soil	8	8	8	1	8	8	8	-	-	-	-	-	-	-	-	2	1	1	-	-	-
	15,500	Open Space	TP20 - TP29	F3	1:1,500m^2	71	Soil	10	10	10	1	10	10	10	-	-	-	-	-	-	-	-	2	1	1	-	-	-
ROBA_AEC15	16,500	Open Space	TP32 - TP41	F3, G3	1:1,650m^2	71	Soil	10	10	10	1	10	10	10	2	-	-	-	-	-	-	-	2	1	1	-	-	-
ROBA_AEC16, 17, 18	12 m^3	Open Space	TP44	H3	1:12m^3	71	Soil	1	1	1	-	1	1	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-
	9 m^3	Open Space	TP45	H3	1:9m^3	71	Soil	1	1	1	-	1	1	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-
	110 m^3	Open Space	TP46 - TP49	G3	1:27m^2	71	Soil	4	4	4	-	4	4	4	-	-	-	-	-	-	-	-	1	-	-	-	-	-
ROBA_AEC20	6,000	Open Space	TP50 - TP61	E2, E3	1:300m^2	71	Soil	12	20	20	2	20	20	20	20	20	-	20	20	-	-	6	12	4	4	-	-	-
ROBA_AEC21	400 and 1,300	Open Space	TP62 - TP65	E3	1:100m^2	71	Soil	4	4	4	1	4	4	4	-	-	-	-	-	-	-	-	1	-	-	-	-	-
		Open Space	-	E3	n/a	71	Water	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1
		Open Space	TP66 - TP71	E3	1:130m^2	71	Soil	6	10	10	1	10	10	10	10	10	-	10	10	-	-	10	6	1	1	-	-	-
ROBA_AEC22, 23	50 (each)	Open Space	TP18	D2	0:50m^2	71	Soil	0	Ob's Only	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Open Space	TP19	D2	0:50m^2	71	Soil	0	Ob's Only	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ROBA_AEC24, 25, 26, 27, 28	10 (each)	Open Space	TP77	E3	1:10m^2	71	Soil	1	1	1	-	1	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
		Open Space	TP78	D2	1:10m^2	71	Soil	1	1	1	1	1	1	1	-	-	-	-	-	1	-	-	1	-	-	-	-	-
		Open Space	TP79	D2	1:10m^2	71	Soil	1	1	1	-	1	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
		Open Space	TP80	D2	1:10m^2	71	Soil	1	1	1	1	1	1	1	-	-	-	-	-	1	-	-	1	-	-	-	-	-
		Open Space	TP81	D2	1:10m^2	71	Soil	1	1	1	-	1	1	1	-	-	-	-	-	1	-	-	1	-	-	-	-	-
	-	Open Space	-	D2, E3	n/a	71	Water	5	5	5	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	5	5	5
WSPA_AEC31	Whole Site	Urban Development and Open Space	TP84 - TP93	B2, A2, F2, D2, E2, F1, H2, I3.	n/a	All Blocks	Soil	10	10	10	1	10	10	5	-	-	-	-	-	-	-	-	4	1	1	-	-	-
WSPA_AEC33	225 Hectares	Urban Development and Open Space	TP94 - TP97	B2, E3, F3, G2	n/a	All Blocks	Soil	4	4	4	1	-	-	-	4	4	-	-	-	-	-	-	2	1	1	-	-	-
WSPA_AEC50	700	Urban Development	TP82	A3	1:700m^2	71	Dam sediment	1	1	1	-	1	1	1	1	1	-	-	-	1	-	-	-	-	-	1	1	1
WSPA_AEC51	600	Urban Development	TP83	D3	1:600m^2	71	Dam sediment	1	1	1	-	1	1	1	1	1	-	-	-	1	-	-	-	-	-	1	1	1
Molonglo River Water	-	Open Space	SW01, SW02	D2, H3	n/a	-	Water	2	2	2	-	2	2	-	2	2	-	2	-	2	-	-	-	-	-	2	2	2
Molonglo River Sediment	-	Open Space	SS01, SS02	D2, H3	n/a	-	River Sediment	2	2	2	-	2	2	2	2	2	-	2	2	2	2	-	2	-	-	-	-	-
							Soil TOTAL:	**89**	**101**	**95**	**13**	**94**	**94**	**81**	**44**	**42**	**0**	**35**	**32**	**8**	**2**	**17**	**45**	**11**	**11**	**-**	**-**	**-**
							Water TOTAL:	**9**	**9**	**9**	**0**	**3**	**3**	**1**	**3**	**3**	**0**	**2**	**0**	**8**	**0**	**0**	**0**	**0**	**0**	**9**	**9**	**9**
							Soil QA/QC Intralab duplicates:	-	-	5	-	5	5	4	3	3	-	2	2	-	-	-	-	-	-	-	-	-
							Soil QA/QC Interlab duplicates:	-	-	5	-	5	5	4	3	3	-	2	2	-	-	-	-	-	-	-	-	-
							Water QA/QC Intralab duplicates:	-	-	1	-	1	1	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-
							Water QA/QC Interlab duplicates:	-	-	1	-	1	1	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-
							Trip Blanks (per sample batch):	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
							Trip Spikes (per sample batch):	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
							Rinsates (per week for equipment only):	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-

Table Notes:

1 Heavy metals: arsenic, cadmium, chromium, copper, mercury, lead, nickel and zinc
2 Nutrients: total phosphorus, ammonia, nitrate
3 ^ Indicative future proposed landuse based on LDA drawing dated 19/12/2014, P00421.01 (FUA Development Plan).

Table B2
Completed SAQP (January 2015)

Molonglo Valley Stage 3
(Area A)

AEC	Approx. Area (m^2) or m^3 if noted	Indicative Future Proposed Landuse^	Test Pit IDs	Appendix A, Figure 6 Grid Reference	Approx. Sampling Points / AEC Ratio	Block ID	Phase 2 DSI Sampling			Contaminants of Potential Concern (CoPC)														Soil Parameters			Water Physical Parameters		
							Media	Number of Locations	Samples Analysed	Heavy metals	TCLP/ASLP	OCPs	OPPs	Triazine Herb's	TRH	PAH	Silica Clean-up	BTEX	PCB, phenols	Nutrients	Faecal coliforms	Asbestos	pH	% Clay	CEC	pH	Electrical Conductivity	Dissolved Oxygen
WSPA_AEC6	250	Urban Development	TP98	F3	1:250m^2	71	Dam sediment	1	1	1	-	0	0	0	1	1	-	1	-	1	-	-	-	-	-	-	-	-	-
	-	Urban Development	-	F3	-	71	Water	1	1	0	-	0	0	0	0	0	-	-	-	0	-	-	-	-	-	1	1	1	1
WSPA_AEC22	30	Urban Development	TP01 - TP03	G2	1:10m^2	71	Soil	3	3	3	0	-	-	-	3	3	-	3	-	-	-	1	1	-	-	-	-	-	-
WSPA_AEC29	2.5 km along boundary	Urban Development	TP04 - TP09	A3, B3, C3, D3, E3, F3	1:400m	70, 71, 34, 74	Soil	6	6	-	0	6	6	-	-	-	-	-	-	-	-	-	3	1	1	-	-	-
~~ROBA_AEC13, 14~~	~~12,500~~	~~Open Space~~	~~TP10 - TP17~~	~~F3~~	~~1:1,562m^2~~	~~71~~	~~Soil~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	-	-	-	-	-	-	-	-	~~0~~	~~0~~	~~0~~	-	-	-
	~~15,500~~	~~Open Space~~	~~TP20 - TP29~~	~~F3~~	~~1:1,500m^2~~	~~71~~	~~Soil~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	-	-	-	-	-	-	-	-	~~0~~	~~0~~	~~0~~	-	-	-
~~ROBA_AEC15~~	~~16,500~~	~~Open Space~~	~~TP32 - TP41~~	~~F3, G3~~	~~1:1,650m^2~~	~~71~~	~~Soil~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~	-	-	-	-	-	-	-	~~0~~	~~0~~	~~0~~	-	-	-
ROBA_AEC16, 17, 18	12 m^3	Open Space	TP44	H3	1:12m^3	71	Soil	1	1	1	-	1	1	1	-	-	-	-	-	-	-	-	0	-	-	-	-	-
	9 m^3	Open Space	TP45	H3	1:9m^3	71	Soil	1	1	1	-	1	1	1	-	-	-	-	-	-	-	-	0	-	-	-	-	-
	110 m^3	Open Space	TP46 - TP49	G3	1:27m^2	71	Soil	4	4	4	-	4	4	4	-	-	-	-	-	-	-	-	1	-	-	-	-	-
ROBA_AEC20	6,000	Open Space	TP50 - TP61	E2, E3	1:300m^2	71	Soil	12	20	20	7	20	20	20	20	20	-	20	20	-	-	6	24	1	4	-	-	-
ROBA_AEC21	400 and 1,300	Open Space	TP62 - TP65	E3	1:100m^2	71	Soil	4	4	4	1	4	4	4	-	-	-	-	-	-	-	-	4	-	-	-	-	-
		Open Space	-	E3	n/a	71	Water	1	1	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	1	1
		Open Space	TP66 - TP71	E3	1:130m^2	71	Soil	6	9	9	1	9	9	9	9	9	-	9	9	-	-	5	8	0	2	-	-	-
ROBA_AEC22, 23	50 (each)	Open Space	TP18	D2	0:50m^2	71	Soil	0	Ob's Only	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Open Space	TP19	D2	0:50m^2	71	Soil	0	Ob's Only	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ROBA_AEC24, 25, 26, 27, 28	10 (each)	Open Space	TP77	E3	1:10m^2	71	Soil	1	1	1	-	1	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
		Open Space	TP78	D2	1:10m^2	71	Soil	1	1	1	0	1	1	1	-	-	-	-	-	1	-	-	1	-	-	-	-	-
		Open Space	TP79	D2	1:10m^2	71	Soil	1	1	1	-	1	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
		Open Space	TP80	D2	1:10m^2	71	Soil	1	1	1	0	1	1	1	-	-	-	-	-	1	-	-	1	-	-	-	-	-
		Open Space	TP81	D2	1:10m^2	71	Soil	1	1	1	-	1	1	1	-	-	-	-	-	1	-	-	1	-	-	-	-	-
	-	Open Space	-	D2, E3	n/a	71	Water	2	2	2	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	2	2	2
WSPA_AEC31	Whole Site	Urban Development and Open Space	TP84 - TP93	B2, A2, F2, D2, E2, F1, H2, I3.	n/a	All Blocks	Soil	10	10	10	3	10	10	2	-	-	-	-	-	-	-	-	0	0	0	-	-	-
WSPA_AEC33	225 Hectares	Urban Development and Open Space	TP94 - TP97	B2, E3, F3, G2	n/a	All Blocks	Soil	4	4	4	0	-	-	-	4	4	-	1	-	-	-	-	1	0	0	1	-	-
WSPA_AEC50	700	Urban Development	TP82	A3	1:700m^2	71	Dam sediment	1	1	1	-	1	1	1	1	1	-	1	1	1	-	-	-	-	-	1	1	1
WSPA_AEC51	600	Urban Development	TP83	D3	1:600m^2	71	Dam sediment	1	1	1	-	1	1	1	1	1	-	1	1	1	-	-	-	-	-	1	1	1
Molonglo River Water	-	Open Space	SW01, SW02	D2, H3	n/a	-	Water	2	2	2	-	0	0	-	2	2	-	2	-	2	-	-	-	-	-	2	2	2
Molonglo River Sediment	-	Open Space	SS01, SS02	D2, H3	n/a	-	River Sediment	2	2	2	-	2	2	2	2	2	-	2	2	2	2	-	2	-	-	-	-	-
							Soil TOTAL:	**61**	**72**	**66**	**12**	**64**	**64**	**48**	**41**	**41**	**0**	**38**	**33**	**8**	**2**	**12**	**49**	**2**	**7**	**-**	**-**	**-**
							Water TOTAL:	**6**	**6**	**5**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**2**	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**6**	**6**	**6**
							Soil QA/QC Intralab duplicates:	-	-	5	-	5	5	2	2	2	-	2	1	-	-	-	-	-	-	-	-	-
							Soil QA/QC Interlab duplicates:	-	-	5	-	5	5	2	2	2	-	2	1	-	-	-	-	-	-	-	-	-
							Water QA/QC Intralab duplicates:	-	-	1	-	0	0	-	0	0	-	0	-	1	-	-	-	-	-	-	-	-
							Water QA/QC Interlab duplicates:	-	-	1	-	0	0	-	0	0	-	0	-	1	-	-	-	-	-	-	-	-
							Trip Blanks (per sample batch):	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
							Trip Spikes (per sample batch):	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
							Rinsates (per week for equipment only):	-	-	-	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-	-

Table Notes:

1 Heavy metals: arsenic, cadmium, chromium, copper, mercury, lead, nickel and zinc
2 Nutrients: total phosphorus, ammonia, nitrate
3 ^ Indicative future proposed landuse based on LDA drawing dated 19/12/2014, P00421.01 (FUA Development Plan).
4 Samples collected and analysed as per the SAQP or a slight increase where applicable.
5 Samples either not collected or not analysed for the specific analytical test or reduced number analysed.

Table B3
Soil Summary Results

Molonglo Valley Stage 3
Area A
39275.001

| | Physical Parametres | | | | Nutrients | | | | | Metals | | | | | | | | Total Recoverable Hydrocarbons | | | | | | | BTEX | | | | PAHs | | | | | | | | | | | | | | | | Phenols | | PCBs | Herbicides | | | | | | | | | | | | | | | |

Table B3
Soil Summary Results

	Organochlorine Pesticides									Organophosphorous Pesticides														Asbestos
	DDD	DDT	DDT+DDE+DDD	Endosulfan	Endrin	g-BHC (Lindane)	Heptachlor	Hexachlorobenzene	Methoxychlor	Azinophos-methyl	Bromophos-ethyl	Carbophenothion	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenthion	Malathion	Methyl parathion	Monocrotophos	Prothiofos	Asbestos Detected
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	g/kg
EQL	0.05	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.2	0.2	0.05	0.1
NEPM HIL-A Residential	-	-	240	270	10	-	6	10	300	-	-	-	-	160	-	-	-	-	-	-	-	-	-	-	0.01
NEPM HIL-C Recreational	-	-	400	340	20	-	10	10	400	-	-	-	-	250	-	-	-	-	-	-	-	-	-	-	0.02
NEPM HSL-A/B, 0m to <1m, Sand, Soil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NEPM EIL, Urban Res & Open Space	-	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NEPM ESL, Urban Res & Open Space, Coarse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NEPM ML Residential, Parkland & Open Space, Coarse	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sample ID	Location	Sample Depth	Sampled Date	Description																						
SS01	SS01	0-0.1	10/12/2014	River Sediment	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
SS02	SS02	0-0.1	10/12/2014	River Sediment	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP01 0.0-0.2	TP01	0-0.2	8/12/2014	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP02 0.0-0.2	TP02	0-0.2	8/12/2014	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No
TP03 0.0-0.2	TP03	0-0.2	8/12/2014	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP04_0.0-0.1	TP04	0-0.1	9/12/2014	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP05_0.0-0.1	TP05	0-0.1	9/12/2014	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP06_0.0-0.1	TP06	0-0.1	9/12/2014	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP07_0.0-0.1	TP07	0-0.1	9/12/2014	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP08_0.0-0.1	TP08	0-0.1	9/12/2014	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP09_0.0-0.1	TP09	0-0.1	9/12/2014	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP44 0.0-0.2	TP44	0-0.2	8/12/2014	Fill	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP45 0.0-0.2	TP45	0-0.2	8/12/2014	Fill	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP46 0.1-0.2	TP46	0.1-0.2	8/12/2014	Fill	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP47 0.1-0.2	TP47	0.1-0.2	8/12/2014	Fill	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP48 0.1-0.2	TP48	0.1-0.2	8/12/2014	Fill	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP49 0.1-0.2	TP49	0.1-0.2	8/12/2014	Fill	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP50 0.1-0.2	TP50	0.1-0.2	20/01/2015	Fill	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP50 1.0-1.2	TP50	1-1.2	20/01/2015	Fill	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	No
TP51 0.0-0.1	TP51	0-0.1	20/01/2015	Fill	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP51 0.8-1.0	TP51	0.8-1.0	20/01/2015	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No
TP52 0.0-0.1	TP52	0-0.1	20/01/2015	Fill	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP52 1.0-1.2	TP52	1-1.2	20/01/2015	Fill	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP52 2.4-2.5	TP52	2.4-2.5	20/01/2015	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP53 0.0-0.1	TP53	0-0.1	20/01/2015	Fill	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP53 0.4-0.6	TP53	0.4-0.6	20/01/2015	Fill	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	No
TP53 2.7-2.9	TP53	2.7-2.9	20/01/2015	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP54 0.0-0.1	TP54	0-0.1	20/01/2015	Fill	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	No
TP55 0.0-0.1	TP55	0-0.1	20/01/2015	Fill	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP55 0.8-1.0	TP55	0.8-0.1	20/01/2015	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP55 2.2-2.4	TP55	2.2-2.4	20/01/2015	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP56 0.0-0.1	TP56	0-0.1	20/01/2015	Fill	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP57 0.0-0.1	TP57	0-0.1	20/01/2015	Fill	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP57 1.5-1.6	TP57	1.5-1.6	20/01/2015	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP58 0.0-0.1	TP58	0-0.1	20/01/2015	Fill	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP58 0.5-0.7	TP58	0.5-0.7	20/01/2015	Fill	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	No
TP58 1.3-1.5	TP58	1.3-1.5	20/01/2015	Fill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP59 0.0-0.1	TP59	0-0.1	20/01/2015	Fill	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP59 0.6-0.75	TP59	0.6-0.75	20/01/2015	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP60 0.0-0.1	TP60	0-0.1	20/01/2015	Fill	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP60 0.4-0.5	TP60	0.4-0.5	20/01/2015	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP61 0.0-0.1	TP61	0-0.1	20/01/2015	Fill	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	No
TP61 1.8-2.0	TP61	1.8-2	20/01/2015	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP62 0.0-0.1	TP62	0-0.1	21/01/2015	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP63 0.0-0.1	TP63	0-0.1	21/01/2015	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP64 0.0-0.1	TP64	0-0.1	21/01/2015	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP65 0.0-0.1	TP65	0-0.1	21/01/2015	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP66 0.4-0.6	TP66	0.4-0.6	20/01/2015	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	No
TP67 0.4-0.6	TP67	0.4-0.6	20/01/2015	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	No
TP68 0.1-0.2	TP68	0.1-0.2	20/01/2015	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP68 0.4-0.5	TP68	0.4-0.5	20/01/2015	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	No
TP69 0.4-0.5	TP69	0.4-0.5	20/01/2015	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	No
TP70 0.1-0.2	TP70	0.1-0.2	20/01/2015	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP70 0.5-0.7	TP70	0.5-0.7	20/01/2015	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	No
TP70 1.8-2.0	TP70	1.8-2	20/01/2015	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP71 0.2-0.3	TP71	0.2-0.3	20/01/2015	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP77 0.0-0.2	TP77	0-0.2	20/01/2015	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP78 0.0-0.1	TP78	0-0.1	21/01/2015	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP79 0.0-0.1	TP79	0-0.1	20/01/2015	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP80 0.0-0.1	TP80	0-0.1	21/01/2015	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP81 0.0-0.1	TP81	0-0.1	21/01/2015	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP82_0.0-0.1	TP82	0-0.1	9/12/2014	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP83_0.0-0.1	TP83	0-0.1	9/12/2014	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP84_0.0-0.1	TP84	0-0.1	9/12/2014	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP85_0.0-0.1	TP85	0-0.1	9/12/2014	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP86 0.0-0.1	TP86	0-0.1	8/12/2014	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP87 0.0-0.1	TP87	0-0.1	8/12/2014	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP88_0.0-0.1	TP88	0-0.1	10/12/2014	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP89 0.0-0.1	TP89	0-0.1	10/12/2014	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP90 0.0-0.1	TP90	0-0.1	8/12/2014	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP91 0.0-0.2	TP91	0-0.2	8/12/2014	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP92 0.0-0.1	TP92	0-0.1	8/12/2014	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP93_0.0-0.1	TP93	0-0.1	9/12/2014	Natural	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-
TP94_0.0-0.1	TP94	0-0.1	9/12/2014	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP95_0.0-0.1	TP95	0-0.1	9/12/2014	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP96 0.0-0.1	TP96	0-0.1	10/12/2014	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP97 0.0-0.1	TP97	0-0.1	8/12/2014	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP98_0.0-0.1	TP98	0-0.1	9/12/2014	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Statistical Summary																										
Number of Results	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	12
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	0
Minimum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	0
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration	0.025	0.1	0.025	0.025	0.025	0.025	0.025	0.025	0.1	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.1	0.1	0.025	0
Median Concentration	0.025	0.1	0.025	0.025	0.025	0.025	0.025	0.025	0.1	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.1	0.1	0.025	0
Standard Deviation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table B4
Sediment Summary Results (ISQG)

Molonglo Valley Stage 3
Area A
39275.001

					Metals								PAHs																PCBs	Organochlorine Pesticides				F' Coliforms
					Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	Acenaphthene	Acenaphthylene	Anthracene	Fluorene	Naphthalene	Phenanthrene	Low Molecular Weight PAHs (Half LOR for ND)	Benz(a)anthracene	Benzo(a) pyrene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Pyrene	High Molecular Weight PAHs (Half LOR for ND)	PAH (Total) (Half LOR for ND)	PCBs (Sum of total)	chlordane	DDT+DDE+DDD	Dieldrin	Endrin	Faecal Coliforms
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	orgs/g
EQL					4	0.4	1	1	1	0.1	1	1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.05	0.05	0.05	0.05	2
ANZECC 2000 ISQG - Low	-	-	-	-	20	1.5	80	65	50	0.15	21	200	0.016	0.044	0.085	0.019	0.16	0.24	0.552	0.261	0.43	0.384	0.063	0.6	0.665	1.7	4	0.023	0.0005	0.0016	0.00002	0.00002	-
ANZECC 2000 ISQG - High	**-**	**-**	**-**	**-**	**70**	**10**	**370**	**270**	**220**	**1**	**52**	**410**	**0.5**	**0.64**	**1.1**	**0.54**	**2.1**	**1.5**	**3.16**	**1.6**	**1.6**	**2.8**	**0.26**	**5.1**	**2.6**	**9.6**	**45**	**-**	**0.006**	**0.046**	**0.008**	**0.008**	**-**
Sample ID	**Location**	**Sample Depth**	**Sampled Date**	**Description**																														
SS01 0.0-0.1	SS01	0-0.1	10/12/2014	River Sediment	<5	<1	17	9	29	<0.1	8	97	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.5	<4	<0.1	<0.05	<0.05	<0.05	<0.05	640
SS02 0.0-0.1	SS02	0-0.1	10/12/2014	River Sediment	5	<1	18	16	51	<0.1	9	218	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.5	<4	<0.1	<0.05	<0.05	<0.05	<0.05	11

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Table B5
ACT Waste Classification for Soils Summary

					Metals (Solid and Leachate)												TPH		BTEX				PAH/Phenol			PCBs (Sum of total)	Organochlorine Pesticides																	Organophosphorous Pesticides																	
					Arsenic	Arsenic	Cadmium	Cadmium	Chromium (III+VI)	Chromium (III+VI)	Lead	Lead	Mercury	Mercury	Nickel	Nickel	C6 - C9	C10 - C36 (Sum of total)	Benzene	Toluene	Ethylbenzene	Xylene Total	Benzo(a) pyrene	Phenol	PAH (Sum Total)	PCBs (Sum of total)	Pesticides (total)	Aldrin + Dieldrin	chlordane	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan	Endrin	Heptachlor	Methoxychlor	Azinophos methyl	Bromophos-ethyl	Carbophenothion	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenthion	Malathion	Methyl parathion	Monocrotophos	Prothiofos
					mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL					4	0.001	0.4	0.0001	1	0.001	1	0.001	0.1	0.0001	1	0.001	10	50	0.2	0.5	0.5	0.5	0.5	0.5		0.1		0.05	0.05	0.05	0.1	0.05	0.05	0.05	0.05	0.05	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.2	0.2	0.05
ACT Waste Guidelines (2000): Inert Waste (CT1) - Without TCLP					10	-	2	-	10	-	10	-	0.4	-	4	4	-	-	1	28.8	60	100	0.08	28.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ACT Waste Guidelines (2000): Solid Waste (CT2) - Without TCLP					**100**	-	**20**	-	**100**	-	**100**	-	**4**	-	**40**	-	-	-	**10**	**288**	**600**	**1000**	**0.8**	**288**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ACT Waste Guidelines (2000): Inert Waste (SCC1) - With TCLP					500	-	100	-	1900	-	1500	-	50	-	1050	-	650	5000	18	518	1080	1800	1	518	200	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ACT Waste Guidelines (2000): Solid Waste (SCC2) - With TCLP					500	-	100	-	1900	-	1500	-	50	-	1050	-	650	10,000	18	518	1080	1800	10	518	200	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ACT Waste Guidelines (2000): Inert Waste - TCLP1					-	0.5	-	0.1	-	0.5	-	0.5	-	0.02	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ACT Waste Guidelines (2000): Inert Waste - TCLP2					-	*5*	-	*1*	-	*5*	-	*5*	-	*0.2*	-	*2*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sample ID	**Location**	**Depth**	**Sampled Date**	**Description**																																																					
TP01 0.0-0.2	TP01	0-0.2	8/12/2014	Fill	13	-	<1	-	34	-	18	-	<0.1	-	16	-	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP02 0.0-0.2	TP02	0-0.2	8/12/2014	Fill	16	-	<1	-	22	-	15	-	<0.1	-	6	-	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP03 0.0-0.2	TP03	0-0.2	8/12/2014	Fill	23	-	<1	-	22	-	11	-	<0.1	-	4	-	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP04_0.0-0.1	TP04	0-0.1	9/12/2014	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP05_0.0-0.1	TP05	0-0.1	9/12/2014	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP06_0.0-0.1	TP06	0-0.1	9/12/2014	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP07_0.0-0.1	TP07	0-0.1	9/12/2014	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP08_0.0-0.1	TP08	0-0.1	9/12/2014	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP09_0.0-0.1	TP09	0-0.1	9/12/2014	Natural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP44 0.0-0.2	TP44	0-0.2	8/12/2014	Fill	<5	-	<1	-	6	-	7	-	<0.1	-	4	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP45 0.0-0.2	TP45	0-0.2	8/12/2014	Fill	<5	-	<1	-	26	-	11	-	<0.1	-	4	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP46 0.1-0.2	TP46	0.1-0.2	8/12/2014	Fill	11	-	<1	-	23	-	17	-	<0.1	-	4	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP47 0.1-0.2	TP47	0.1-0.2	8/12/2014	Fill	15	-	<1	-	27	-	14	-	<0.1	-	4	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP48 0.1-0.2	TP48	0.1-0.2	8/12/2014	Fill	12	-	<1	-	23	-	11	-	<0.1	-	4	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP49 0.1-0.2	TP49	0.1-0.2	8/12/2014	Fill	11	-	<1	-	23	-	11	-	<0.1	-	4	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP50 0.1-0.2	TP50	0.1-0.2	20/01/2015	Fill	30	<0.1	<1	<0.05	31	<0.1	24	<0.1	<0.1	<0.001	19	<0.1	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP50 1.0-1.2	TP50	1-1.2	20/01/2015	Fill	18	-	<1	-	18	-	10	-	<0.1	-	14	-	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP51 0.0-0.1	TP51	0-0.1	20/01/2015	Fill	36	-	<1	-	33	-	25	-	<0.1	-	20	-	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP52 0.0-0.1	TP52	0-0.1	20/01/2015	Fill	37	-	<1	-	22	-	56	-	<0.1	-	18	-	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP52 1.0-1.2	TP52	1-1.2	20/01/2015	Fill	34	-	<1	-	29	-	21	-	<0.1	-	19	-	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP53 0.0-0.1	TP53	0-0.1	20/01/2015	Fill	27	-	<1	-	35	-	26	-	<0.1	-	19	-	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP53 0.4-0.6	TP53	0.4-0.6	20/01/2015	Fill	52	-	<1	-	30	-	23	-	<0.1	-	19	-	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP54 0.0-0.1	TP54	0-0.1	20/01/2015	Fill	33	-	<1	-	23	-	22	-	<0.1	-	16	-	<10	110	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP55 0.0-0.1	TP55	0-0.1	20/01/2015	Fill	34	-	<1	-	31	-	22	-	<0.1	-	19	-	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP56 0.0-0.1	TP56	0-0.1	20/01/2015	Fill	29	<0.1	1	<0.05	17	<0.1	39	<0.1	<0.1	<0.001	16	<0.1	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP57 0.0-0.1	TP57	0-0.1	20/01/2015	Fill	31	-	<1	-	22	-	19	-	<0.1	-	16	-	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP57 1.5-1.6	TP57	1.5-1.6	20/01/2015	Natural	33	-	<1	-	26	-	13	-	<0.1	-	18	-	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP58 0.0-0.1	TP58	0-0.1	20/01/2015	Fill	33	<0.1	<1	<0.05	30	<0.1	25	<0.1	<0.1	<0.001	18	<0.1	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP58 0.5-0.7	TP58	0.5-0.7	20/01/2015	Fill	26	<0.1	<1	<0.05	35	<0.1	31	<0.1	<0.1	<0.001	19	<0.1	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP59 0.0-0.1	TP59	0-0.1	20/01/2015	Fill	33	-	<1	-	30	-	27	-	<0.1	-	19	-	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP59 0.6-0.75	TP59	0.6-0.75	20/01/2015	Natural	34	<0.1	<1	<0.05	36	<0.1	26	<0.1	<0.1	<0.001	21	<0.1	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP60 0.0-0.1	TP60	0-0.1	20/01/2015	Fill	37	<0.1	<1	<0.05	30	<0.1	**150**	<0.1	<0.1	<0.001	**63**	<0.1	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP60 0.4-0.5	TP60	0.4-0.5	20/01/2015	Natural	56	<0.1	<1	<0.05	35	<0.1	51	<0.1	<0.1	<0.001	21	<0.1	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP61 0.0-0.1	TP61	0-0.1	20/01/2015	Fill	6	-	<1	-	18	-	5	-	<0.1	-	15	-	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP61 1.8-2.0	TP61	1.8-2	20/01/2015	Natural	<5	-	<1	-	18	-	<5	-	<0.1	-	15	-	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP62 0.0-0.1	TP62	0-0.1	21/01/2015	Natural	13	-	<1	-	24	-	5	-	<0.1	-	12	-	-	-	-	-	-	-	-	-	-	-	<0.6	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP63 0.0-0.1	TP63	0-0.1	21/01/2015	Natural	12	-	<1	-	25	-	5	-	<0.1	-	11	-	-	-	-	-	-	-	-	-	-	-	<0.6	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP64 0.0-0.1	TP64	0-0.1	21/01/2015	Natural	12	-	<1	-	33	-	6	-	<0.1	-	15	-	-	-	-	-	-	-	-	-	-	-	<0.6	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP65 0.0-0.1	TP65	0-0.1	21/01/2015	Natural	31	<0.1	<1	<0.05	34	<0.1	7	<0.1	<0.1	<0.001	17	<0.1	-	-	-	-	-	-	-	-	-	-	<0.6	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP66 0.4-0.6	TP66	0.4-0.6	20/01/2015	Natural	28	-	<1	-	31	-	7	-	<0.1	-	17	-	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP67 0.4-0.6	TP67	0.4-0.6	20/01/2015	Natural	6	-	<1	-	38	-	<5	-	<0.1	-	18	-	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP68 0.1-0.2	TP68	0.1-0.2	20/01/2015	Natural	8	-	<1	-	36	-	6	-	<0.1	-	19	-	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP68 0.4-0.5	TP68	0.4-0.5	20/01/2015	Natural	10	-	<1	-	37	-	6	-	<0.1	-	17	-	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP69 0.4-0.5	TP69	0.4-0.5	20/01/2015	Natural	22	-	<1	-	30	-	5	-	<0.1	-	17	-	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP70 0.1-0.2	TP70	0.1-0.2	20/01/2015	Natural	24	-	<1	-	29	-	7	-	<0.1	-	19	-	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP70 0.5-0.7	TP70	0.5-0.7	20/01/2015	Natural	27	-	<1	-	33	-	5	-	<0.1	-	23	-	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP70 1.8-2.0	TP70	1.8-2	20/01/2015	Natural	27	<0.1	<1	<0.05	31	<0.1	<5	<0.1	<0.1	<0.001	20	<0.1	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP71 0.2-0.3	TP71	0.2-0.3	20/01/2015	Natural	25	-	<1	-	33	-	6	-	<0.1	-	19	-	<10	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<8.2	<0.1	<1.1	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP77 0.0-0.2	TP77	0-0.2	20/01/2015	Natural	18	-	<1	-	28	-	<5	-	<0.1	-	16	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05
TP78 0.0-0.1	TP78	0-0.1	21/01/2015	Natural	20	-	<1

Table B6
Surface Water Results Summary

Molonglo Valley Stage 3
Area A
39275.001

| | Physical Parameters | | | Nutrients | | | | | Metals | | | | | | | | Total Recoverable Hydrocarbons | | | | | | | | | | | | BTEX | | | | | | | PAH | | | | | | | | | | | |

Table B7
Soil RPDs

Molonglo Valley Stage 3
Area A
39275.001

			Sample ID	ALSE-Sydney TP46 0.1-0.2	ALSE-Sydney DUP141208	RPD	ALSE-Sydney TP89 0.0-0.1	ALSE-Sydney DUP141210	RPD	ALSE-Sydney TP05_0.0-0.1	ALSE-Sydney DUP141209-1	RPD
			Sampled Date	8/12/2014	8/12/2014	%	10/12/2014	10/12/2014	%	9/12/2014	9/12/2014	%
		Units	**EQL**									
BTEX	Benzene	mg/kg	0.2									
	Toluene	mg/kg	0.5									
	Ethylbenzene	mg/kg	0.5 (Primary): 1 (Interlab)									
	Xylene (o)	mg/kg	0.5 (Primary): 1 (Interlab)									
	Xylene (m & p)	mg/kg	0.5 (Primary): 2 (Interlab)									
	Xylene Total	mg/kg	0.5									
Herbicides	Atrazine	mg/kg	0.05 (Primary): 0.5 (Interlab)	<0.05	<0.05	0						
	Simazine	mg/kg	0.05 (Primary): 0.5 (Interlab)	<0.05	<0.05	0						
Metals	Arsenic	mg/kg	5 (Primary): 4 (Interlab)	11.0	8.0	32	16.0	17.0	6			
	Cadmium	mg/kg	1 (Primary): 0.4 (Interlab)	<1.0	<1.0	0	<1.0	<1.0	0			
	Chromium (III+VI)	mg/kg	2 (Primary): 1 (Interlab)	23.0	17.0	30	35.0	36.0	3			
	Copper	mg/kg	5 (Primary): 1 (Interlab)	<5.0	<5.0	0	6.0	6.0	0			
	Lead	mg/kg	5 (Primary): 1 (Interlab)	17.0	13.0	27	8.0	9.0	12			
	Mercury	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0			
	Nickel	mg/kg	2 (Primary): 1 (Interlab)	4.0	4.0	0	15.0	16.0	6			
	Zinc	mg/kg	5 (Primary): 1 (Interlab)	24.0	18.0	29	51.0	54.0	6			
OCPs	4,4-DDE	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	a-BHC	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Aldrin	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Aldrin + Dieldrin	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	b-BHC	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	chlordane	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Chlordane (cis)	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Chlordane (trans)	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	d-BHC	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	DDD	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	DDT	mg/kg	0.2 (Primary): 0.1 (Interlab)	<0.2	<0.2	0	<0.2	<0.2	0	<0.2	<0.2	0
	DDT+DDE+DDD	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Dieldrin	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Endosulfan	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Endosulfan I	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Endosulfan II	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Endosulfan sulphate	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Endrin	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Endrin aldehyde	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Endrin ketone	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	g-BHC (Lindane)	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Heptachlor	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Heptachlor epoxide	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Methoxychlor	mg/kg	0.2 (Primary): 0.1 (Interlab)	<0.2	<0.2	0	<0.2	<0.2	0	<0.2	<0.2	0
OPPs	Azinophos methyl	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Bromophos-ethyl	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Carbophenothion	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Chlorfenvinphos	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Chlorpyrifos	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Chlorpyrifos-methyl	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Diazinon	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Dichlorvos	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Dimethoate	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Ethion	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Fenthion	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Malathion	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
	Methyl parathion	mg/kg	0.2	<0.2	<0.2	0	<0.2	<0.2	0	<0.2	<0.2	0
	Monocrotophos	mg/kg	0.2	<0.2	<0.2	0	<0.2	<0.2	0	<0.2	<0.2	0
	Prothiofos	mg/kg	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
Phenols	2,4-dimethylphenol	mg/kg	0.5									
	2-methylphenol	mg/kg	0.5									
	2-nitrophenol	mg/kg	0.5									
	3-&4-methylphenol	mg/kg	1									
	4-chloro-3-methylphenol	mg/kg	0.5									
PAHs	Acenaphthene	mg/kg	0.5 (Primary): 0.1 (Interlab)									
	Acenaphthylene	mg/kg	0.5 (Primary): 0.1 (Interlab)									
	Anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)									
	Benz(a)anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)									
	Benzo(a) pyrene	mg/kg	0.5									
	Benzo(g,h,i)perylene	mg/kg	0.5 (Primary): 0.1 (Interlab)									
	Benzo(k)fluoranthene	mg/kg	0.5									
	Benzo[b+j]fluoranthene	mg/kg	0.5									
	Chrysene	mg/kg	0.5 (Primary): 0.1 (Interlab)									
	Dibenz(a,h)anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)									
	Fluoranthene	mg/kg	0.5 (Primary): 0.1 (Interlab)									
	Fluorene	mg/kg	0.5 (Primary): 0.1 (Interlab)									
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.5 (Primary): 0.1 (Interlab)									
	Naphthalene	mg/kg	1 (Primary): 0.1 (Interlab)									
	Naphthalene	mg/kg	0.5 (Primary): 1 (Interlab)									
	Phenanthrene	mg/kg	0.5 (Primary): 0.1 (Interlab)									
	Phenol	mg/kg	0.5									
	Pyrene	mg/kg	0.5 (Primary): 0.1 (Interlab)									
PCB	PCBs (Sum of total)	mg/kg	0.1									
TRH	C6-C10	mg/kg	10 (Primary): 25 (Interlab)									
	>C10-C16	mg/kg	50									
	>C16-C34	mg/kg	100									
	>C34-C40	mg/kg	100									
	C10 - C40 (Sum of total)	mg/kg	50									
	F1 C6-C10 less BTEX	mg/kg	10 (Primary): 25 (Interlab)									
	F2 C10-C16 less Naphthalene	mg/kg	50									

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

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

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

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Table B7
Soil RPDs

Molonglo Valley Stage 3
Area A
39275.001

			Sample ID	ALSE-Sydney TP94_0.0-0.1	ALSE-Sydney DUP141209-2	RPD	ALSE-Sydney TP50 1.0-1.2	ALSE-Sydney DUP2 - 200115	RPD	ALSE-Sydney TP81 0.0-0.1	ALSE-Sydney DUP4 - 210115	RPD
			Sampled Date	9/12/2014	9/12/2014	%	20/01/2015	20/01/2015	%	21/01/2015	21/01/2015	%
		Units	EQL									
BTEX	Benzene	mg/kg	0.2	<0.2	<0.2	0	<0.2	<0.2	0			
	Toluene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0			
	Ethylbenzene	mg/kg	0.5 (Primary): 1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0			
	Xylene (o)	mg/kg	0.5 (Primary): 1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0			
	Xylene (m & p)	mg/kg	0.5 (Primary): 2 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0			
	Xylene Total	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0			
Herbicides	Atrazine	mg/kg	0.05 (Primary): 0.5 (Interlab)							<0.05	<0.05	0
	Simazine	mg/kg	0.05 (Primary): 0.5 (Interlab)							<0.05	<0.05	0
Metals	Arsenic	mg/kg	5 (Primary): 4 (Interlab)	6.0	7.0	15	18.0	22.0	20	<5.0	<5.0	0
	Cadmium	mg/kg	1 (Primary): 0.4 (Interlab)	<1.0	<1.0	0	<1.0	<1.0	0	<1.0	<1.0	0
	Chromium (III+VI)	mg/kg	2 (Primary): 1 (Interlab)	35.0	35.0	0	18.0	17.0	6	50.0	43.0	15
	Copper	mg/kg	5 (Primary): 1 (Interlab)	10.0	9.0	11	13.0	15.0	14	<5.0	<5.0	0
	Lead	mg/kg	5 (Primary): 1 (Interlab)	12.0	10.0	18	10.0	12.0	18	6.0	8.0	29
	Mercury	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0
	Nickel	mg/kg	2 (Primary): 1 (Interlab)	13.0	13.0	0	14.0	14.0	0	19.0	16.0	17
	Zinc	mg/kg	5 (Primary): 1 (Interlab)	44.0	45.0	2	53.0	62.0	16	51.0	50.0	2
OCPs	4,4-DDE	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	a-BHC	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	Aldrin	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	Aldrin + Dieldrin	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0
	b-BHC	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	chlordane	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0
	Chlordane (cis)	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	Chlordane (trans)	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	d-BHC	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	DDD	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	DDT	mg/kg	0.2 (Primary): 0.1 (Interlab)				<0.2	<0.2	0	<0.2	<0.2	0
	DDT+DDE+DDD	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0
	Dieldrin	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	Endosulfan	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0
	Endosulfan I	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	Endosulfan II	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	Endosulfan sulphate	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	Endrin	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	Endrin aldehyde	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	Endrin ketone	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0
	g-BHC (Lindane)	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	Heptachlor	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	Heptachlor epoxide	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	Methoxychlor	mg/kg	0.2 (Primary): 0.1 (Interlab)				<0.2	<0.2	0	<0.2	<0.2	0
OPPs	Azinophos methyl	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	Bromophos-ethyl	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	Carbophenothion	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0
	Chlorfenvinphos	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0
	Chlorpyrifos	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	Chlorpyrifos-methyl	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	Diazinon	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	Dichlorvos	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	Dimethoate	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	Ethion	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	Fenthion	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0
	Malathion	mg/kg	0.05 (Primary): 0.1 (Interlab)				<0.05	<0.05	0	<0.05	<0.05	0
	Methyl parathion	mg/kg	0.2				<0.2	<0.2	0	<0.2	<0.2	0
	Monocrotophos	mg/kg	0.2				<0.2	<0.2	0	<0.2	<0.2	0
	Prothiofos	mg/kg	0.05				<0.05	<0.05	0	<0.05	<0.05	0
Phenols	2,4-dimethylphenol	mg/kg	0.5				<0.5	<0.5	0			
	2-methylphenol	mg/kg	0.5				<0.5	<0.5	0			
	2-nitrophenol	mg/kg	0.5				<0.5	<0.5	0			
	3-&4-methylphenol	mg/kg	1				<1.0	<1.0	0			
	4-chloro-3-methylphenol	mg/kg	0.5				<0.5	<0.5	0			
PAHs	Acenaphthene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0			
	Acenaphthylene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0			
	Anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0			
	Benz(a)anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0			
	Benzo(a) pyrene	mg/kg	0.5	<1.2	<1.2	0	<1.2	<1.2	0			
	Benzo(g,h,i)perylene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0			
	Benzo(k)fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0			
	Benzo[b+j]fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5	<0.5	0			
	Chrysene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0			
	Dibenz(a,h)anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0			
	Fluoranthene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0			
	Fluorene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0			
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0			
	Naphthalene	mg/kg	1 (Primary): 0.1 (Interlab)	<1.0	<1.0	0	<1.0	<1.0	0			
	Naphthalene	mg/kg	0.5 (Primary): 1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0			
	Phenanthrene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0			
	Phenol	mg/kg	0.5				<0.5	<0.5	0			
	Pyrene	mg/kg	0.5 (Primary): 0.1 (Interlab)	<0.5	<0.5	0	<0.5	<0.5	0			
PCB	PCBs (Sum of total)	mg/kg	0.1				<0.1	<0.1	0			
TRH	C6-C10	mg/kg	10 (Primary): 25 (Interlab)	<10.0	<10.0	0	<10.0	<10.0	0			
	>C10-C16	mg/kg	50	<50.0	<50.0	0	<50.0	<50.0	0			
	>C16-C34	mg/kg	100	<100.0	<100.0	0	<100.0	<100.0	0			
	>C34-C40	mg/kg	100	<100.0	<100.0	0	<100.0	<100.0	0			
	C10 - C40 (Sum of total)	mg/kg	50	<50.0	<50.0	0	<50.0	<50.0	0			
	F1 C6-C10 less BTEX	mg/kg	10 (Primary): 25 (Interlab)	<10.0	<10.0	0	<10.0	<10.0	0			
	F2 C10-C16 less Naphthalene	mg/kg	50	<50.0	<50.0	0	<50.0	<50.0	0			

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

High RPDs are in **bold (Acceptable RPDs for each EQL multiplier range are: 100 (0-5 x EQL); 75 (5-1(

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. An

Table B7
Soil RPDs

Molonglo Valley Stage 3
Area A
39275.001

				Sample ID	ALSE-Sydney TP46 0.1-0.2	EnviroLab Trip 141208	RPD	ALSE-Sydney TP05_0.0-0.1	EnviroLab Trip 141209-1	RPD	ALSE-Sydney TP94_0.0-0.1	EnviroLab Trip 141209-2	RPD
				Sampled Date	8/12/2014	8/12/2014	%	9/12/2014	9/12/2014	%	9/12/2014	9/12/2014	%
		Units	EQL										
BTEX	Benzene	mg/kg	0.2								<0.2	<0.2	0
	Toluene	mg/kg	0.5								<0.5	<0.5	0
	Ethylbenzene	mg/kg	0.5 (Primary): 1 (Interlab)								<0.5	<1.0	0
	Xylene (o)	mg/kg	0.5 (Primary): 1 (Interlab)								<0.5	<1.0	0
	Xylene (m & p)	mg/kg	0.5 (Primary): 2 (Interlab)								<0.5	<2.0	0
	Xylene Total	mg/kg	0.5								<0.5		
Herbicides	Atrazine	mg/kg	0.05 (Primary): 0.5 (Interlab)	<0.05	<0.5	0							
	Simazine	mg/kg	0.05 (Primary): 0.5 (Interlab)	<0.05	<0.5	0							
Metals	Arsenic	mg/kg	5 (Primary): 4 (Interlab)	11.0	9.0	20					6.0	4.0	40
	Cadmium	mg/kg	1 (Primary): 0.4 (Interlab)	<1.0	<0.4	0					<1.0	<0.4	0
	Chromium (III+VI)	mg/kg	2 (Primary): 1 (Interlab)	23.0	19.0	19					**35.0**	**25.0**	**33**
	Copper	mg/kg	5 (Primary): 1 (Interlab)	<5.0	4.0	0					10.0	8.0	22
	Lead	mg/kg	5 (Primary): 1 (Interlab)	17.0	14.0	19					12.0	8.0	40
	Mercury	mg/kg	0.1	<0.1	<0.1	0					<0.1	<0.1	0
	Nickel	mg/kg	2 (Primary): 1 (Interlab)	4.0	4.0	0					13.0	9.0	36
	Zinc	mg/kg	5 (Primary): 1 (Interlab)	24.0	20.0	18					44.0	35.0	23
OCPs	4,4-DDE	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0				
	a-BHC	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0				
	Aldrin	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0				
	Aldrin + Dieldrin	mg/kg	0.05	<0.05			<0.05						
	b-BHC	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0				
	chlordane	mg/kg	0.05	<0.05			<0.05						
	Chlordane (cis)	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0				
	Chlordane (trans)	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0				
	d-BHC	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0				
	DDD	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0				
	DDT	mg/kg	0.2 (Primary): 0.1 (Interlab)	<0.2	<0.1	0	<0.2	<0.1	0				
	DDT+DDE+DDD	mg/kg	0.05	<0.05			<0.05						
	Dieldrin	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0				
	Endosulfan	mg/kg	0.05	<0.05			<0.05						
	Endosulfan I	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0				
	Endosulfan II	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0				
	Endosulfan sulphate	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0				
	Endrin	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0				
	Endrin aldehyde	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0				
	Endrin ketone	mg/kg	0.05	<0.05			<0.05						
	g-BHC (Lindane)	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0				
	Heptachlor	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0				
	Heptachlor epoxide	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0				
	Methoxychlor	mg/kg	0.2 (Primary): 0.1 (Interlab)	<0.2	<0.1	0	<0.2	<0.1	0				
OPPs	Azinophos methyl	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05			<0.05						
	Bromophos-ethyl	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0				
	Carbophenothion	mg/kg	0.05	<0.05			<0.05						
	Chlorfenvinphos	mg/kg	0.05	<0.05			<0.05						
	Chlorpyrifos	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0				
	Chlorpyrifos-methyl	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0				
	Diazinon	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0				
	Dichlorvos	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05			<0.05						
	Dimethoate	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0				
	Ethion	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0				
	Fenthion	mg/kg	0.05	<0.05			<0.05						
	Malathion	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05			<0.05						
	Methyl parathion	mg/kg	0.2	<0.2			<0.2						
	Monocrotophos	mg/kg	0.2	<0.2			<0.2						
	Prothiofos	mg/kg	0.05	<0.05			<0.05						
Phenols	2,4-dimethylphenol	mg/kg	0.5										
	2-methylphenol	mg/kg	0.5										
	2-nitrophenol	mg/kg	0.5										
	3-&4-methylphenol	mg/kg	1										
	4-chloro-3-methylphenol	mg/kg	0.5										
PAHs	Acenaphthene	mg/kg	0.5 (Primary): 0.1 (Interlab)								<0.5	<0.1	0
	Acenaphthylene	mg/kg	0.5 (Primary): 0.1 (Interlab)								<0.5	<0.1	0
	Anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)								<0.5	<0.1	0
	Benz(a)anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)								<0.5	<0.1	0
	Benzo(a) pyrene	mg/kg	0.5								<1.2	<0.5	0
	Benzo(g,h,i)perylene	mg/kg	0.5 (Primary): 0.1 (Interlab)								<0.5	<0.1	0
	Benzo(k)fluoranthene	mg/kg	0.5								<0.5		
	Benzo[b+j]fluoranthene	mg/kg	0.5								<0.5		
	Chrysene	mg/kg	0.5 (Primary): 0.1 (Interlab)								<0.5	<0.1	0
	Dibenz(a,h)anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)								<0.5	<0.1	0
	Fluoranthene	mg/kg	0.5 (Primary): 0.1 (Interlab)								<0.5	<0.1	0
	Fluorene	mg/kg	0.5 (Primary): 0.1 (Interlab)								<0.5	<0.1	0
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.5 (Primary): 0.1 (Interlab)								<0.5	<0.1	0
	Naphthalene	mg/kg	1 (Primary): 0.1 (Interlab)								<1.0	<0.1	0
	Naphthalene	mg/kg	0.5 (Primary): 1 (Interlab)								<0.5	<0.1	0
	Phenanthrene	mg/kg	0.5 (Primary): 0.1 (Interlab)								<0.5	<0.1	0
	Phenol	mg/kg	0.5										
	Pyrene	mg/kg	0.5 (Primary): 0.1 (Interlab)								<0.5	<0.1	0
PCB	PCBs (Sum of total)	mg/kg	0.1										
TRH	C6-C10	mg/kg	10 (Primary): 25 (Interlab)								<10.0	<25.0	0
	>C10-C16	mg/kg	50								<50.0	<50.0	0
	>C16-C34	mg/kg	100								<100.0	<100.0	0
	>C34-C40	mg/kg	100								<100.0	<100.0	0
	C10 - C40 (Sum of total)	mg/kg	50								<50.0		
	F1 C6-C10 less BTEX	mg/kg	10 (Primary): 25 (Interlab)								<10.0	<25.0	0
	F2 C10-C16 less Naphthalene	mg/kg	50								<50.0	<50.0	0

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

High RPDs are in **bold (Acceptable RPDs for each EQL multiplier range are: 100 (0-5 x EQL); 75 (5-1

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. An

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Table B7
Soil RPDs

Molonglo Valley Stage 3
Area A
39275.001

				Sample ID	ALSE-Sydney TP89 0.0-0.1	EnviroLab Trip141210	RPD	ALSE-Sydney TP50 1.0-1.2	EnviroLab TRIP2-200115	RPD	ALSE-Sydney TP81 0.0-0.1	EnviroLab TRIP4-210115	RPD
				Sampled Date	10/12/2014	10/12/2014	%	20/01/2015	20/01/2015	%	21/01/2015	21/01/2015	%
		Units	EQL										
BTEX	Benzene	mg/kg	0.2				<0.2	<0.2	0			
	Toluene	mg/kg	0.5				<0.5	<0.5	0			
	Ethylbenzene	mg/kg	0.5 (Primary): 1 (Interlab)				<0.5	<1.0	0			
	Xylene (o)	mg/kg	0.5 (Primary): 1 (Interlab)				<0.5	<1.0	0			
	Xylene (m & p)	mg/kg	0.5 (Primary): 2 (Interlab)				<0.5	<2.0	0			
	Xylene Total	mg/kg	0.5				<0.5					
Herbicides	Atrazine	mg/kg	0.05 (Primary): 0.5 (Interlab)							<0.05	<0.5	0
	Simazine	mg/kg	0.05 (Primary): 0.5 (Interlab)							<0.05	<0.5	0
Metals	Arsenic	mg/kg	5 (Primary): 4 (Interlab)	16.0	15.0	6	**18.0**	**75.0**	**123**	<5.0	5.0	0
	Cadmium	mg/kg	1 (Primary): 0.4 (Interlab)	<1.0	<0.4	0	<1.0	<0.4	0	<1.0	<0.4	0
	Chromium (III+VI)	mg/kg	2 (Primary): 1 (Interlab)	35.0	34.0	3	18.0	15.0	18	50.0	49.0	2
	Copper	mg/kg	5 (Primary): 1 (Interlab)	6.0	5.0	18	13.0	15.0	14	<5.0	4.0	0
	Lead	mg/kg	5 (Primary): 1 (Interlab)	8.0	7.0	13	**10.0**	**15.0**	**40**	6.0	9.0	40
	Mercury	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0
	Nickel	mg/kg	2 (Primary): 1 (Interlab)	15.0	13.0	14	14.0	10.0	33	19.0	18.0	5
	Zinc	mg/kg	5 (Primary): 1 (Interlab)	51.0	44.0	15	53.0	40.0	28	51.0	57.0	11
OCPs	4,4-DDE	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0	<0.05	<0.1	0
	a-BHC	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0	<0.05	<0.1	0
	Aldrin	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0	<0.05	<0.1	0
	Aldrin + Dieldrin	mg/kg	0.05	<0.05			<0.05			<0.05		
	b-BHC	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0	<0.05	<0.1	0
	chlordane	mg/kg	0.05	<0.05			<0.05			<0.05		
	Chlordane (cis)	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0	<0.05	<0.1	0
	Chlordane (trans)	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0	<0.05	<0.1	0
	d-BHC	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0	<0.05	<0.1	0
	DDD	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0	<0.05	<0.1	0
	DDT	mg/kg	0.2 (Primary): 0.1 (Interlab)	<0.2	<0.1	0	<0.2	<0.1	0	<0.2	<0.1	0
	DDT+DDE+DDD	mg/kg	0.05	<0.05			<0.05			<0.05		
	Dieldrin	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0	<0.05	<0.1	0
	Endosulfan	mg/kg	0.05	<0.05			<0.05			<0.05		
	Endosulfan I	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0	<0.05	<0.1	0
	Endosulfan II	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0	<0.05	<0.1	0
	Endosulfan sulphate	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0	<0.05	<0.1	0
	Endrin	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0	<0.05	<0.1	0
	Endrin aldehyde	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0	<0.05	<0.1	0
	Endrin ketone	mg/kg	0.05	<0.05			<0.05			<0.05		
	g-BHC (Lindane)	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0	<0.05	<0.1	0
	Heptachlor	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0	<0.05	<0.1	0
	Heptachlor epoxide	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0	<0.05	<0.1	0
	Methoxychlor	mg/kg	0.2 (Primary): 0.1 (Interlab)	<0.2	<0.1	0	<0.2	<0.1	0	<0.2	<0.1	0
OPPs	Azinophos methyl	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05			<0.05	<0.1	0	<0.05	<0.1	0
	Bromophos-ethyl	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0	<0.05	<0.1	0
	Carbophenothion	mg/kg	0.05	<0.05			<0.05			<0.05		
	Chlorfenvinphos	mg/kg	0.05	<0.05			<0.05			<0.05		
	Chlorpyrifos	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0	<0.05	<0.1	0
	Chlorpyrifos-methyl	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0	<0.05	<0.1	0
	Diazinon	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0	<0.05	<0.1	0
	Dichlorvos	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05			<0.05	<0.1	0	<0.05	<0.1	0
	Dimethoate	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0	<0.05	<0.1	0
	Ethion	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05	<0.1	0	<0.05	<0.1	0	<0.05	<0.1	0
	Fenthion	mg/kg	0.05	<0.05			<0.05			<0.05		
	Malathion	mg/kg	0.05 (Primary): 0.1 (Interlab)	<0.05			<0.05	<0.1	0	<0.05	<0.1	0
	Methyl parathion	mg/kg	0.2	<0.2			<0.2			<0.2		
	Monocrotophos	mg/kg	0.2	<0.2			<0.2			<0.2		
	Prothiofos	mg/kg	0.05	<0.05			<0.05			<0.05		
Phenols	2,4-dimethylphenol	mg/kg	0.5				<0.5					
	2-methylphenol	mg/kg	0.5				<0.5					
	2-nitrophenol	mg/kg	0.5				<0.5					
	3-&4-methylphenol	mg/kg	1				<1.0					
	4-chloro-3-methylphenol	mg/kg	0.5				<0.5					
PAHs	Acenaphthene	mg/kg	0.5 (Primary): 0.1 (Interlab)				<0.5	<0.1	0			
	Acenaphthylene	mg/kg	0.5 (Primary): 0.1 (Interlab)				<0.5	<0.1	0			
	Anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)				<0.5	<0.1	0			
	Benz(a)anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)				<0.5	<0.1	0			
	Benzo(a) pyrene	mg/kg	0.5				<1.2	<0.5	0			
	Benzo(g,h,i)perylene	mg/kg	0.5 (Primary): 0.1 (Interlab)				<0.5	<0.1	0			
	Benzo(k)fluoranthene	mg/kg	0.5				<0.5					
	Benzo[b+j]fluoranthene	mg/kg	0.5				<0.5					
	Chrysene	mg/kg	0.5 (Primary): 0.1 (Interlab)				<0.5	<0.1	0			
	Dibenz(a,h)anthracene	mg/kg	0.5 (Primary): 0.1 (Interlab)				<0.5	<0.1	0			
	Fluoranthene	mg/kg	0.5 (Primary): 0.1 (Interlab)				<0.5	<0.1	0			
	Fluorene	mg/kg	0.5 (Primary): 0.1 (Interlab)				<0.5	<0.1	0			
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.5 (Primary): 0.1 (Interlab)				<0.5	<0.1	0			
	Naphthalene	mg/kg	1 (Primary): 0.1 (Interlab)				<1.0	<0.1	0			
	Naphthalene	mg/kg	0.5 (Primary): 1 (Interlab)				<0.5	<0.1	0			
	Phenanthrene	mg/kg	0.5 (Primary): 0.1 (Interlab)				<0.5	<0.1	0			
	Phenol	mg/kg	0.5				<0.5					
	Pyrene	mg/kg	0.5 (Primary): 0.1 (Interlab)				<0.5	<0.1	0			
PCB	PCBs (Sum of total)	mg/kg	0.1				<0.1					
TRH	C6-C10	mg/kg	10 (Primary): 25 (Interlab)				<10.0	<25.0	0			
	>C10-C16	mg/kg	50				<50.0	<50.0	0			
	>C16-C34	mg/kg	100				<100.0	<100.0	0			
	>C34-C40	mg/kg	100				<100.0	<100.0	0			
	C10 - C40 (Sum of total)	mg/kg	50				<50.0					
	F1 C6-C10 less BTEX	mg/kg	10 (Primary): 25 (Interlab)				<10.0	<25.0	0			
	F2 C10-C16 less Naphthalene	mg/kg	50				<50.0	<50.0	0			

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

High RPDs are in **bold (Acceptable RPDs for each EQL multiplier range are: 100 (0-5 x EQL); 75 (5-1(

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. An

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Table B7a
Soil Trip Blanks

Molonglo Valley Stage 3
Area A
39275.001

Field_ID	TRIP BLANK
Sampled_Date-Time	13/01/2015
Sample_Type	Trip_B

Chem_Group	ChemName	Units	EQL	
BTEX	Benzene	mg/kg	0.2	<0.2
	Toluene	mg/kg	0.5	<0.5
	Ethylbenzene	mg/kg	0.5	<0.5
	Xylene (o)	mg/kg	0.5	<0.5
	Xylene (m & p)	mg/kg	0.5	<0.5
	Xylene Total	mg/kg	0.5	<0.5
	Total BTEX	mg/kg	0.2	<0.2
	Naphthalene	mg/kg	0.5	<1
Total Recoverable Hydrocarbons	C6 - C9	mg/kg	10	<10
	C6-C10	mg/kg	10	<10
	F1 C6-C10 less BTEX	mg/kg	10	<10

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Table B8
Surface Water RPDs

Molonglo Valley Stage 3
Area A
39275.001

				ALSE-Sydney	ALSE-Sydney		ALSE-Sydney	Interlab_D (EnviroLab)	
			Sample ID	**SW03**	**DUPW - 210115**	**RPD**	**SW03**	**TRIPW-210115**	**RPD**
			Sampled Date	21/01/2015	21/01/2015		21/01/2015	21/01/2015	
		Units	**EQL**						
Metals	Arsenic (Filtered)	mg/l	0.001	<0.001	<0.001	0	<0.001	<0.001	0
	Cadmium (Filtered)	mg/l	0.0001	<0.0001	<0.0001	0	<0.0001	<0.0001	0
	Chromium (III+VI) (Filtered)	mg/l	0.001	<0.001	<0.001	0	<0.001	<0.001	0
	Copper (Filtered)	mg/l	0.001	<0.001	<0.001	0	<0.001	<0.001	0
	Lead (Filtered)	mg/l	0.001	<0.001	<0.001	0	<0.001	<0.001	0
	Mercury (Filtered)	mg/l	0.0001 (Primary): 0.00005 (Interlab)	<0.0001	<0.0001	0	<0.0001	<0.0001	0
	Nickel (Filtered)	mg/l	0.001	<0.001	<0.001	0	<0.001	<0.001	0
	Phosphorus	mg/l	0.01 (Primary): 0.05 (Interlab)	0.03	0.04	29	0.03	<0.05	0
	Zinc (Filtered)	mg/l	0.005 (Primary): 0.001 (Interlab)	0.008	0.006	29	0.008	0.005	46
Nutrients	Ammonia as N	µg/l	10	<10.0	20.0	67	<10.0	-	-
	Nitrogen (Total Oxidised)	mg/l	0.01	5.35	5.49	3	5.35	-	-

*RPDs have only been considered where a concentration is greater than 0 times the EQL.
High RPDs are in **bold (Acceptable RPDs for each EQL multiplier range are: 100 (0-5 x EQL); 75 (5-10 x EQL); 30 (> 10 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory - Not analysed

Table B9
WSP (2012) Soil Summary Results

Molonglo Valley Stage 3
Area A
39275.001

									TPH					Metals								PAH																			
			,	,	,	,	,	,	,	TPH C6 - C9	TPH C10 - C14	TPH C15 - C28	TPH C29-C36	TPH+C10 - C36 (Sum of total)	Lead	Arsenic	Cadmium	Chromium (III+VI)	Copper	Mercury (inorganic)	Nickel	Zinc	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a) pyrene	Benzo(b)&(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Benzo(a) pyrene (TEQ) Half LOR	Sum of PAHs (Half LOR)
									mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL									25	50	100	100		1	4	0.5	1	1	0.1	1	1	0.1	0.1	0.1	0.1	0.05	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
NEPM HIL-A Residential			-	-	-	-	-	-	-	-	-	-	-	-	300	100	20	100	6000	40	400	7400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	300
NEPM HIL-C Recreational			-	-	-	-	-	-	-	-	-	-	-	-	600	300	90	300	17000	80	1200	30000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	300
NEPM HSL-A/B, 0m to <1m, Sand, Soil			-	-	-	-	-	-	45	110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
NEPM EIL, Urban Res & Open Space			-	-	-	-	-	-	-	-	-	-	-	1100 - 1113	100	-	427 - 431	307 - 311	-	42 - 189	273 - 451	-	-	-	-	0.7	-	-	-	-	-	-	-	-	170	-	-	-	-
NEPM ESL, Urban Res & Open Space, Coarse			-	-	-	-	-	-	180	120	300	2800	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NEPM ML Residential, Parkland & Open Space, Coarse			-	-	-	-	-	-	*700*	-	*2500*	*10,000*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sample ID	Location	Sampled Date	Sample Depth (Avg)																																						
SS2	SS2	30/05/2012	0.05	-	-	-	-	-	-	-	-	<50	<100	<100	<250	10	<4	<0.5	16	4	<0.1	4	15	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.15	<0.8
SS3	SS3	30/05/2012	0.05	-	-	-	-	-	-	-	-	<50	<200 - 1800*	<200 - 930*	<500 - 2755*	8	<4	<0.5	9	4	<0.1	3	24	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.15	<0.8
SS4	SS4	30/05/2012	0.05	-	-	-	-	-	-	-	-	<50	<100	<100	<250	7	<4	<0.5	9	3	<0.1	2	11	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.15	<0.8
SS5	SS5	30/05/2012	0.05	-	-	-	-	-	-	-	-	<50	<100	<100	<250	11	<4	<0.5	24	5	<0.1	7	27	<0.1	<0.1	<0.1	<0.1	<0.05	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.15	<0.8

Table Notes:

- * TPH analysis was repeated with silica gel cleanup because of high reported results. Silica gel cleanup results indicated that high concentrations are naturally occuring, which is consistent with the high fraction of organic matter of the sample.
- Criteria has been updated to NEPM, 2013. Note that TRH fractions have been used as a 'best fit' due to the change in reporting for NEPM, 2013. This also applies to benzo(a)pyrene TEQ changes in methodology.
- EILs have been derived from 2015 data collected by WSP.

									Organochlorine Pesticides																Organophosphorus Pesticides								Triazine Herbicides				
									4,4-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane (cis)	Chlordane (trans)	d-BHC	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Hexachlorobenzene	Methoxychlor	Bromophos-ethyl	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dimethoate	Ethion	Fenitrothion	Ronnel	Atrazine	Hexazinone	Metribuzin	Prometryn	Simazine
									mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL									0.05	0.05	0.05		0.05	0.05	0.05	0.05	0.05	0.1		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	0.05	0.05	0.05	0.05	0.05	0.05	0.1	0.1	0.1	0.1	0.1
NEPM HIL-A Residential			-	-	-	6	-	50	-	-	-	-	-	-	-	-	-	-	240	-	270	-	-	10	-	-	6	-	10	300	-	160	-	-	-	-	-	-	320	-	-	-	-
NEPM HIL-C Recreational			-	-	-	10	-	70	-	-	-	-	-	-	-	-	-	-	400	-	340	-	-	20	-	-	10	-	10	400	-	250	-	-	-	-	-	-	400	-	-	-	-
NEPM HSL-A/B, 0m to <1m, Sand, Soil			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NEPM EIL, Urban Res & Open Space			-	-	-	-	-	-	-	-	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NEPM ESL, Urban Res & Open Space, Coarse			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NEPM ML Residential, Parkland & Open Space, Coarse			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Sample ID	Location	Sampled Date	Sample Depth (Avg)																																								
SS2	SS2	30/05/2012	0.05	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
SS3	SS3	30/05/2012	0.05	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
SS4	SS4	30/05/2012	0.05	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
SS5	SS5	30/05/2012	0.05	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Printed Date: 18/06/2015

Appendix D Borelogs

Test Pit Log

Pit ID. TP01

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.20 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**686536.09**
Date Started:	**8/12/2014**	Northing:	**6090695.42**
Date Completed:	**8/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: pH	Samples / Tests: Sample Method	Observations / Comments
	0.20			Fill	**FILL** - Silty CLAY, yellow brown, very soft.	dry	0.0	TP01_0.0-0.2 (ASB)	6.0	HA	No hydrocarbon odour. No staining. ASB 11.1kg. No fragments.
	0.4				**End of Hole at 0.20m (target depth)**						
	0.6										
	0.8										
	1.0										
	1.2										
	1.4										
	1.6										
	1.8										
	2.0										

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **8/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:25 PM

Test Pit Log

Pit ID. TP02

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.25 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**686555.63**
Date Started:	**8/12/2014**	Northing:	**6090674.62**
Date Completed:	**8/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
	0.2 *0.25*			Fill	**FILL** - Silty CLAY, yellow brown and yellow grey, very soft.	dry	0.0	TP02_0.0-0.2 (ASB)	HA	No hydrocarbon odour. No staining. ABS 12.2kg. No fragments.
	0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0				**End of Hole at 0.25m (target depth)**					

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **8/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:26 PM

Test Pit Log

Pit ID. TP03

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.30 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**686563.82**
Date Started:	**8/12/2014**	Northing:	**6090704.25**
Date Completed:	**8/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
	0.2			Fill	**FILL** - Silty CLAY, yellow brown and brown, very soft to soft, with rare wood mulch.	dry	0.0	TP03_0.0-0.2 (ASB)	HA	No hydrocarbon odour. No staining. ABS 11.4kg. No fragments.
	0.30				**End of Hole at 0.30m (target depth)**					
	0.4									
	0.6									
	0.8									
	1.0									
	1.2									
	1.4									
	1.6									
	1.8									
	2.0									

Observations		
Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **8/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:27 PM

Test Pit Log

Pit ID. **TP04**

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.25 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**687327.97**
Date Started:	**9/12/2014**	Northing:	**6093327.38**
Date Completed:	**9/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
	0.2 *0.25*			Natural	**TOPSOIL. Sandy CLAY** - red brown, very soft to soft, with rootlets.	dry	0.0	TP04_0.0-0.1	HA	No hydrocarbon odour. No staining.
					End of Hole at 0.25m (target depth)					

0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **9/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:27 PM

Test Pit Log

Pit ID. TP05

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.20 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**687131.56**
Date Started:	**9/12/2014**	Northing:	**6092929.81**
Date Completed:	**9/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	ID No.	pH	Sample Method	DUP TRIP QC	Observations / Comments
	0.20			Natural	**TOPSOIL. Sandy CLAY** - rich brown, very soft, with rootlets throughout.	moist	0.0	TP05_0.0-0.1	6.0	HA	Dup_141209_1 Trip_141209_1	No hydrocarbon odour. No staining.
					End of Hole at 0.20m (target depth)							

0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

Observations

Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **9/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:28 PM

Test Pit Log

Pit ID. **TP06**

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.15 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**687024.49**
Date Started:	**9/12/2014**	Northing:	**6092542.37**
Date Completed:	**9/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
	0.15			Natural	**TOPSOIL. Sandy CLAY** - dark brown, soft.	dry	0.0	TP06_0.0-0.1	HA	No hydrocarbon odour. No staining.
	0.2				**End of Hole at 0.15m (target depth)**					
	0.4									
	0.6									
	0.8									
	1.0									
	1.2									
	1.4									
	1.6									
	1.8									
	2.0									

Observations

Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **9/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

Test Pit Log

Pit ID. **TP07**

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.20 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**687478.78**
Date Started:	**9/12/2014**	Northing:	**6092101.03**
Date Completed:	**9/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: pH	Samples / Tests: Sample Method	Observations / Comments
	0.20			Natural	**TOPSOIL. Sandy CLAY** - red brown, very soft to soft, with rootlets.	dry	0.0	TP07_0.0-0.1	5.5	HA	No hydrocarbon odour. No staining.
					End of Hole at 0.20m (target depth)						

0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **9/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:30 PM

Test Pit Log

Pit ID. **TP08**

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.25 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**687399.41**
Date Started:	**9/12/2014**	Northing:	**6091636.68**
Date Completed:	**9/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
	0.2 ***0.25***		SC	Natural	**Clayey SAND** - yellow brown and red brown, medium dense, with occasional coarse sandstone, fine to medium purple igneous gravel, sub rounded to sub angular.	dry	0.0	TP08_0.0-0.1	HA	No hydrocarbon odour. No staining.
					End of Hole at 0.25m (refusal)					

0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

Observations

Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **9/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:30 PM

Test Pit Log

Pit ID. TP09

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.30 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**687264.47**
Date Started:	**9/12/2014**	Northing:	**6091216.00**
Date Completed:	**9/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: pH	Samples / Tests: Sample Method	Observations / Comments
	0.2			Natural	**TOPSOIL. Sandy CLAY** - dark brown, soft.	moist	0.0	TP09_0.0-0.1	6.5	HA	No hydrocarbon odour. No staining.
	0.30				**End of Hole at 0.30m (target depth)**						
	0.4										
	0.6										
	0.8										
	1.0										
	1.2										
	1.4										
	1.6										
	1.8										
	2.0										

Observations

Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **9/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:31 PM

Test Pit Log

Pit ID. TP18

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.50 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686340.96**
Date Started:	**20/01/2015**	Northing:	**6092089.64**
Date Completed:	**20/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Observations / Comments
					Grass.		
	0.2 0.4 0.50			Reworked Natural	**Gravelly CLAY** - orange / brown, firm, with rootlets, cobbles (20%).	moist	Reworked Natural Soils. No hydrocarbon odour. No staining.
	0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0				**End of Hole at 0.50m (target depth)** Observation pit only. No samples taken.		

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **20/01/2015**
Checked By: **Peter Moore** Date: **30/01/2015**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:32 PM

Test Pit Log

Pit ID. TP19

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.50 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686519.97**
Date Started:	**20/01/2015**	Northing:	**6091892.31**
Date Completed:	**20/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Observations / Comments
					Grass.		
	0.2 0.4 0.50			Reworked Natural	**Gravelly CLAY** - orange / brown, firm, with rootlets, cobbles (20%).	moist	Reworked Natural Soils. No hydrocarbon odour. No staining.
	0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0				**End of Hole at 0.50m (target depth)** Observation pit only. No samples taken.		

Observations

Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

Sewer line may run close as manhole located 20m to the West.

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **20/01/2015**
Checked By: **Peter Moore** Date: **30/01/2015**

Test Pit Log

Pit ID. TP44

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.30 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**687218.61**
Date Started:	**8/12/2014**	Northing:	**6090152.27**
Date Completed:	**8/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
	0.2			Fill	**FILL** - CLAY and Mulched Wood, brown, soft.	moist	0.0	TP44_0.0-0.2	HA	No hydrocarbon odour. No staining.
	0.30				**End of Hole at 0.30m (target depth)**					
	0.4									
	0.6									
	0.8									
	1.0									
	1.2									
	1.4									
	1.6									
	1.8									
	2.0									

Observations

Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

Wood mulch stockpile.

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **8/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

Test Pit Log

Pit ID. TP45

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.25 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**687372.88**
Date Started:	**8/12/2014**	Northing:	**6090406.47**
Date Completed:	**8/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
	0.2 *0.25*			Fill	**FILL** - Sandy CLAY, yellow brown, soft, with rare gravel and wood chips.	dry	0.0	TP45_0.0-0.2	HA	No hydrocarbon odour. No staining.
	0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0				**End of Hole at 0.25m (target depth)**					

Observations

Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

Soil and mulch stockpile.

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **8/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

Test Pit Log

Pit ID. TP46

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.30 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**687004.24**
Date Started:	**8/12/2014**	Northing:	**6090689.25**
Date Completed:	**8/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: pH	Samples / Tests: Sample Method	Samples / Tests: DUP TRIP QC	Observations / Comments
	0.2			Fill	**FILL** - Sandy CLAY, light brown and dark brown, soft.	dry	0.0	TP46_0.1-0.2	6.0	HA	Dup_141208 Trip_141208	No hydrocarbon odour. No staining.
	0.30				**End of Hole at 0.30m (target depth)**							
	0.4											
	0.6											
	0.8											
	1.0											
	1.2											
	1.4											
	1.6											
	1.8											
	2.0											

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **8/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:34 PM

Test Pit Log

Pit ID. TP47

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.25 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**687020.51**
Date Started:	**8/12/2014**	Northing:	**6090689.25**
Date Completed:	**8/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
	0.2 *0.25*			Fill	**FILL** - Sandy CLAY, yellow orange, yellow brown and black, soft to firm, with minor gravel, charcoal and igneous rock.	dry	0.0	TP47_0.1-0.2	HA	No hydrocarbon odour. No staining.
	0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0				**End of Hole at 0.25m (target depth)**					

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **8/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:35 PM

Test Pit Log

Pit ID. TP48

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.25 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**686998.28**
Date Started:	**8/12/2014**	Northing:	**6090677.74**
Date Completed:	**8/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
	0.2 ***0.25***			Fill	**FILL** - Sandy CLAY, dark brown, soft, with occasional wood mulch.	moist	0.0	TP48_0.1-0.2	HA	No hydrocarbon odour. No staining.
	0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0				**End of Hole at 0.25m (target depth)**					

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **8/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:36 PM

Test Pit Log

Pit ID. TP49

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.20 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**687012.57**
Date Started:	**8/12/2014**	Northing:	**6090676.95**
Date Completed:	**8/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
	0.20			Fill	**FILL** - Sandy CLAY, grey brown and brown, firm.	dry	0.0	TP49_0.1-0.2	HA	No hydrocarbon odour. No staining.
	0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0				**End of Hole at 0.20m (target depth)**					

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **8/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:36 PM

Test Pit Log

Pit ID. TP50

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**2.70 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686709.08**
Date Started:	**20/01/2015**	Northing:	**6091445.35**
Date Completed:	**20/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Samples / Tests: DUP TRIP QC	Observations / Comments
					Grass and weeds.						
	0.50			Fill	**FILL** - Gravelly CLAY, brown, soft, gravels and cobbles (25%).	moist	0.0	TP50_0.1-0.2	Grab		No hydrocarbon odour. No staining.
	1.0			Fill	**FILL** - Gravelly CLAY, light grey, soft, gravels and cobbles (40%).	moist	0.0	TP50_1.0-1.2 (ASB)	Grab	Dup2_200115 Trip2_200115	No hydrocarbon odour. No staining.
	1.5			Fill							
	2.0			Fill							
	2.5			Fill							
	2.70			Fill							
	3.0				**End of Hole at 2.70m (collapse)**						

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **20/01/2015**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:37 PM

Test Pit Log

Pit ID. TP51

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**2.70 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686741.89**
Date Started:	**20/01/2015**	Northing:	**6091445.35**
Date Completed:	**20/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
					Grass and weeds.					
	0.20			Fill	**FILL** - Gravelly CLAY, brown, soft, with rootlets.	moist	0.0	TP51_0.0-0.1	Grab	No hydrocarbon odour. No staining.
	0.5				**FILL** - Gravelly CLAY, grey to brown, soft, gravels and cobbles (50%).	moist	0.0	TP51_0.8-1.0 (ASB)	Grab	No hydrocarbon odour. No staining. Minor detonation wire in matrix.
	1.0									
	1.5									
	2.0									
	2.5									
	2.70				**End of Hole at 2.70m (collapse)**					
	3.0									

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **20/01/2015**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:38 PM

Test Pit Log

Pit ID. TP52

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**3.00 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686691.09**
Date Started:	**20/01/2015**	Northing:	**6091422.60**
Date Completed:	**20/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
					Grass and weeds.					
	0.5			Fill	**FILL** - Gravelly CLAY, brown to grey, soft, with rootlets, gravels and cobbles (30%), cobbles 100 to 300mm Ø.	moist to dry	0.0	TP52_0.0-0.1	Grab	No hydrocarbon odour. No staining.
	1.0						0.0	TP52_1.0-1.2	Grab	
	1.5									
	2.0									
	2.20									
	2.5		CL	Natural	**Gravelly CLAY** - orange / brown to light brown, firm, gravels and cobbles (15%).	moist	0.0	TP52_2.4-2.5	Grab	No hydrocarbon odour. No staining.
	3.00									
					End of Hole at 3.00m (natural)					

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **20/01/2015**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:39 PM

Test Pit Log

Pit ID. TP53

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**3.00 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686713.31**
Date Started:	**20/01/2015**	Northing:	**6091422.60**
Date Completed:	**20/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
					Grass and weeds.					
	0.5			Fill	**FILL** - Gravelly CLAY, brown, soft, with rootlets, gravels and cobbles (30%).	moist to dry	0.0	TP53_0.0-0.1	Grab	No hydrocarbon odour. No staining.
	1.0						0.0	TP53_0.4-0.6 (ASB)	Grab	
	1.5									
	2.0									
	2.5									
	2.60		CL	Natural	**Gravelly CLAY** - orange / brown, firm, gravels and cobbles (15%).	moist	0.0	TP53_2.7-2.9	Grab	No hydrocarbon odour. No staining.
	3.00				**End of Hole at 3.00m (natural)**					

Observations		
Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **20/01/2015**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:40 PM

Test Pit Log

Pit ID. TP54

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**2.30 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686742.41**
Date Started:	**20/01/2015**	Northing:	**6091424.71**
Date Completed:	**20/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
					Grass and weeds.					
	0.5			Fill	**FILL** - Gravelly CLAY, brown, soft.	moist	0.0	TP54_0.0-0.1 (ASB)	Grab	No hydrocarbon odour. No staining. Collapsing into hole.
	1.0						0.0	TP54_1.0-1.2	Grab	
	1.5									
	2.0									
	2.30				**End of Hole at 2.30m (collapse)**					
	2.5									
	3.0									

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **20/01/2015**
Checked By: **Blake Dickson** Date: **20/12/2014**

Test Pit Log

Pit ID. TP55

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**2.60 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686770.46**
Date Started:	**20/01/2015**	Northing:	**6091421.54**
Date Completed:	**20/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
					Grass and weeds.					
	0.5			Fill	**FILL** - Gravelly CLAY, light grey to light brown, soft, with rootlets, gravels and cobbles (20%).	dry to moist	0.0	TP55_0.0-0.1	Grab	No hydrocarbon odour. No staining. Minor detonation wire.
	1.0						0.0	TP55_0.8-1.0 (ASB)	Grab	
	1.5									
	2.0									
	2.20									
	2.5		CL	Natural	**CLAY** - dark brown, stiff.	moist	0.0	TP55_2.2-2.4	Grab	No hydrocarbon odour. No staining.
	2.60				**End of Hole at 2.60m (natural)**					
	3.0									

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **20/01/2015**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:41 PM

Test Pit Log

Pit ID. TP56

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**2.40 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686665.76**
Date Started:	**20/01/2015**	Northing:	**6091397.67**
Date Completed:	**20/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Observations / Comments
					Grass and weeds.				
	0.5 1.0 1.5 **1.90**			Fill	**FILL** - Gravelly CLAY, dark brown to grey, soft, with rootlets, gravels and cobbles (40%).	moist	0.0	TP56_0.0-0.1	No hydrocarbon odour. No staining. Collapsing from sides.
	2.0 **2.40**		CL	Natural	**Sandy CLAY** - light brown, soft, cobbles (15%).	moist to dry	0.0	TP56_2.0-2.2	No hydrocarbon odour. No staining.
	2.5 3.0				**End of Hole at 2.40m (natural)**				

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **20/01/2015**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:42 PM

Test Pit Log

Pit ID. TP57

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**1.80 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686693.36**
Date Started:	**20/01/2015**	Northing:	**6091397.71**
Date Completed:	**20/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
					Grass and weeds.					
	0.5 1.0 1.40			Fill	**FILL** - GRAVELS and COBBLES, dark grey, loose, rootlets, clayey sand (20%), loose rook (80%).	moist	0.0	TP57_0.0-0.1	Grab	No hydrocarbon odour. No staining.
	1.5 1.80		GP	Natural	**Clayey GRAVEL** - orange / brown, loose, gravels (20%), trace sand.	moist	0.0	TP57_1.5-1.6	Grab	No hydrocarbon odour. No staining.
	2.0 2.5 3.0				**End of Hole at 1.80m (natural)**					

Observations

Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **20/01/2015**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:43 PM

Test Pit Log

Pit ID. TP58

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**1.50 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686714.75**
Date Started:	**20/01/2015**	Northing:	**6091401.69**
Date Completed:	**20/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Samples / Tests: DUP TRIP QC	Observations / Comments
					Grass and weeds.						
	0.5			Fill	**FILL** - Clayey GRAVEL, brown, loose, with concrete and metal fragments throughout (25%), electrical wiring, pneumatic hoses, corroded drum top, plastics, rope.	moist	0.0	TP58_0.0-0.1	Grab		No hydrocarbon odour. No staining.
	1.00						0.0	TP58_0.5-0.7 (ASB)	Grab	Dup1_ 200115 Trip1_ 200115	
					FILL - Clayey GRAVEL, brown, loose, with concrete and metal fragments throughout (25%), large concrete blacks with reinforcement bar, layered on top of each other.	moist					No hydrocarbon odour. No staining.
	1.50						0.0	TP58_1.3-1.5	Grab		
	2.0				**End of Hole at 1.50m (refusal on large concrete blocks)**						
	2.5										
	3.0										

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **20/01/2015**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:44 PM

Test Pit Log

Pit ID. TP59

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.75 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686745.59**
Date Started:	**20/01/2015**	Northing:	**6091401.96**
Date Completed:	**20/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
					Grass and weeds.					
	0.2			Fill	**FILL** - Gravelly Sandy CLAY, dark brown, soft, with rootlets, gravels (20%).	moist	0.0	TP59_0.0-0.1	Grab	No hydrocarbon odour. No staining.
	0.40									
	0.6		CL	Natural	**Gravelly CLAY with Cobbles** - light brown, hard, compacted, cobbles and gravels (40%).	dry to moist	0.0	TP59_0.6-0.75	Grab	No hydrocarbon odour. No staining.
	0.75									
	0.8				**End of Hole at 0.75m (refusal on cobbles)**					
	1.0									
	1.2									
	1.4									
	1.6									
	1.8									
	2.0									

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **20/01/2015**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:44 PM

Test Pit Log

Pit ID. TP60

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.80 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686784.22**
Date Started:	**20/01/2015**	Northing:	**6091399.84**
Date Completed:	**20/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
					Grass and weeds.					
	0.2			Fill	**FILL** - Gravelly Sandy CLAY, dark brown, soft, with rootlets, gravels (20%).	moist	0.0	TP60_0.0-0.1	Grab	No hydrocarbon odour. No staining.
	0.30									
	0.4		CL	Natural	**Gravelly CLAY with Cobbles** - light brown, hard, compacted, cobbles and gravels (40%).	dry to moist	0.0	TP60_0.4-0.5	Grab	No hydrocarbon odour. No staining.
	0.6									
	0.80				**End of Hole at 0.80m (refusal on cobbles)**					
	1.0									
	1.2									
	1.4									
	1.6									
	1.8									
	2.0									

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **20/01/2015**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:45 PM

Test Pit Log

Pit ID. TP61

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**2.00 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686818.09**
Date Started:	**20/01/2015**	Northing:	**6091395.61**
Date Completed:	**20/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
					Grass and weeds.					
	0.5 1.0 1.5 ***1.70***			Fill	**FILL** - Sandy CLAY, Cobbles and Gravel, dark brown, soft, with rootlets, gravels and cobbles (40%).	moist	0.0	TP61_0.0-0.1 (ASB)	Grab	No hydrocarbon odour. No staining.
	2.00		CL	Natural	**Sandy Gravelly CLAY** - dark brown, soft.	moist	0.0	TP61_1.8-2.0	Grab	Natural odour.
	2.5 3.0				**End of Hole at 2.00m (refusal on bedrock)**					

Observations

Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **20/01/2015**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:46 PM

Test Pit Log

Pit ID. TP62

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.25 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Shovel**	Easting:	**686835.90**
Date Started:	**21/01/2015**	Northing:	**6091750.00**
Date Completed:	**21/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
					Grass and cobbles / soil.					
	0.2 **0.25**		CL	Reworked Natural	**Gravelly CLAY** - light brown, soft, with rootlets, small to medium gravels (20%).	dry to moist	0.0	TP62_0.0-0.1	Grab	No hydrocarbon odour. No staining.
	0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0				**End of Hole at 0.25m (refusal on rock)**					

Observations

Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

Shovel used. No access due to electric fence.

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **21/01/2015**
Checked By: **Peter Moore** Date: **30/01/2015**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:47 PM

Test Pit Log

Pit ID. **TP63**

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.25 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Shovel**	Easting:	**686850.40**
Date Started:	**21/01/2015**	Northing:	**6091748.00**
Date Completed:	**21/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
					Grass and cobbles / soil.					
	0.2 ***0.25***		CL	Reworked Natural	**Gravelly CLAY** - light brown, soft, with rootlets, small to medium gravels (20%).	dry to moist	0.0	TP63_0.0-0.1	Grab	No hydrocarbon odour. No staining.
					End of Hole at 0.25m (refusal on rock)					

0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

Observations		
Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

Shovel used. No access due to electric fence.

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **21/01/2015**
Checked By: **Peter Moore** Date: **30/01/2015**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:47 PM

Test Pit Log

Pit ID. **TP64**

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.25 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Shovel**	Easting:	**686846.10**
Date Started:	**21/01/2015**	Northing:	**6091734.00**
Date Completed:	**21/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
					Grass and cobbles / soil.					
	0.2 **0.25**		CL	Reworked Natural	**Gravelly CLAY** - light brown, soft, with rootlets, small to medium gravels (20%).	dry to moist	0.0	TP64_0.0-0.1	Grab	No hydrocarbon odour. No staining.
					End of Hole at 0.25m (refusal on rock)					

0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	Shovel used. No access due to electric fence.
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **21/01/2015**
Checked By: **Peter Moore** Date: **30/01/2015**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:48 PM

Test Pit Log

Pit ID. TP65

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.25 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Shovel**	Easting:	**686848.10**
Date Started:	**21/01/2015**	Northing:	**6091741.00**
Date Completed:	**21/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
					Grass and cobbles / soil.					
	0.2 ***0.25***		CL	Reworked Natural	**Gravelly CLAY** - light brown, soft, with rootlets, small to medium gravels (20%).	dry to moist	0.0	TP65_0.0-0.1	Grab	No hydrocarbon odour. No staining.
					End of Hole at 0.25m (refusal on rock)					

0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

Observations		
Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

Shovel used. No access due to electric fence.

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **21/01/2015**
Checked By: **Peter Moore** Date: **30/01/2015**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:49 PM

Test Pit Log

Pit ID. TP66

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**1.30 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686843.90**
Date Started:	**20/01/2015**	Northing:	**6091666.00**
Date Completed:	**20/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
					Grass.					
	0.5		CL	Reworked Natural	**Gravelly CLAY** - orange / brown, firm, with rootlets.	moist	0.0	TP66_0.4-0.6 (ASB)	Grab	No hydrocarbon odour. No staining.
	0.70									
	1.0		CL	Reworked Natural	**Gravelly CLAY** - light brown, soft, with cobbles throughout (20%).	moist				No hydrocarbon odour. No staining.
	1.30									
	1.5				**End of Hole at 1.30m (target depth)**					
	2.0									
	2.5									
	3.0									

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **20/01/2015**
Checked By: **Peter Moore** Date: **30/01/2015**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:50 PM

Test Pit Log

Pit ID. **TP67**

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.70 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686844.70**
Date Started:	**20/01/2015**	Northing:	**6091657.00**
Date Completed:	**20/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
					Grass.					
	0.2 0.4 0.6 0.70		CL	Reworked Natural	**Gravelly CLAY** - orange / brown, firm, with rootlets, cobbles (10%).	moist	0.0	TP67_0.4-0.6 (ASB)	Grab	No hydrocarbon odour. No staining.
	0.8 1.0 1.2 1.4 1.6 1.8 2.0				**End of Hole at 0.70m (target depth)**					

Observations

Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

Eastern side embankment.

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **20/01/2015**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:50 PM

Test Pit Log

Pit ID. **TP68**

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**1.40 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686839.90**
Date Started:	**20/01/2015**	Northing:	**6091647.00**
Date Completed:	**20/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Samples / Tests: DUP TRIP QC	Observations / Comments
					Grass.						
	0.5		CL	Reworked Natural	**Gravelly CLAY** - orange / brown, firm, with rootlets, gravel (15%), minor cobbles.	moist	0.0	TP68_0.1-0.2	Grab		No hydrocarbon odour. No staining.
	1.0				Becoming stiff with depth.		0.0	TP68_0.4-0.5 (ASB)	Grab	Dup3_300115 Trip3_300115	
	1.40										
	1.5				**End of Hole at 1.40m (target depth)**						
	2.0										
	2.5										
	3.0										

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **20/01/2015**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:51 PM

Test Pit Log

Pit ID. TP69

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.50 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686848.10**
Date Started:	**20/01/2015**	Northing:	**6091642.00**
Date Completed:	**20/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
					Grass.					
	0.50		CL	Reworked Natural	**Gravelly CLAY** - orange / brown, firm, with rootlets, cobbles (10%).	moist	0.0	TP69_0.4-0.5 (ASB)	Grab	No hydrocarbon odour. No staining.
	1.0				**End of Hole at 0.50m (target depth)**					
	1.5									
	2.0									
	2.5									
	3.0									

Observations		
Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

Eastern side embankment.

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **20/01/2015**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:52 PM

Test Pit Log

Pit ID. TP70

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**2.20 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686847.80**
Date Started:	**20/01/2015**	Northing:	**6091631.00**
Date Completed:	**20/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
					Grass and blackberries.					
	0.5		CL	Reworked Natural	**Gravelly CLAY** - brown, soft, with rootlets.	moist	0.0	TP70_0.1-0.2	Grab	No hydrocarbon odour. No staining.
	1.0						0.0	TP70_0.5-0.7 (ASB)	Grab	
	1.5									
	1.70									
	2.0		CL	Natural	**Gravelly CLAY** - orange / brown, soft, with rootlets, minor cobbles (<2%).	moist	0.0	TP70_1.8-2.0	Grab	No hydrocarbon odour. No staining.
	2.20									
	2.5				**End of Hole at 2.20m (target depth)**					
	3.0									

Observations

Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

Western side embankment.

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **20/01/2015**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:53 PM

Test Pit Log

Pit ID. TP71

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.50 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686852.30**
Date Started:	**20/01/2015**	Northing:	**6091613.00**
Date Completed:	**20/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
					Grass.					
	0.2 0.4 0.50		CL	Reworked Natural	**Gravelly CLAY** - light brown, soft, with rootlets, cobbles (10%).	moist	0.0	TP71_0.2-0.3	Grab	No hydrocarbon odour. No staining.
	0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0				**End of Hole at 0.50m (target depth)**					

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	Eastern side embankment.
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **20/01/2015**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:54 PM

Test Pit Log

Pit ID. TP77

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.50 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686847.30**
Date Started:	**20/01/2015**	Northing:	**6091602.00**
Date Completed:	**20/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
					Grass.					
	0.2 0.4 0.50		CL	Reworked Natural	**Gravelly CLAY** - brown, soft, with rootlets, large cobble throughout (15%).	dry to moist	0.0	TP77_0.0-0.2	Grab	No hydrocarbon odour. No staining.
	0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0				**End of Hole at 0.50m (target depth)**					

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **20/01/2015**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:55 PM

Test Pit Log

Pit ID. **TP78**

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.50 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686760.00**
Date Started:	**21/01/2015**	Northing:	**6091769.00**
Date Completed:	**21/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
					Grass and blackberries.					
	0.2		CL	Natural	**Gravelly CLAY** - dark brown, some grey, with rootlets, organics (20%), some cobbles to 20mmØ at base of pit.	wet	0.0	TP78_0.0-0.1	Grab	Channel sediment. Organic odour. Water present.
	0.4						0.0	TP78_0.3-0.4	Grab	
	0.50				**End of Hole at 0.50m (target depth)**					
	0.6									
	0.8									
	1.0									
	1.2									
	1.4									
	1.6									
	1.8									
	2.0									

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **21/01/2015**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:56 PM

Test Pit Log

Pit ID. TP79

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.50 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686509.67**
Date Started:	**21/01/2015**	Northing:	**6091940.12**
Date Completed:	**21/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
					Thick grass.					
	0.2		CL	Natural	**Silty Gravelly CLAY** - dark brown, soft, with rootlets, organics.	moist	0.0	TP79_0.0-0.1	Grab	Channel sediment. Organic odour. Water present in culvert.
	0.25									
	0.4		CL		**Gravelly CLAY** - dark brown, firm to stiff, with rootlets, large cobbles (15%).	moist				No hydrocarbon odour. No staining.
	0.50						0.0	TP79_0.4-0.5	Grab	
	0.6				**End of Hole at 0.50m (target depth)**					
	0.8									
	1.0									
	1.2									
	1.4									
	1.6									
	1.8									
	2.0									

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **21/01/2015**
Checked By: **Peter Moore** Date: **30/01/2015**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:56 PM

Test Pit Log

Pit ID. TP80

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.50 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686400.56**
Date Started:	**21/01/2015**	Northing:	**6092028.88**
Date Completed:	**21/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
					Grass, bare at outlet.					
	0.15		CL	Natural	**Silty CLAY** - light brown, soft, minor rootlets.	dry to moist	0.0	TP80_0.0-0.1	Grab	No hydrocarbon odour. No staining.
	0.2		CL	Natural	**Gravelly CLAY** - brown, soft, with rootlets, large cobbles (30%).	moist				No hydrocarbon odour. No staining.
	0.50						0.0	TP80_0.4-0.5	Grab	
	0.6				**End of Hole at 0.50m (target depth)**					
	0.8									
	1.0									
	1.2									
	1.4									
	1.6									
	1.8									
	2.0									

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Blake Dickson** Date: **21/01/2015**
Checked By: **Peter Moore** Date: **30/01/2015**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:57 PM

Test Pit Log

Pit ID. TP81

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.50 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**Ground Control (ACT) Pty Ltd**		
Excavation Method:	**Backhoe**	Easting:	**686271.39**
Date Started:	**21/01/2015**	Northing:	**6092116.98**
Date Completed:	**21/01/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Samples / Tests: DUP TRIP QC	Observations / Comments
					Grass, some cobbles.						
	0.2 0.4 0.50		CL	Natural	**Gravelly CLAY** - brown, soft, with rootlets, trace sand.	moist	0.0 0.0	TP81_0.0-0.1 TP81_0.4-0.5	Grab Grab	Dup4_201015 Trip4_201015	No hydrocarbon odour. No staining.
	0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0				**End of Hole at 0.50m (target depth)**						

Observations

Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

Log Drawn By:	Laurie White	Logged By:	**Blake Dickson** Date: **21/01/2015**
Contact:	laurie.white@reumad.com.au	Checked By:	**Peter Moore** Date: **30/01/2015**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:58 PM

Test Pit Log

Pit ID. TP82

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.20 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**687089.00**
Date Started:	**9/12/2014**	Northing:	**6093276.43**
Date Completed:	**9/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: pH	Samples / Tests: Sample Method	Observations / Comments
	0.20			Fill	**FILL** - Silty Sandy CLAY, grey, green grey and brown, very soft.	moist	0.1	TP82_0.0-0.1	5.5	HA	Slight organic odour.
					End of Hole at 0.20m (target depth)						

0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0

Observations

Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

YSI reading taken at pond.

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **9/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:59 PM

Test Pit Log

Pit ID. TP83

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.25 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**687264.41**
Date Started:	**9/12/2014**	Northing:	**6091904.60**
Date Completed:	**9/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: pH	Samples / Tests: Sample Method	Observations / Comments
	0.2			Natural	**TOPSOIL. Silty Sandy CLAY** - brown to light brown, soft.	dry	0.0	TP83_0.0-0.1	8.0	HA	No hydrocarbon odour. No staining.
	0.25				**End of Hole at 0.25m (target depth)**						
	0.4										
	0.6										
	0.8										
	1.0										
	1.2										
	1.4										
	1.6										
	1.8										
	2.0										

Observations

Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **9/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:39:59 PM

Test Pit Log

Pit ID. TP84

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.30 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**686239.23**
Date Started:	**9/12/2014**	Northing:	**6093011.79**
Date Completed:	**9/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: pH	Samples / Tests: Sample Method	Observations / Comments
	0.15			Fill	**TOPSOIL. Sandy CLAY** - dark brown, very soft, with minor charcoal gravel.	dry	0.0	TP84_0.0-0.1	5.5	HA	No hydrocarbon odour. No staining.
	0.2		GP		**Sandy CLAY** - orange brown, soft, with rare igneous gravel.	moist			6.0		No hydrocarbon odour. No staining.
	0.30				**End of Hole at 0.30m (target depth)**						
	0.4										
	0.6										
	0.8										
	1.0										
	1.2										
	1.4										
	1.6										
	1.8										
	2.0										

Observations

Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **9/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:40:00 PM

Test Pit Log

Pit ID. TP85

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.25 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**686734.03**
Date Started:	**9/12/2014**	Northing:	**6093204.55**
Date Completed:	**9/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
	0.2			Natural	**TOPSOIL. Sandy CLAY** - brown and orange brown, very soft, with rare rootlets.	moist	0.0	TP85_0.0-0.1	HA	No hydrocarbon odour. No staining.
	0.25				**End of Hole at 0.25m (target depth)**					
	0.4									
	0.6									
	0.8									
	1.0									
	1.2									
	1.4									
	1.6									
	1.8									
	2.0									

Observations

Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **9/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:40:01 PM

Test Pit Log

Pit ID. **TP86**

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.20 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**686656.53**
Date Started:	**8/12/2014**	Northing:	**6091070.36**
Date Completed:	**8/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: pH	Samples / Tests: Sample Method	Observations / Comments
	0.20			Natural	**TOPSOIL. Silty CLAY** - red / brown, soft.	moist	0.0	TP86_0.0-0.1	6.5	HA	No hydrocarbon odour. No staining.
					End of Hole at 0.20m (target depth)						

0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **8/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:40:02 PM

Test Pit Log

Pit ID. TP87

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.40 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**686338.58**
Date Started:	**8/12/2014**	Northing:	**6091251.19**
Date Completed:	**8/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
	0.2			Natural	**TOPSOIL. Silty Sandy CLAY** - dark brown, soft.	moist	0.0	TP87_0.0-0.1	HA	No hydrocarbon odour. No staining.
	0.25		ML		**Clayey SILT** - green brown and grey, loose.	moist				No hydrocarbon odour. No staining.
	0.40				**End of Hole at 0.40m (target depth)**					
	0.6									
	0.8									
	1.0									
	1.2									
	1.4									
	1.6									
	1.8									
	2.0									

Observations

Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **8/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:40:02 PM

Test Pit Log

Pit ID. TP88

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.15 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**686351.70**
Date Started:	**10/12/2014**	Northing:	**6092014.54**
Date Completed:	**10/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
	0.15			Natural	**TOPSOIL. Sandy Gravelly CLAY** - red brown, soft, yellow sandstone gravels, fine to medium, sub angular.	dry	0.0	TP88_0.0-0.1	HA	No hydrocarbon odour. No staining.
	0.2				**End of Hole at 0.15m (target depth)**					
	0.4									
	0.6									
	0.8									
	1.0									
	1.2									
	1.4									
	1.6									
	1.8									
	2.0									

Observations

Asbestos	No visual evidence of asbestos noted during excavation.
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	No groundwater encountered during excavation.

Notes

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **10/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:40:03 PM

Test Pit Log

Pit ID. TP89

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.20 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**686770.42**
Date Started:	**10/12/2015**	Northing:	**6091716.71**
Date Completed:	**10/12/2015**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Samples / Tests: DUP TRIP QC	Observations / Comments
	0.20		SC	Natural	**Clayey SAND** - yellow grey and yellow brown, loose, with occasional igneous gravel.	dry	0.0	TP89_0.0-0.1	HA	Dup_141210 Trip_141210	No hydrocarbon odour. No staining.
					End of Hole at 0.20m (refusal)						

0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **10/12/2015**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:40:04 PM

Test Pit Log

Pit ID. **TP90**

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.20 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**686027.59**
Date Started:	**8/12/2014**	Northing:	**6091174.59**
Date Completed:	**8/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
	0.20			Natural	**TOPSOIL. Silty CLAY** - red brown, very soft, with rootlets.	moist	0.0	TP90_0.0-0.1	HA	
					End of Hole at 0.20m (target depth)					

0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

Observations

Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

Taken on western side of fence.

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **8/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:40:05 PM

Test Pit Log

Pit ID. TP91

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.30 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**686180.55**
Date Started:	**8/12/2014**	Northing:	**6090363.53**
Date Completed:	**8/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: pH	Samples / Tests: Sample Method	Observations / Comments
	0.2			Natural	**TOPSOIL. Sandy CLAY** - dark brown, soft.	dry	0.0	TP91_0.0-0.2	6.5	HA	No hydrocarbon odour. No staining.
	0.30				**End of Hole at 0.30m (target depth)**						
	0.4										
	0.6										
	0.8										
	1.0										
	1.2										
	1.4										
	1.6										
	1.8										
	2.0										

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **8/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:40:05 PM

Test Pit Log

Pit ID. **TP92**

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.30 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**687013.99**
Date Started:	**8/12/2014**	Northing:	**6090026.98**
Date Completed:	**8/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: pH	Observations / Comments
	0.2			Natural	**TOPSOIL. Silty Sandy CLAY** - dark brown, soft, with rootlets throughout.	dry	0.0	TP92_0.0-0.1	8.0	No hydrocarbon odour. No staining.
	0.30				**End of Hole at 0.30m (target depth)**					
	0.4									
	0.6									
	0.8									
	1.0									
	1.2									
	1.4									
	1.6									
	1.8									
	2.0									

Observations

Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **8/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:40:06 PM

Test Pit Log

Pit ID. TP93

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.30 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**686314.89**
Date Started:	**9/12/2014**	Northing:	**6092770.24**
Date Completed:	**9/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
	0.20			Natural	**TOPSOIL. Sandy CLAY** - red brown, very soft, with rootlets.	dry	0.0	TP93_0.0-0.1	HA	No hydrocarbon odour. No staining.
	0.30		GP		**Clayey GRAVEL** - orange brown, loose.	moist				No hydrocarbon odour. No staining.
					End of Hole at 0.30m (refusal)					

0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

Observations

Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **9/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:40:07 PM

Test Pit Log

Pit ID. TP94

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.20 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**686653.56**
Date Started:	**9/12/2014**	Northing:	**6093040.11**
Date Completed:	**9/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	ID No.	pH	Sample Method	DUP TRIP QC	Observations / Comments
	0.20			Natural	**TOPSOIL. Sandy CLAY** - brown, soft, with occasional purple and grey igneous gravel and charcoal.	dry	0.4	TP94_0.0-0.1	6.0	HA	Dup_141209_2 Trip_141209_2	No hydrocarbon odour. No staining.
					End of Hole at 0.20m (target depth)							

0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

Observations

Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **9/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:40:08 PM

Test Pit Log

Pit ID. **TP95**

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.30 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**687143.61**
Date Started:	**9/12/2014**	Northing:	**6091515.31**
Date Completed:	**9/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
	0.2		CL	Natural	**Topsoil. Sandy CLAY** - dark brown, soft, with rare charcoal fragments.	dry	0.1	TP95_0.0-0.1	Grab	No hydrocarbon odour. No staining.
	0.30				**End of Hole at 0.30m (target depth)**					
	0.4									
	0.6									
	0.8									
	1.0									
	1.2									
	1.4									
	1.6									
	1.8									
	2.0									

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **9/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:40:08 PM

Test Pit Log

Pit ID. TP97

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.40 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**686759.90**
Date Started:	**8/12/2014**	Northing:	**6090528.63**
Date Completed:	**8/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: pH	Samples / Tests: Sample Method	Observations / Comments
	0.10		CL	Natural	**Topsoil. Silty CLAY** - dark brown and black, soft, with abundant charcoal.	dry	0.3	TP97_0.0-0.1	5.5	HA	No hydrocarbon odour. No staining.
	0.2		CL	Natural	**Sandy CLAY** - light brown, soft.	moist					No hydrocarbon odour. No staining.
	0.40				**End of Hole at 0.40m (target depth)**						
	0.6										
	0.8										
	1.0										
	1.2										
	1.4										
	1.6										
	1.8										
	2.0										

Observations		Notes
Asbestos	No visual evidence of asbestos noted during excavation.	
Staining	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.	
Odour	No olfactory (e.g. odour) evidence of contamination noted during excavation.	
Groundwater	No groundwater encountered during excavation.	

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **8/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:40:09 PM

Test Pit Log

Pit ID. **TP98**

WSP Environmental Pty Ltd

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

Project Name:	**Molonglo Valley Stage 3 DSI**	Hole Depth:	**0.30 m**
Project Number:	**39275**	GW Encountered:	**No**
Location / Site:	**Area A**		
Client:	**Land Development Agency**	Ground Level RL:	
Excavation Company:	**WSP Environmental**		
Excavation Method:	**Hand Auger / Hand Tools to EOH.**	Easting:	**687077.21**
Date Started:	**9/12/2014**	Northing:	**6091263.15**
Date Completed:	**9/12/2014**	Zone:	**55**

Water Inflow	Depth (m)	Graphic Log	USCS Symbol	Material Type	Material Description	Moisture	Samples / Tests: PID ppm	Samples / Tests: ID No.	Samples / Tests: Sample Method	Observations / Comments
	0.2		SC	Reworked Natural	**Clayey SAND** - light yellow to grey and light yellow brown, loose to medium dense, with occasional igneous gravel.	moist	0.0	TP98_0.0-0.1	HA	No hydrocarbon odour. No staining.
	0.30				**End of Hole at 0.30m (refusal)**					
	0.4									
	0.6									
	0.8									
	1.0									
	1.2									
	1.4									
	1.6									
	1.8									
	2.0									

Observations		
Asbestos	|	No visual evidence of asbestos noted during excavation.
Staining	|	No visual evidence of contamination (e.g. staining / precipitate) noted during excavation.
Odour	|	No olfactory (e.g. odour) evidence of contamination noted during excavation.
Groundwater	|	No groundwater encountered during excavation.

Notes

REUMAD

Log Drawn By: Laurie White
Contact: laurie.white@reumad.com.au

Logged By: **Simon Dunstan** Date: **9/12/2014**
Checked By: **Blake Dickson** Date: **20/12/2014**

WSP LOG 2014 39275 MOLONGLO.GPJ WSP.GDT 19/5/15 4:40:10 PM

Level 1, 41 McLaren Street
North Sydney NSW 2060
Office: +61 (0)2 8925 6700
www.wspgroup.com

LOG REPORT LEGEND

Material Symbol

FILL

CONCRETE

ASPHALT

BRICK / PAVER

TOPSOIL

ORGANICS

ESTUARINE MUD

CLAY

SAND

SILT

GRAVEL

Sandy CLAY

Clayey SAND

Clayey SILT

Clayey GRAVEL

Silty CLAY

Silty SAND

Sandy SILT

Sandy GRAVEL

Gravelly CLAY

Gravelly SAND

Gravelly SILT

Silty GRAVEL

SANDSTONE

SILTSTONE

SHALE

CLAYSTONE

MUDSTONE

IRONSTONE

GRANITE

BASALT

GNEISS

PORCELLANITE

SHALE / SANDSTONE

SHALE / SILTSTONE

MUDSTONE / CLAYSTONE

SHALE / CLAYSTONE

Water Levels

Encountered Water

Standing Water

Abbreviations

PT	Pushtube
SFA	Solid Flight Auger
PWS	Percussion Window Sampler
HA	Hand Auger
HFA	Hollow Flight Auger

Well Graphics

Cuttings / Backfill

Grout

Bentonite

Gravel Pack

Screen

Cave-in

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Appendix E QA/QC Summary

The evaluation of QA/QC was conducted on the WSP (2016) Stage 2 DSI conducted for Area A, which was the most relevant report pertaining to the assessment of contamination onsite.

Table E.1: Quality Assessment and Quality Control Summary

Requirement	DQI	Molonglo Valley Stage 3 (Area A) Stage 2 Detailed Site Investigation April 2016	Auditor Comment
Precision		DQI Range	
Appropriate field sampling, sample documentation & description	AS4482.2 (1997) Parts 1&2	Field sampling conducted did not include the collection of rinsate samples, which were considered unnecessary by WSP due to the soil sampling methods employed for the study, where sample collection was conducted using new disposable nitrile gloves and collection of soil in direct contact with excavator bucket was avoided.	Partial acceptability, noting that the lack of rinsate samples collected is a deviation from the SAQP (2014), and was not noted in the Stage 2 DSI report as a deviation.
Records detailing samples & conditions	Recorded on Borehole logs	Details of the sample, including the sample name, job number, date of sample and sample depth are labelled on sample jars. Conditions during collection of samples provided in testpit logs.	Acceptable, noting that meteorological conditions on the day of sampling were not recorded in testpit logs.
All critical samples analysed for COCs and compared to criteria	All Samples.	All sample analysed	Acceptable.
Comparability			
Experienced sampling team followed SAQP/SOP	Comment made in report	The DSI Phase 2 report mentions that the site works were carried by two different experienced WSP staff using the same methodology as per WSP SOPs.	Acceptable.
Climatic Conditions Recorded & Discussed	Recorded on Borehole logs or in Report	Meteorological data noted in the report with regards to regional meteorology, but not recorded in testpit logs.	Partial acceptability, noting that the lack of meteorological data would not impact on the outcome of this assessment.
Primary Laboratory	NATA Accredited to 17025	ALS Group Services (NATA 0825)	Acceptable.
Secondary Laboratory	NATA Accredited to 17025	Envirolab Services (NATA 2901)	Acceptable.
Appropriate Analytical Methods	NEPM	All analysis was undertaken in accordance with NATA approved methods, in-house methods or methods recommended in the NEPM, 2013 (Schedule B3 - Laboratory Analysis of Potentially Contaminated Soils).	Acceptable.

Requirement	DQI	Molonglo Valley Stage 3 (Area A) Stage 2 Detailed Site Investigation April 2016	Auditor Comment
Appropriate LOR, PQL Appropriate & Consistent	LOR<criteria	LOR< criteria	Acceptable.
Representativeness			
Sample Handling Appropriate & Received by Lab in Good Condition under correct Preservation Conditions	Compliant SRN	Soil, sediment and surface water samples were immediately placed in an ice-filled esky to keep the samples cool. A chain of custody (CoC) form was filled out with the sample ID and required analyses, and dispatched to the laboratory for analysis.	Acceptable.
Field Screening Method Calibration	Field Instrumentation calibrated in accordance with manufacturers instruction	All field equipment used during soil sampling was appropriately calibrated prior to use. Calibration certificates provided in WSP report.	Acceptable.
Primary Lab Holding Times	All samples comply with NEPM (2013)	Compliant with the exception of: • Surface water: Laboratory pH and DO for SW01 and SW02. 1 day late. • Soil: Soil trip spike, TSC, and trip blank for BTEX for TRH. 4 days late.	Partial acceptability, noting WSP clarifications: • Surface water data is not considered to impact on data quality as field parameters were collected during sampling. • While the trip blank, spike and trip spike control (TSC) were outside the holding times by 4 days, it is estimated that there would be insignificant impact on data quality as recoveries were acceptable and blank was non-detect. The sample batch also had non-detect results for primary samples analysed for volatile TRH and BTEX. It should also be noted that by exceeding holding times by 4 days, a false negative (e.g. non-detect.) could be created.
Secondary Lab Holding Times	All samples comply with NEPM (2013)	All samples were tested within acceptable holding times.	Acceptable.
Trip Spike	(1/20)	<30 to 100%R. Holding times for samples for BTEX 4 days late.	Partially acceptable. False negatives may arise from exceeding holding times may influence trip spike results. Only 1 trip spike collected.
Trip Blank	70-130%R	Trip blanks percentages were within acceptable limits.	Acceptable.

Requirement	DQI	Molonglo Valley Stage 3 (Area A) Stage 2 Detailed Site Investigation April 2016	Auditor Comment
Rinsate Blank	Samples not collected.		No rinsate samples for equipment were considered necessary by WSP, due to the soil sampling methods employed. (collection of sample that had not come into contact with sample equipment i.e. shovel)
Precision			
Primary Lab Duplicates (D)	(1/20 sample batch) 0 to 50% RPD	Two samples with RPDs exceeding LOR based limits: • ES1427601-007, Sum of PAHs, • ES1501394-001, Sum of PAHs. All other sample's RPDs were within the LOR based limits. The exceedances of DQOs marginally above the DQO recoveries. The results are not considered to affect the outcomes of this assessment regarding site characterisation.	Acceptable considering dataset as a whole.
Field Duplicate Samples by Primary (inter-laboratory duplicates)	<30 to 100% RPD	Due to the removal of three samples (AECs ROBA_AEC13, ROBA_AEC14 and ROBA_AEC15), the sample sizes were reduced resulting in a higher frequency ratio which was higher than the DQI for herbicides, TRH, PAHs, Phenols and PCBs. Three soil RPD exceedances were detected for Inter-Laboratory duplicates for chromium (total), arsenic and lead. Where any adopted site criteria were exceeded, a conservative approach has been taken and the highest reported chemical concentration has been used for decision making for site characterisation purposes. The identified RPD exceedances for M8 are considered attributed to sample heterogeneity and are not considered to affect the outcomes of this assessment regarding Site characterisation.)	Acceptable considering dataset as a whole.
Field Duplicate Samples by Primary (intra-laboratory duplicates)	<30 to 100% RPD	Due to the removal of three samples (AECs ROBA_AEC13, ROBA_AEC14 and ROBA_AEC15), the sample sizes were reduced resulting in a higher frequency ratio which was higher than the DQI for herbicides, TRH, PAHs, Phenols and PCBs. The exceedances of DQOs marginally above the DQO	Acceptable considering dataset as a whole.

Requirement	DQI	Molonglo Valley Stage 3 (Area A) Stage 2 Detailed Site Investigation April 2016	Auditor Comment
		recoveries. The results are not considered to affect the outcomes of this assessment regarding site characterisation.	
Accuracy			
Primary Lab Matrix Spikes (MS)	(1/20 sample batch) 60 to 140%RPD	One sample in exceedance ES1427475-001 for ammonia as N. Matrix spike recovery determined background level greater than or equal to 4x spike levels. The exceedances of DQOs marginally above the DQO recoveries. The results are not considered to affect the outcomes of this assessment regarding site characterisation	Acceptable considering dataset as a whole.
Primary Lab Surrogate Spikes (S)	(1/20 sample batch) 60-140%RPD	Two samples in exceedance (TP96 0.0-0.1, Anthracene-d10, TP61 1.8-2.0, 2-Fluorobiphenyl), recovery less than lower DQO. The exceedances of DQOs marginally below the DQO recoveries. The results are not considered to affect the outcomes of this assessment regarding site characterisation.	Acceptable considering dataset as a whole.
Primary Lab Control Spikes (LCS)	(1/20 sample batch) 60 to 140%RPD	4 samples exceeding DQIs: • 4591624-002, Copper, Recovery less than lower control limit. • 4591624-002, Lead, Recovery less than lower control limit. • 4591624-002, Nickel, Recovery less than lower control limit. • 4573151-007, 2.4-Dimethylphenol, Recovery greater than upper control limit. The exceedances of DQOs marginally above the DQO recoveries. The results not considered to affect the outcomes of this assessment regarding site characterisation.	Acceptable considering dataset as a whole.
Primary Lab Method Blanks (MB)	(1/20 sample batch) <LOR	Compliant.	Acceptable.
Secondary Laboratory QA/QC Data (Soil and Water)	LCS: 60 to 140% MB: <LOR	Compliant.	Acceptable.

Appendix F Zoning Development Uses

CFZ - Community Facility Zone

Zone Objectives

a) To facilitate social sustainability and inclusion through providing accessible sites for key government and non-government facilities and services for individuals, families, and communities.

b) To provide accessible sites for civic life and allow community organisations to meet the needs of the Territory's various forms of community.

c) To protect these social and community uses from competition from other uses.

d) To enable the efficient use of land through facilitating the co-location, and multi-use of community facilities, generally near public transport routes and convenience services appropriate to the use.

e) To encourage adaptable and affordable housing for persons in need of residential support or care.

f) To safeguard the amenity of surrounding residential areas against unacceptable adverse impacts including from traffic, parking, noise or loss of privacy.

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CFZ – Community Facility Zone Development Table

EXEMPT DEVELOPMENT Development approval is not required. Building approval may be required. On leased land, development must be authorised by a lease.	
Development identified in the Planning and Development Act 2007 as exempt (see sections 133 and 134 of the Act and section 20 and schedule 1 of the Planning and Development Regulation 2008)	
ASSESSABLE DEVELOPMENT Development application required. On leased land, development must be authorised by a lease.	
MINIMUM ASSESSMENT TRACK **CODE** Development listed below requires a development application and is assessed in the code track	
Development	
No development identified	
MINIMUM ASSESSMENT TRACK **MERIT** Development listed below requires a development application and is assessed in the merit track, unless specified in schedule 4 of the Planning and Development Act 2007 (as impact track) or specified as prohibited development in a precinct map.	
Development	
ancillary use	minor use
business agency	office
child care centre	outdoor recreation facility
community activity centre	parkland
community theatre	place of worship
consolidation	public agency
cultural facility	religious associated use
demolition	residential care accommodation
development in a location and of a type indentified in a precinct map as additional merit track development	retirement village
educational establishment	sign
emergency services facility	subdivision
health facility	supportive housing
hospital	temporary use
indoor recreation facility	varying a lease (where not code track or impact track assessable)
minor road	
MINIMUM ASSESSMENT TRACK **IMPACT** Development listed below requires a development application and is assessed in the impact track	
1. Development that is not: a. Exempt code track or merit track development; or b. Prohibited development other than development that is permitted under s137 of the Planning and Development Act 2007.	
2. Development specified in schedule 4 of the Planning and Development Act 2007 and not listed as a prohibited use in this table.	
3. Development that is authorised by a lease and listed as a prohibited use in this table.	
4. Development declared under section 124 or section 125 of the Planning and Development Act 2007 and not listed as a prohibited development in this table.	
5. Varying a lease to add a use assessable under the impact track.	

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PROHIBITED DEVELOPMENT	
Development listed below is prohibited development unless the development is identified elsewhere in this development table as assessable under the code, merit or impact track.	
agriculture	mobile home park
airport	multi-unit housing
animal care facility	municipal depot
animal husbandry	nature conservation area
aquatic recreation facility	offensive industry
boarding house	overnight camping area
bulk landscape supplies	pedestrian plaza
car park	place of assembly
caretakers residence	plant and equipment hire establishment
caravan park/camping ground	plantation forestry
cemetery	playing field
civic administration	produce market
club	public transport facility
communications facility	railway use
COMMERCIAL ACCOMMODATION USE	recyclable materials collection
corrections facility	recycling facility
craft workshop	restaurant
defence installation	sand and gravel extraction
development in a location and of a type identified in a precinct map as additional prohibited development	scientific research establishment
drink establishment	secondary residence
drive-in cinema	serviced apartment
farm tourism	service station
financial establishment	SHOP
freight transport facility	single dwelling housing
funeral parlour	special dwelling
general industry	stock/sale yard
group or organised camp	store
hazardous industry	tourist facility
hazardous waste facility	transport depot
home business	varying a lease to add a use listed as “prohibited development” in this development table
incineration facility	vehicle sales
indoor entertainment facility	veterinary hospital
industrial trades	warehouse
land fill site	waste transfer station
land management facility	woodlot
light industry	zoological facility
liquid fuel depot	
major road	

RELEVANT CODE
Development proposals must comply with the Community Facility Zone Development Code.

Authorised by the ACT Parliamentary Counsel—also accessible at www.legislation.act.gov.au

NOTE ABOUT ANCILLARY, MINOR AND TEMPORARY USE
Some development that would otherwise be prohibited may be assessed under the merit track if they can be defined as *ancillary*, *minor or temporary use*. For example, a *car park* alone is prohibited, but could be considered if it is ancillary to a *child care centre* which is an assessable development under the merit track.

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CZ1 – Core Zone

Zone Objectives

a) Encourage a mix of predominantly commercial land uses that contribute to a diverse and active character

b) Provide for a range of conveniently located retail and service outlets

c) Promote vibrant, interesting and lively street frontages including during evenings and weekends

d) Encourage an attractive, safe pedestrian environment with ready access to public transport

e) Maintain and enhance a high standard of urban design through use of sustainable design and materials and ensure that buildings retain a high level of design consistency and compatibility

f) Provide opportunities for business investment and employment

g) Maintain and enhance environmental amenity

h) Promote the establishment of cultural and community identity that is representative of, and appropriate to, the place

Authorised by the ACT Parliamentary Counsel—also accessible at www.legislation.act.gov.au

CZ1 – Core Zone Development Table

EXEMPT DEVELOPMENT Development approval is not required. Building approval may be required. On leased land, development must be authorised by a lease.	
Development identified in the Planning and Development Act 2007 as exempt (see sections 133 and 134 of the Act and section 20 and schedule 1 of the Planning and Development Regulation 2008)	
ASSESSABLE DEVELOPMENT Development application required. On leased land, development must be authorised by a lease.	
MINIMUM ASSESSMENT TRACK **CODE** Development listed below requires a development application and is assessed in the code track	
Development	
No development identified.	
MINIMUM ASSESSMENT TRACK **MERIT** Development listed below requires a development application and is assessed in the merit track, unless specified in schedule 4 of the Planning and Development Act 2007 (as impact track) or specified as prohibited development in a precinct map.	
Development	
ancillary use	minor road
car park	minor use
civic administration	NON RETAIL COMMERCIAL USE
club	outdoor recreation facility
COMMERCIAL ACCOMMODATION USE	parkland
communications facility	pedestrian plaza
COMMUNITY USE	place of assembly
consolidation	public transport facility
craft workshop	recyclable materials collection
demolition	RESIDENTIAL USE
development in a location and of a type indentified in a precinct map as additional merit track development	restaurant
drink establishment	service station
emergency services facility	SHOP
home business	sign
indoor entertainment facility	subdivision
indoor recreation facility	temporary use
light industry	tourist facility
MINIMUM ASSESSMENT TRACK **IMPACT** Development listed below requires a development application and is assessed in the impact track	
1. Development that is not: a. Exempt code track or merit track development; or b. Prohibited development other than development that is permitted under s137 of the Planning and Development Act 2007.	
2. Development specified in schedule 4 of the Planning and Development Act 2007 and not listed as a prohibited use in this table.	
3. Development that is authorised by a lease and listed as a prohibited use in this table.	

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4. Development declared under section 124 or section 125 of the Planning and Development Act 2007 and not listed as a prohibited development in this table.	
5. Varying a lease to add a use assessable under the impact track.	
PROHIBITED DEVELOPMENT	
Development listed below is prohibited development unless the development is identified elsewhere in this development table as assessable under the code, merit or impact track.	
agriculture	MAJOR UTILITY INSTALLATION
airport	mining industry
animal care facility	mobile home park
animal husbandry	municipal depot
aquatic recreation facility	nature conservation area
boarding house	offensive industry
bulk landscape supplies	overnight camping area
caravan park/camping ground	plant and equipment hire establishment
cemetery	plantation forestry
corrections facility	playing field
defence installation	produce market
development in a location and of a type identified in a precinct map as additional prohibited development	railway use
drive-in cinema	recycling facility
farm tourism	sand and gravel extraction
freight transport facility	scientific research establishment
funeral parlour	stock/sale yard
general industry	store
group or organised camp	transport depot
hazardous industry	varying a lease to add a use listed as “prohibited development” in this development table
hazardous waste facility	vehicle sales
incineration facility	veterinary hospital
industrial trades	warehouse
land fill site	waste transfer station
land management facility	woodlot
liquid fuel depot	zoological facility
major road	
RELEVANT CODE	
Development proposals must comply with the Commercial Zones Development Code.	
NOTE ABOUT ANCILLARY, MINOR AND TEMPORARY USE	
Some development that would otherwise be prohibited may be assessed under the merit track if they can be defined as *ancillary*, *minor or temporary use*. For example, a *store* alone is prohibited, but could be considered if it is ancillary to a *shop* which is an assessable development under the merit track.	

Authorised by the ACT Parliamentary Counsel—also accessible at www.legislation.act.gov.au

CZ4 – Local Centre Zone

Zone Objectives

a) Provide for convenience retailing and other accessible, convenient shopping and community and business services to meet the daily needs of local residents, particularly those with mobility issues.

b) Provide opportunities for business investment and local employment

c) Ensure the mix of uses is appropriate to this level of the commercial hierarchy and enable centres to adapt to changing social and economic circumstances

d) Maintain and enhance local residential and environmental amenity through appropriate and sustainable urban design

e) Promote the establishment of a cultural and community identity that is representative of, and appropriate to, the place

Authorised by the ACT Parliamentary Counsel—also accessible at www.legislation.act.gov.au

CZ4 – Local Centre Zone Development Table

EXEMPT DEVELOPMENT Development approval is not required. Building approval may be required. On leased land, development must be authorised by a lease.	
Development identified in the Planning and Development Act 2007 as exempt (see sections 133 and 134 of the Act and section 20 and schedule 1 of the Planning and Development Regulation 2008)	
ASSESSABLE DEVELOPMENT Development application required. On leased land, development must be authorised by a lease.	
MINIMUM ASSESSMENT TRACK **CODE** Development listed below requires a development application and is assessed in the code track	
Development	
No development identified	
MINIMUM ASSESSMENT TRACK **MERIT** Development listed below requires a development application and is assessed in the merit track, unless specified in schedule 4 of the Planning and Development Act 2007 (as impact track) or specified as prohibited development in a precinct map.	
Development	
ancillary use	minor use
car park	NON RETAIL COMMERCIAL USE
COMMUNITY USE	parkland
consolidation	pedestrian plaza
demolition	RESIDENTIAL USE
development in a location and of a type identified in a precinct map as additional merit track development	recyclable materials collection
guest house	restaurant
home business	service station
indoor entertainment facility	SHOP
indoor recreation facility	sign
industrial trades	subdivision
light industry	temporary use
minor road	veterinary hospital
MINIMUM ASSESSMENT TRACK **IMPACT** Development listed below requires a development application and is assessed in the impact track	
1. Development that is not: a. Exempt, code track or merit track development (see section 132 of the Planning and Development Act 2007); or b. Prohibited development, other than development that is permitted under s137 of the Planning and Development Act 2007.	
2. Development specified in schedule 4 of the Planning and Development Act 2007 and not listed as a prohibited use in this table.	
3. Development that is authorised by a lease and listed as a prohibited use in this table.	
4. Development declared under section 124 or section 125 of the Planning and Development Act 2007 and not listed as a prohibited development in this table.	
5. Varying a lease to add a use assessable under the impact track.	

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PROHIBITED DEVELOPMENT	
Development listed below is prohibited development unless the development is identified elsewhere in this development table as assessable under the code, merit or impact track.	
agriculture	major road
airport	MAJOR UTILITY INSTALLATION
animal care facility	mining industry
animal husbandry	mobile home park
aquatic recreation facility	motel
boarding house	municipal depot
bulk landscape supplies	nature conservation area
caravan park/camping ground	offensive industry
cemetery	outdoor recreation facility
civic administration	overnight camping area
club	place of assembly
communications facility	plant and equipment hire establishment
corrections facility	plantation forestry
defence installation	playing field
development in a location and of a type identified in a precinct map as additional prohibited development	produce market
drink establishment	public transport facility
drive-in cinema	railway use
emergency services facility	recycling facility
farm tourism	scientific research establishment
freight transport facility	stock/sale yard
funeral parlour	store
general industry	tourist facility
group or organised camp	tourist resort
hazardous industry	transport depot
hazardous waste facility	varying a lease to add a use listed as “prohibited development” in this development table
hotel	vehicle sales
incineration facility	warehouse
land fill site	waste transfer station
land management facility	woodlot
liquid fuel depot	zoological facility

RELEVANT CODE
Development proposals must comply with the Commercial Zones Development Code.

NOTE ABOUT ANCILLARY, MINOR AND TEMPORARY USE
Some development that would otherwise be prohibited may be assessed under the merit track if they can be defined as *ancillary*, *minor or temporary use*. For example, a *store* alone is prohibited, but could be considered if it is ancillary to a *shop* which is an assessable development under the merit track.

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NUZ4 – River Corridor Zone

Zone Objectives

a) Conserve the ecological and cultural values of the ACT's major river corridors

b) Protect stream flow, water quality and flood plains from adverse impacts

c) Ensure that the type and intensity of development is sustainable

d) Provide opportunities for a range of ecologically sensitive water and land based recreational activities

e) Ensure compatibility between land uses, water uses and the general character of the rivers

f) Provide opportunities for appropriate environmental education and scientific research activities

g) Prevent development that would significantly increase fire hazard

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NUZ4 – River Corridor Zone Development Table

EXEMPT DEVELOPMENT Development approval is not required. Building approval may be required. On leased land, development must be authorised by a lease.	
Development identified in the Planning and Development Act 2007 as exempt (see sections 133 and 134 of the Act and section 20 and schedule 1 of the Planning and Development Regulation 2008)	
ASSESSABLE DEVELOPMENT Development application required. On leased land, development must be authorised by a lease.	
MINIMUM ASSESSMENT TRACK **CODE** Development listed below requires a development application and is assessed in the code track	
Development	
No development identified.	
MINIMUM ASSESSMENT TRACK **MERIT** Development listed below requires a development application and is assessed in the merit track, unless specified in schedule 4 of the Planning and Development Act 2007 (as impact track) or specified as prohibited development in a precinct map.	
Development	
agriculture	minor road
ancillary use	minor use
consolidation	nature conservation area
demolition	parkland
development in a location and of a type identified in a precinct map as additional merit track development	sign
farm tourism	subdivision
land management facility	temporary use
major road	woodlot
MAJOR UTILITY INSTALLATION	
MINIMUM ASSESSMENT TRACK **IMPACT** Development listed below requires a development application and is assessed in the impact track	
1. Development that is not: a. Exempt, code track or merit track development (see section 132 of the Planning and Development Act 2007); or b. Prohibited development, other than development that is permitted under s137 of the Planning and Development Act 2007.	
2. Development specified in schedule 4 of the Planning and Development Act 2007 and not listed as a prohibited use in this table.	
3. Development that is authorised by a lease and listed as a prohibited use in this table.	
4. Development declared under section 124 or section 125 of the Planning and Development Act 2007 and not listed as a prohibited development in this table.	
5. Varying a lease to add a use assessable under the impact track.	

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PROHIBITED DEVELOPMENT	
Development listed below is prohibited development unless the development is identified elsewhere in this development table as assessable under the code, merit or impact track.	
airport	mining industry
animal care facility	NON-RETAIL COMMERCIAL USE
animal husbandry	offensive industry
aquatic recreation facility	overnight camping area
boarding house	outdoor entertainment facility
bulk landscape supplies	outdoor recreation facility
car park	pedestrian plaza
cemetery	place of assembly
civic administration	plant and equipment hire establishment
club	plantation forestry
COMMERCIAL ACCOMMODATION USE	playing field
communications facility	produce market
COMMUNITY USE	public transport facility
corrections facility	railway use
craft workshop	recyclable materials collection
defence installation	recycling facility
development in a location and of a type identified in a precinct map as additional prohibited development	RESIDENTIAL USE
drink establishment	restaurant
drive-in cinema	retirement village
emergency services facility	sand and gravel extraction
freight transport facility	service station
funeral parlour	SHOP
general industry	special dwelling
group or organized camp	stock/sale yard
hazardous industry	store
hazardous waste facility	tourist facility
home business	transport depot
incineration facility	varying a lease to add a use listed as “prohibited development” in this development table
indoor entertainment facility	vehicle sales
indoor recreation facility	veterinary hospital
industrial trades	warehouse
land fill site	waste transfer station
light industry	zoological facility
liquid fuel depot	
mobile home park	

RELEVANT CODE

Development proposals must comply with the Non Urban Zones Development Code.

NOTE ABOUT ANCILLARY, MINOR AND TEMPORARY USE

Some development that would otherwise be prohibited may be assessed under the merit track if they can be defined as *ancillary*, *minor or temporary use*. For example, a *car park* is prohibited, but could be considered if it is ancillary to a *parkland* which is an assessable development under the merit track.

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PRZ1 - Urban Open Space Zone

Zone Objectives

a) Provide an appropriate quality, quantity and distribution of parks and open spaces that will contribute to the recreational and social needs of the community

b) Establish a variety of settings that will support a range of recreational and leisure activities as well as protect flora and fauna habitats and corridors, natural and cultural features and landscape character

c) Allow for stormwater drainage and the protection of water quality, stream flows and stream environs in a sustainable, environmentally responsible manner and which provides opportunities for the community to interact with and interpret the natural environment

d) Allow for ancillary uses that support the care, management and enjoyment of these open spaces including park maintenance depots, small-scale community activity centres

e) Ensure that development does not unacceptably affect the landscape or scenic quality of the area, adequacy of open space for other purposes, access to open space, or amenity of adjoining residents

f) Provide for integrated land and water planning and management

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PRZ1 – Urban Open Space Zone Development Table

EXEMPT DEVELOPMENT Development approval is not required. Building approval may be required. On leased land, development must be authorised by a lease.	
Development identified in the Planning and Development Act 2007 as exempt (see sections 133 and 134 of the Act and section 20 and schedule 1 of the Planning and Development Regulation 2008)	
ASSESSABLE DEVELOPMENT Development application required. On leased land, development must be authorised by a lease.	
MINIMUM ASSESSMENT TRACK **CODE** Development listed below requires a development application and is assessed in the code track	
Development	
No development identified.	
MINIMUM ASSESSMENT TRACK **MERIT** Development listed below requires a development application and is assessed in the merit track, unless specified in schedule 4 of the Planning and Development Act 2007 (as impact track) or specified as prohibited development in a precinct map.	
Development	
ancillary use	minor use
aquatic recreation facility	municipal depot
community activity centre	outdoor recreation facility
consolidation	parkland
demolition	playing field
development in a location and of a type identified in a precinct map as additional merit track development	sign
major road	subdivision
MAJOR UTILITY INSTALLATION	temporary use
minor road	
MINIMUM ASSESSMENT TRACK **IMPACT** Development listed below requires a development application and is assessed in the impact track	
1. Development that is not: a. Exempt code track or merit track development; or b. Prohibited development other than development that is permitted under s137 of the Planning and Development Act 2007.	
2. Development specified in schedule 4 of the Planning and Development Act 2007 and not listed as a prohibited use in this table.	
3. Development that is authorised by a lease and listed as a prohibited use in this table.	
4. Development declared under section 124 or section 125 of the Planning and Development Act 2007 and not listed as a prohibited development in this table.	
5. Varying a lease to add a use assessable under the impact track.	

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PROHIBITED DEVELOPMENT	
Development listed below is prohibited development unless the development is identified elsewhere in this development table as assessable under the code, merit or impact track.	
agriculture	light industry
airport	liquid fuel depot
animal care facility	mining industry
animal husbandry	mobile home park
boarding house	nature conservation area
bulk landscape supplies	NON-RETAIL COMMERCIAL USE
car park	offensive industry
caravan park/camping ground	overnight camping area
cemetery	pedestrian plaza
child care centre	place of assembly
civic administration	place of worship
club	plant and equipment hire establishment
communications facility	plantation forestry
community theatre	produce market
COMMERCIAL ACCOMMODATION USE	public agency
corrections facility	public transport facility
craft workshop	railway use
cultural facility	recyclable materials collection
defence installation	recycling facility
development in a location and of a type identified in a precinct map as additional prohibited development	religious associated use
drink establishment	RESIDENTIAL USE
drive-in cinema	restaurant
educational establishment	retirement village
emergency services facility	sand and gravel extraction
farm tourism	scientific research establishment
freight transport facility	service station
funeral parlour	shop
general industry	stock/sale yard
group or organised camp	store
hazardous industry	tourist facility
hazardous waste facility	transport depot
health facility	varying a lease to add a use listed as “prohibited development” in this development table
home business	vehicle sales
hospital	veterinary hospital
incineration facility	warehouse
indoor entertainment facility	waste transfer station
indoor recreation facility	woodlot
industrial trades	zoological facility
land fill site	
land management facility	

RELEVANT CODE
Development proposals must comply with the Parks and Recreation Zone Development Code.

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NOTE ABOUT ANCILLARY, MINOR AND TEMPORARY USE
Some development that would otherwise be prohibited may be assessed under the merit track if they can be defined as *ancillary*, *minor or temporary use*. For example, a *car park* alone is prohibited, but could be considered if it is ancillary to a *playing field* which is an assessable development under the merit track.

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RZ1 – Suburban zone

Zone objectives

a) Provide for the establishment and maintenance of residential areas where the housing is low rise and predominantly single dwelling and low density in character

b) Protect the character of established single dwelling housing areas by limiting the extent of change that can occur particularly with regard to the original pattern of subdivision and the density of dwellings

c) Provide for a wide range of affordable and sustainable housing choices that meet changing household and community needs

d) Ensure development respects valued features of the neighbourhood and landscape character of the area and does not have unreasonable negative impacts on neighbouring properties

e) Provide opportunities for home based employment consistent with residential amenity

f) Provide for a limited range of small-scale facilities to meet local needs consistent with residential amenity

g) Promote good solar access

h) Promote energy efficiency and conservation

i) Promote sustainable water use

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RZ1 – Suburban zone development table

EXEMPT DEVELOPMENT Development approval is not required. Building approval may be required. On leased land, development must be authorised by a lease.	
Single dwelling housing – new residential land, subject to section 20 and schedule 1 of the Planning and Development Regulation 2008.	
Exempt development identified in section 20 and schedule 1 of the Planning and Development Regulation 2008.	
ASSESSABLE DEVELOPMENT Development application required. On leased land, development must be authorised by a lease.	
MINIMUM ASSESSMENT TRACK **CODE** Development application required and assessed in the code track	
Development	
Single dwelling housing that complies with the relevant rules, except where exempted from requiring development approval by section 20 and schedule 1 of the Planning and Development Regulation 2008.	
Varying a lease to do one or more of the following: 1. express the number of approved or lawfully erected dwellings 2. remove, relocate or change easements.	
Development specified as additional code track development in a suburb precinct code for land shown on the relevant suburb precinct map	
MINIMUM ASSESSMENT TRACK **MERIT** Development application required and assessed in the merit track, unless specified in schedule 4 of the Planning and Development Act 2007 (as impact track)	
Development	
ancillary use	parkland
boarding house	residential care accommodation
child care centre	retirement village
community activity centre	sign
consolidation	single dwelling housing (where not exempt development or code track assessable)
demolition	secondary residence
development specified as additional merit track development in a suburb precinct code for land shown on the relevant suburb precinct map	special dwelling
guest house	subdivision
health facility	supportive housing
home business	temporary use
minor use	varying a lease (where not code track or impact track assessable)
multi-unit housing	
MINIMUM ASSESSMENT TRACK **IMPACT** Development application required and assessed in the impact track	
1. Development that is not an exempt, code track or merit track development (see section 134 of the Planning and Development Act 2007).	
2. Development specified in schedule 4 of the Planning and Development Act 2007 and not listed as a prohibited use in this table.	
3. Development that is authorised by a lease and listed as a prohibited use in this table.	

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4. Development declared under section 123 or section 124 of the Planning and Development Act 2007 and not listed as a prohibited development in this table.	
5. Varying a lease add a use assessable under the impact track.	
PROHIBITED DEVELOPMENT	
Development listed below is prohibited development except where it is listed elsewhere in this development table.	
Agriculture	liquid fuel depot
Airport	mining industry
animal care facility	mobile home park
animal husbandry	motel
aquatic recreation facility	municipal depot
bulk landscape supplies	nature conservation area
business agency	offensive industry
car park	office
caretakers residence	outdoor recreation facility
caravan park/camping ground	overnight camping area
Cemetery	pedestrian plaza
civic administration	place of assembly
Club	place of worship
communications facility	plant and equipment hire establishment
community theatre	plantation forestry
commercial accommodation unit	produce market
corrections facility	public agency
craft workshop	public transport facility
cultural facility	railway use
defence installation	recyclable materials collection
development specified as additional prohibited development in a suburb precinct code for land shown on the relevant suburb precinct map	recycling facility
drink establishment	religious associated use
drive-in cinema	restaurant
educational establishment	sand and gravel extraction
emergency services facility	scientific research establishment
farm tourism	serviced apartment
freight transport facility	service station
funeral parlour	SHOP
general industry	stock/sale yard
group or organised camp	store
hazardous industry	tourist facility
hazardous waste facility	tourist resort
hospital	transport depot
Hotel	varying a lease to add a use listed as "prohibited development" in this development table
incineration facility	vehicle sales
indoor entertainment facility	veterinary hospital
indoor recreation facility	warehouse
industrial trades	waste transfer station
land fill site	woodlot
land management facility	zoological facility
light industry	

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RELEVANT CODE
Development proposals in residential zones must comply with the Residential Zones Development Code.
NOTE ABOUT ANCILLARY AND MINOR USE
Some development that would otherwise be prohibited may be assessed under the merit track if they can be defined as *ancillary* or *minor use*. For example, a *car park* alone is prohibited, but could be considered if it is ancillary to a *child care centre* which is an assessable development under the merit track.

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RZ3 – Urban residential zone

Zone objectives

a) Provide for the establishment and maintenance of residential areas where the housing is low rise and predominantly medium density in character and particularly in areas that have good access to facilities and services and/ or frequent public transport services

b) Provide opportunities for redevelopment by enabling changes to the original pattern of subdivision and the density of dwellings

c) Provide for a wide range of affordable and sustainable housing choices that meet changing household and community needs

d) Ensure development and redevelopment is carefully managed so that it achieves a high standard of residential amenity, makes a positive contribution to the neighbourhood and landscape character of the area and does not have unreasonable negative impacts on neighbouring properties

e) Provide opportunities for home based employment consistent with residential amenity

f) Provide for a limited range of small-scale facilities to meet local needs consistent with residential amenity

g) Promote good solar access

h) Promote energy efficiency and conservation

i) Promote sustainable water use

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RZ3 – Urban residential zone development table

EXEMPT DEVELOPMENT Development approval is not required. Building approval may be required. On leased land, development must be authorised by a lease.	
Single dwelling housing – new residential land, subject to section 20 and schedule 1 of the Planning and Development Regulation 2008.	
Exempt development identified in section 20 and schedule 1 of the Planning and Development Regulation 2008.	
ASSESSABLE DEVELOPMENT Development application required. On leased land, development must be authorised by a lease.	
MINIMUM ASSESSMENT TRACK **CODE** Development application required and assessed in the code track	
Development	
Single dwelling housing that complies with the relevant rules, except where exempted from requiring development approval by section 20 and schedule 1 of the Planning and Development Regulation 2008.	
Development specified as additional code track development in a suburb precinct code for land shown on the relevant suburb precinct map	
Varying a lease to do one or more of the following: 1. express the number of approved or lawfully erected dwellings 2. remove, relocate or change easements.	
MINIMUM ASSESSMENT TRACK **MERIT** Development application required and assessed in the merit track, unless specified in schedule 4 of the Planning and Development Act 2007 (as impact track)	
Development	
ancillary use	parkland
boarding house	residential care accommodation
child care centre	retirement village
community activity centre	sign
consolidation	single dwelling housing (where not exempt development or code track assessable)
demolition	secondary residence
development specified as additional merit track development in a suburb precinct code for land shown on the relevant suburb precinct map	special dwelling
guest house	subdivision
health facility	supportive housing
home business	temporary use
minor road	varying a lease (where not code track or impact track assessable)
minor use	
multi-unit housing	
MINIMUM ASSESSMENT TRACK IMPACT Development application required and assessed in the impact track	
1. Development that is not: a. Exempt, code track or merit track development (see section 132 of the Planning and Development Act 2007); or b. Prohibited development, other than development that is permitted under s137 of the Planning and Development Act 2007.	

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2. Development specified in schedule 4 of the Planning and Development Act 2007 and not listed as a prohibited use in this table.	
3. Development that is authorised by a lease and listed as a prohibited use in this table.	
4. Development declared under section 124 or section 125 of the Planning and Development Act 2007 and not listed as a prohibited development in this table.	
5. Varying a lease to add a use assessable under the impact track.	
PROHIBITED DEVELOPMENT	
Development listed below is prohibited development except where it is listed elsewhere in this development table.	
agriculture	liquid fuel depot
airport	mining industry
animal care facility	mobile home park
animal husbandry	motel
aquatic recreation facility	municipal depot
bulk landscape supplies	nature conservation area
business agency	offensive industry
car park	office
caretakers residence	outdoor recreation facility
caravan park/camping ground	overnight camping area
cemetery	pedestrian plaza
civic administration	place of assembly
club	place of worship
communications facility	plant and equipment hire establishment
community theatre	plantation forestry
commercial accommodation unit	produce market
corrections facility	public agency
craft workshop	public transport facility
cultural facility	railway use
defence installation	recyclable materials collection
development specified as additional prohibited development in a suburb precinct code for land shown on the relevant suburb precinct map	recycling facility
drink establishment	religious associated use
drive-in cinema	restaurant
educational establishment	sand and gravel extraction
emergency services facility	scientific research establishment
farm tourism	serviced apartment
freight transport facility	service station
funeral parlour	SHOP
general industry	stock/sale yard
group or organised camp	store
hazardous industry	tourist facility
hazardous waste facility	tourist resort
hospital	transport depot
hotel	varying a lease to add a use listed as “prohibited development” in this development table.
incineration facility	vehicle sales
indoor entertainment facility	veterinary hospital
indoor recreation facility	warehouse
industrial trades	waste transfer station

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land fill site	woodlot
land management facility	zoological facility
light industry	

RELEVANT CODE

Development proposals in residential zones must comply with the Residential Zones Development Code.

NOTE ABOUT ANCILLARY AND MINOR USE

Some development that would otherwise be prohibited may be assessed under the merit track if they can be defined as *ancillary* or *minor use*. For example, a *car park* alone is prohibited, but could be considered if it is ancillary to a *child care centre* which is an assessable development under the merit track.

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TSZ1 - Transport Zone

Zone Objectives

a) Make provision for a transport network that can provide for the efficient, safe and convenient movement of people and goods

b) Ensure that major roads, light rail and transport infrastructure are developed in a comprehensive manner, including the provision of appropriate landscaping, street furniture and lighting, traffic control devices, and noise attenuation measures

c) Make provision for public transport

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TSZ1 - Transport Zone Development Table

EXEMPT DEVELOPMENT Development approval is not required. Building approval may be required. On leased land, development must be authorised by a lease.	
Development identified in the Planning and Development Act 2007 as exempt (see sections 133 and 134 of the Act and section 20 and schedule 1 of the Planning and Development Regulation 2008)	
ASSESSABLE DEVELOPMENT Development application required. On leased land, development must be authorised by a lease.	
MINIMUM ASSESSMENT TRACK **CODE** Development listed below requires a development application and is assessed in the code track	
Development	
No development identified.	
MINIMUM ASSESSMENT TRACK **MERIT** Development listed below requires a development application and is assessed in the merit track, unless specified in schedule 4 of the Planning and Development Act 2007 (as impact track) or specified as prohibited development in a precinct map.	
Development	
ancillary use	minor road
car park	minor use
communications facility	pedestrian plaza
consolidation	public transport facility
demolition	sign
development in a location and of a type identified in a precinct map as additional merit track development	subdivision
major road	temporary use
major service conduits	
MINIMUM ASSESSMENT TRACK **IMPACT** Development listed below requires a development application and is assessed in the impact track	
1. Development that is not: a. Exempt, code track or merit track development (see section 132 of the Planning and Development Act 2007); or b. Prohibited development, other than development that is permitted under s137 of the Planning and Development Act 2007.	
2. Development specified in schedule 4 of the Planning and Development Act 2007 and not listed as a prohibited use in this table.	
3. Development that is authorised by a lease and listed as a prohibited use in this table.	
4. Development declared under section 124 or section 125 of the Planning and Development Act 2007 and not listed as a prohibited development in this table.	
5. Varying a lease to add a use assessable under the impact track.	
PROHIBITED DEVELOPMENT	
Development listed below is prohibited development unless the development is identified elsewhere in this development table as assessable under the code, merit or impact track.	
agriculture	mobile home park
airport	municipal depot

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animal care facility	nature conservation area
animal husbandry	NON-RETAIL COMMERCIAL USE
aquatic recreation facility	offensive industry
boarding house	outdoor recreation facility
bulk landscape supplies	overnight camping area
caravan park/camping ground	parkland
cemetery	place of assembly
civic administration	plant and equipment hire establishment
club	plantation forestry
COMMUNITY USE	playing field
COMMERCIAL ACCOMMODATION USE	produce market
corrections facility	railway use
craft workshop	recyclable materials collection
development in a location and of a type identified in a precinct map as additional prohibited development	recycling facility
drink establishment	RESIDENTIAL USE
drive-in cinema	restaurant
emergency services facility	retirement village
farm tourism	sand and gravel extraction
freight transport facility	scientific research establishment
funeral parlour	service station
general industry	SHOP
group or organised camp	stock/sale yard
hazardous industry	store
hazardous waste facility	tourist facility
incineration facility	transport depot
indoor entertainment facility	varying a lease to add a use listed as “prohibited development” in this development table
indoor recreation facility	vehicle sales
industrial trades	veterinary hospital
land fill site	warehouse
land management facility	waste transfer station
light industry	woodlot
liquid fuel depot	zoological facility
mining industry	

RELEVANT CODE

Development proposals must comply with the Transport and Services Zone Development Code.

NOTE ABOUT ANCILLARY, MINOR AND TEMPORARY USE

Some development that would otherwise be prohibited may be assessed under the merit track if they can be defined as *ancillary*, *minor or temporary use*. For example, a *SHOP* alone is prohibited, but could be considered if it is ancillary to a *public transport facility* which is an assessable development under the merit track.

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TSZ2 - Services Zone

Zone Objectives

a) Make provision for essential municipal services such as water, energy, transport and waste disposal

b) Ensure that development is carried out in an economic, safe, environmentally sensitive manner and does not unacceptably affect the health and safety of any nearby residents

c) Ensure that there is minimal impact on adjacent land uses due to any municipal services development

d) Ensure that development is compatible with the surrounding landscape, especially in areas of high visibility, and that appropriate measures are taken to soften the impact of development on the landscape

e) Limit the impact of electro-magnetic interference from development on electrical appliances in nearby premises

f) Enable the development of transport facilities that are accessible and efficient for passengers and goods handling

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TSZ2 - Services Zone Development Table

EXEMPT DEVELOPMENT Development approval is not required. Building approval may be required. On leased land, development must be authorised by a lease.	
Development identified in the Planning and Development Act 2007 as exempt (see sections 133 and 134 of the Act and section 20 and schedule 1 of the Planning and Development Regulation 2008)	
ASSESSABLE DEVELOPMENT Development application required. On leased land, development must be authorised by a lease.	
MINIMUM ASSESSMENT TRACK **CODE** Development listed below requires a development application and is assessed in the code track	
Development	
No development identified.	
MINIMUM ASSESSMENT TRACK **MERIT** Development listed below requires a development application and is assessed in the merit track, unless specified in schedule 4 of the Planning and Development Act 2007 (as impact track) or specified as prohibited development in a precinct map.	
Development	
ancillary use	minor road
car park	minor use
cemetery	municipal depot
communications facility	public transport facility
consolidation	railway use
demolition	recyclable materials collection
development in a location and of a type identified in a precinct map as additional merit track development	recycling facility
emergency services facility	sign
freight transport facility	store
hazardous waste facility	subdivision
incineration facility	temporary use
land fill site	transport depot
major road	waste transfer station
MAJOR UTILITY INSTALLATION	
MINIMUM ASSESSMENT TRACK **IMPACT** Development listed below requires a development application and is assessed in the impact track	
1. Development that is not: a. Exempt, code track or merit track development (see section 132 of the Planning and Development Act 2007); or b. Prohibited development, other than development that is permitted under s137 of the Planning and Development Act 2007.	
2. Development specified in schedule 4 of the Planning and Development Act 2007 and not listed as a prohibited use in this table.	
3. Development that is authorised by a lease and listed as a prohibited use in this table.	
4. Development declared under section 124 or section 125 of the Planning and Development Act 2007 and not listed as a prohibited development in this table.	
5. Varying a lease to add a use assessable under the impact track.	

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PROHIBITED DEVELOPMENT	
Development listed below is prohibited development unless the development is identified elsewhere in this development table as assessable under the code, merit or impact track.	
agriculture	mobile home park
airport	nature conservation area
animal care facility	NON-RETAIL COMMERCIAL USE
animal husbandry	offensive industry
aquatic recreation facility	outdoor recreation facility
boarding house	overnight camping area
bulk landscape supplies	parkland
caravan park/camping ground	pedestrian plaza
civic administration	place of assembly
club	plant and equipment hire establishment
COMMUNITY USE	plantation forestry
COMMERCIAL ACCOMMODATION USE	playing field
corrections facility	produce market
craft workshop	public agency
defence installation	RESIDENTIAL USE
development in a location and of a type identified in a precinct map as additional prohibited development	restaurant
drink establishment	retirement village
drive-in cinema	sand and gravel extraction
farm tourism	scientific research establishment
funeral parlour	service station
general industry	SHOP
group or organised camp	stock/sale yard
hazardous industry	tourist facility
home business	varying a lease to add a use listed as “prohibited development” in this development table
indoor entertainment facility	vehicle sales
indoor recreation facility	veterinary hospital
industrial trades	warehouse
land management facility	woodlot
light industry	zoological facility
liquid fuel depot	
mining industry	

RELEVANT CODE
Development proposals must comply with the Transport and Services Zone Development Code.

NOTE ABOUT ANCILLARY AND MINOR USE
Some development that would otherwise be prohibited may be assessed under the merit track if they can be defined as *ancillary*, *minor or temporary use*. For example, a *SHOP* alone is prohibited, but could be considered if it is ancillary to a *public transport facility* which is an assessable development under the merit track.

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