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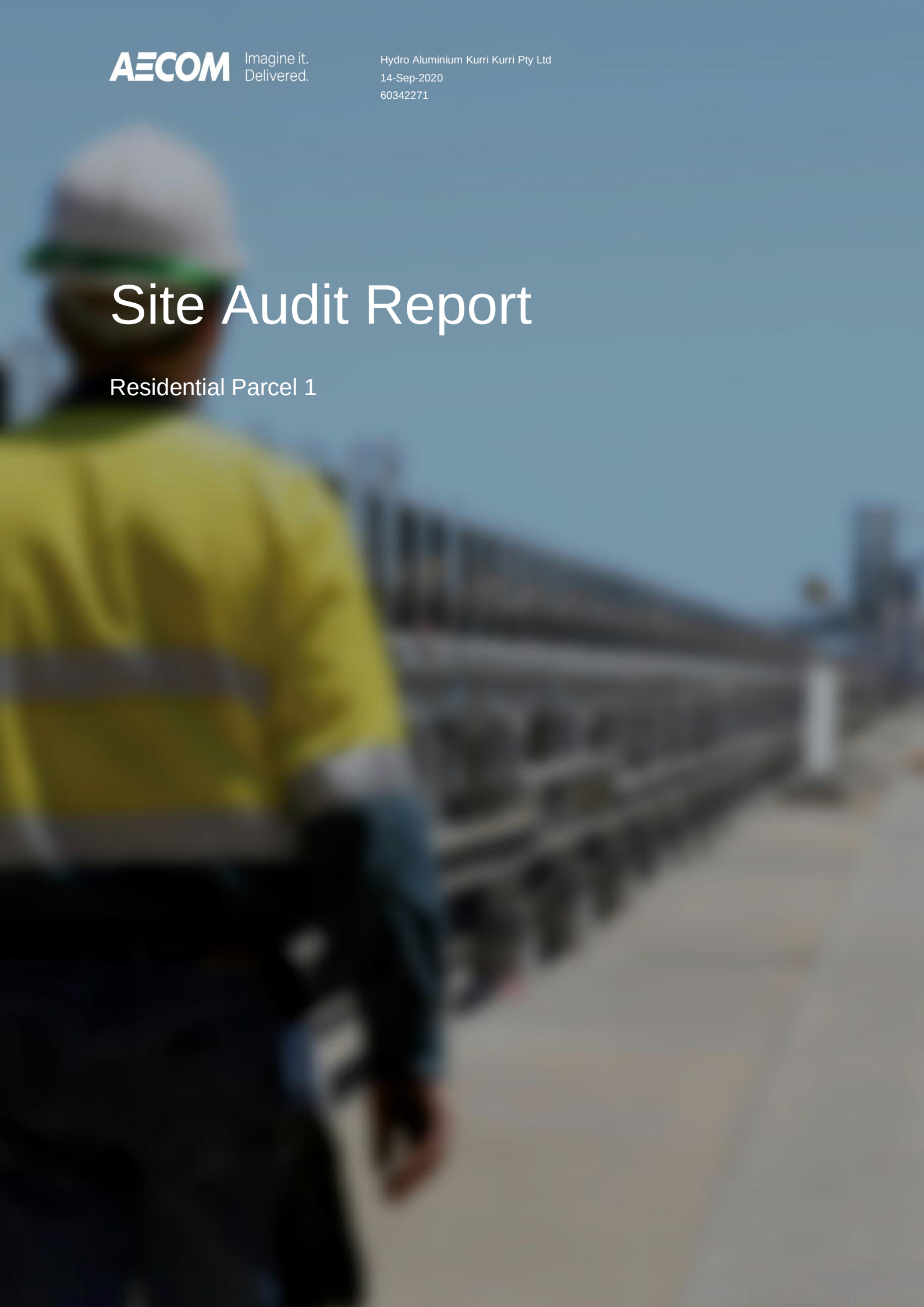
Hydro Aluminium Kurri Kurri Pty Ltd
14-Sep-2020
60342271

Site Audit Report

Residential Parcel 1



Site Audit Report

Residential Parcel 1

Client: Hydro Aluminium Kurri Kurri Pty Ltd

ABN: 55 093 266 221

Prepared by

AECOM Australia Pty Ltd
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14-Sep-2020

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Quality Information

Document Site Audit Report

Ref 60342271

Date 14-Sep-2020

Prepared by Ross McFarland

Reviewed by Mark Tiedeman

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
A	01-Sept-2016	Draft	Ross McFarland Chief Environmental Scientist	
B	03-May-2019	Draft Final	Ross McFarland Chief Environmental Scientist	
0	07-May-2020	Final	Ross McFarland Chief Environmental Scientist	
R	14-Sep-2020	Revised Final	Ross McFarland Chief Environmental Scientist	

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Site Audit Statement

NSW Site Auditor Scheme

Site Audit Statement

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

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

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

Part I: Site audit identification

Site audit statement no. 2015/02R

This site audit is a:

☐ ~~statutory audit~~

☑ non-statutory audit

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

Site auditor details

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

Name Ross McFarland

Company AECOM Australia Pty Ltd

Address 17 Warabrook Blvd

Warabrook NSW Postcode 2304

Phone 02 49 11 4900

Email ross.mcfarland@aecom.com

Site details

Address Cessnock Road

CLIFTLEIGH NSW Postcode 2321

Property description

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

Residential Parcel 1

Lots 1, 2, 3, 4, 5, 7, 8 and 9 in DP456946, Lots 54, 55, 69, 70 & 71 in DP975994, and Part Lot 1 in DP 1206034 Local government area, Maitland City Council

Area of site (include units, e.g. hectares) 80.32 ha

Current zoning RU1 – Primary Production under the Maitland Local Environmental Plan

Regulation and notification

To the best of my knowledge:

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

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

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

To the best of my knowledge:

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

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

Site audit commissioned by

Name Mr Richard Brown

Company Hydro Aluminium Kurri Kurri Pty Ltd

Address PO Box 1

KURRI KURRI NSW Postcode 2327

Phone 02 4937 0406

Email Richard.Brown@hydro.com

Contact details for contact person (if different from above)

Name – as above

Nature of statutory requirements (not applicable for non-statutory audits)

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

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

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

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

Purpose of site audit

☐ **A1** To determine land use suitability

Intended uses of the land:

Low density residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry, or less sensitive uses as may be permitted by the relevant zonings
The Proposed Zoning is:

• R1: General Residential; and

• R2: Low Density Residential

There are restrictions on residential development on the following areas of the site:

• Active railway line. Proposed Zoning is: SP2 Special Purposes Infrastructure.

• Buffer around active railway line. Proposed Zoning is: RE1 Public Recreation.

• Mine subsidence areas. Proposed Zoning is: RU2 Rural Landscape and E2 Environmental Conservation.

~~OR~~

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

~~Intended uses of the land:~~

OR

(Tick all that apply)

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

~~☐ **B2** To determine the appropriateness of:~~

~~☐ an investigation plan~~

~~☐ a remediation plan~~

~~☐ a management plan~~

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

~~☐ **B4** To determine the compliance with an approved:~~

~~☐ **voluntary management proposal** or~~

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

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

~~☐ Intended uses of the land:~~

Information sources for site audit

Consultancies which conducted the site investigations and/or remediation:

Ramboll Australia Pty Ltd

Titles of reports reviewed:

- DLA, 2015, "Validation Report Residential Parcel 1 Lots 1 through 9 in DP456946 Lots 54, 55, 69, 70 & 71 DP975994", dated 18 June 2015 (herein referred to as "the Validation Report");
- Ramboll Environ, 2016, "Response to Auditor Comments, Residential Parcel 1", dated 27 June 2016 (provided in Appendix B. Referred to herein as "the Response Letter");
- Ramboll Environ, 2016, Responses inserted into the Auditor's Reporting Guidelines Compliance Checklist - Validation, received on the 27 June 2016 (provided in Appendix B herein).
- Environ, 2013, "Preliminary Screening Level, Health Risk Assessment for Fluoride and Aluminium Part of the Kurri Kurri Aluminium Smelter", dated 2 April 2013 (herein referred to as "the HRA");
- Hart Road, Loxford Environ, 2013, "Phase 1 ESA, Hydro Kurri Kurri Aluminium Smelter", dated 22 October 2013 (herein referred to as "the Phase 1 Report");
- Ramboll Environ, 2013, "Phase 2 Environmental Site Assessment, Residential Parcel 1", dated 5 November 2013 (herein referred to as "the DSI Report");
- Environ, 2014, "Remedial Action Work Plan, Residential Parcel 1 Kurri Kurri NSW", dated 10 July 2014 (herein referred to as "the RAWP");
- Environ, 2014, "Addenda to Remedial Action plan, Residential Parcel 1, Kurri Kurri, NSW", dated 21 November 2014 (herein referred to as "the RAWP Addendum");
- Ramboll Environ, 2016, Responses inserted into the Auditor's Reporting Guidelines Compliance Checklist – Stage 2 Investigations, received on the 26 July 2016 (provided in Appendix B herein);
- Ramboll, 2017, Addenda to Phase 2 Environmental Site Assessment Report and Validation Report, Residential Parcel 1: Environmental Conservation and Rural Landscape Boundary;
- Ramboll, 2018, Addendum to Phase 2 Environmental Site Assessment, Residential Parcel 1: Change to Site Boundary;
- Ramboll, 2020, Suitability of Residential Parcel 1 and Residential Central for other land uses, received on the 3 April 2020; and
- Ramboll, 2020, Suitability of Residential Parcel 1 for land uses, received on the 22 July 2020.

Site audit report details

Title Site Audit Report – Residential Parcel 1

Report no. Rev R Date September 2020

Part II: Auditor's findings

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

- Use **Section A1** where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land uses **without the implementation** of an environmental management plan.

- Use **Section A2** where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land uses **with the implementation** of an active or passive environmental management plan.

- Use **Section B** where the audit is to determine:
  - (B1) the nature and extent of contamination, and/or
  - (B2) the appropriateness of an investigation, remediation or management plan[1], and/or
  - (B3) the appropriateness of a site testing plan in accordance with the *Temporary Water Restrictions Order for the Botany Sands Groundwater Source 2017*, and/or
  - (B4) whether the terms of the approved voluntary management proposal or management order have been complied with, and/or
  - (B5) whether the site can be made suitable for a specified land use (or uses) if the site is remediated or managed in accordance with the implementation of a specified plan.

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

Section A1

I certify that, in my opinion:

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

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

- ~~☐ Residential, including substantial vegetable garden and poultry~~
- ~~☐ Residential, including substantial vegetable garden, excluding poultry~~
- ✓ **Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry**
- ✓ **Day care centre, preschool, primary school**
- ✓ **Residential with minimal opportunity for soil access, including units**
- ✓ **Secondary school**
- ✓ **Park, recreational open space, playing field**
- ✓ **Commercial/industrial**
- ✓ **Other (please specify):**

RU2 Rural Landscape and E2 Environmental Conservation.

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

Overall comments:

Due to the potential for undiscovered low-level contamination/waste issues remaining at the Site, it is common practice that a Construction Environmental Management Plan (CEMP) be prepared by a suitably qualified environmental consultant for the civil works Contractor, immediately prior to the commencement of the civil works program.

Section A2

I certify that, in my opinion:

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

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

☐ Residential, including substantial vegetable garden and poultry

☐ Residential, including substantial vegetable garden, excluding poultry

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

☐ Day care centre, preschool, primary school

☐ Residential with minimal opportunity for soil access, including units

☐ Secondary school

☐ Park, recreational open space, playing field

☐ Commercial/industrial

☐ Other (please specify):

_____

EMP details

Title _____

Author _____

Date _____ No. of pages _____

EMP summary

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

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

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

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

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

~~Purpose of the EMP:~~

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

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

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

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

~~Overall comments:~~

Section B

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

I certify that, in my opinion:

(B1)

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

☐ AND/OR (B2)

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

AND/OR (B3)

☐ The site testing plan:

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

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

AND/OR (B4)

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

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

*voluntary management proposal no.

**management order no.

AND/OR (B5)

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

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

- ☐ Residential, including substantial vegetable garden and poultry
- ☐ Residential, including substantial vegetable garden, excluding poultry

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

- ☐ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry
- ☐ Day care centre, preschool, primary school
- ☐ Residential with minimal opportunity for soil access, including units
- ☐ Secondary school
- ☐ Park, recreational open space, playing field
- ☐ Commercial/industrial
- ☐ Other (please specify):

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

*Strike out as appropriate

Plan title

Plan author

Plan date No. of pages

SUBJECT to compliance with the following condition(s):

Overall comments:

Part III: Auditor's declaration

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

Accreditation no. 9819

I certify that:

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

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

Signed

Date 14 September 2020

Part IV: Explanatory notes

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

How to complete this form

Part I

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

Part II

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

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

Section A1

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

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

Section A2

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

Environmental management plan

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

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

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

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

Active or passive control systems

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

Auditor's comments

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

Section B

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

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

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

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

Part III

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

Where to send completed forms

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

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

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

1.0 Introduction

1.1 Background

Ross McFarland of AECOM Australia Pty Ltd (AECOM) was engaged by Hydro Aluminium Kurri Kurri Pty Ltd (Hydro) as a NSW Environment Protection Authority (EPA) Accredited Contaminated Sites Auditor (No. 9819) for the Environmental Site Assessments (ESAs) and remediation of the former aluminium smelter in Kurri Kurri, NSW. The area comprises approximately 60 ha of the smelter site and approx. 2,000 ha of buffer land and other Hydro land purchases, which surround the smelter site. The Site location and layout are presented on **Figures 1** – **3** in **Appendix A**.

The former Aluminium Smelter was in operation from 1969 until 2012, and closed down in 2014 after two years of care and maintenance. The smelter operated a single pot line until 1979, when a second pot line was commissioned. A third pot line was added in 1985, and upgrades were undertaken in 2002, resulting in a production of 180,000 tonnes of aluminium per annum.

The buffer land (within which the subject Site partly lies) has remained largely undisturbed since the commencement of the smelter operations.

As presented on **Figures 1** – **3**, the Site is approximately 50% within the buffer land and 50% within other lands purchased by Hydro around the former Aluminium Smelter.

This Site Audit Report and Site Audit Statement (SAR / SAS) relates to the Phase 2 ESA and Validation Letter for the Site. The Audit Report no 60342271_SAR_2019_Rev0 relates to Residential Parcel 1 only ("the Site") which lies outside the smelter's 'operational' area. The SAR / SAS Rev0 was submitted on 7 May 2019. This SAR /SAS (Rev R) has been revised in light of further landuse suitability information provided by the Environmental Consultant and discussed further in Sections 1.3, 13 and 14. As a result of the technical adequacy of this additional information, the attached Site Audit Statement has been revised (Rev R) to include the following landuses:

- Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry
- Day care centre, preschool, primary school
- Residential with minimal opportunity for soil access, including units
- Secondary school
- Park, recreational open space, playing field
- Commercial/industrial
- Other: RU2 Rural Landscape and E2 Environmental Conservation

The revised landuses that have been independently assessed as suitable by this Audit are consistent with Council's Permitted Uses within the proposed zoning.

1.2 Purpose of the Audit

The purpose of the Audit is to determine if the Site is suitable for its proposed residential landuse, noting that some areas are proposed as environmental conservation, public recreation and rural landscape. See Figure 1 in the Response Letter included in **Appendix B** (i.e. a "Part A" Audit) for further information.

1.3 Reports Reviewed

In preparing this SAR, the Site Auditor has reviewed the following main report and associated responses to the Auditor's comments:

- DLA, 2015, "*Validation Report Residential Parcel 1 Lots 1 through 9 in DP456946 Lots 54, 55, 69, 70 & 71 DP975994*", dated 18 June 2015 (herein referred to as "the Validation Report");
- Ramboll Environ, 2016, "*Response to Auditor Comments, Residential Parcel 1*", dated 27 June 2016 (provided in **Appendix B**. Referred to herein as "the Response Letter");
- Ramboll Environ, 2016, Responses inserted into the Auditor's Reporting Guidelines Compliance Checklist - Validation, received on the 27 June 2016 (provided in **Appendix B** herein).

In addition, a number of previous and / or supplementary reports have been referred to in the process of preparing this SAR, including but not limited to:

- Environ, 2013, "*Preliminary Screening Level, Health Risk Assessment for Fluoride and Aluminium Part of the Kurri Kurri Aluminium Smelter*", dated 2 April 2013 (herein referred to as "the HRA");
- Hart Road, Loxford Environ, 2013, "*Phase 1 ESA, Hydro Kurri Kurri Aluminium Smelter*", dated 22 October 2013 (herein referred to as "the Phase 1 Report");
- Ramboll Environ, 2013, "*Phase 2 Environmental Site Assessment, Residential Parcel 1*", dated 5 November 2013 (herein referred to as "the DSI Report");
- Environ, 2014, "*Remedial Action Work Plan, Residential Parcel 1 Kurri Kurri NSW*", dated 10 July 2014 (herein referred to as "the RAWP");
- Environ, 2014, "*Addenda to Remedial Action plan, Residential Parcel 1, Kurri Kurri, NSW*", dated 21 November 2014 (herein referred to as "the RAWP Addendum");
- Ramboll Environ, 2016, Responses inserted into the Auditor's Reporting Guidelines Compliance Checklist – Stage 2 Investigations, received on the 26 July 2016 (provided in **Appendix B** herein);
- Ramboll, 2017, Addenda to Phase 2 Environmental Site Assessment Report and Validation Report, Residential Parcel 1: Environmental Conservation and Rural Landscape Boundary;
- Ramboll, 2018, Addendum to Phase 2 Environmental Site Assessment, Residential Parcel 1: Change to Site Boundary;
- Ramboll, 2020, Suitability of Residential Parcel 1 and Residential Central for other land uses, received on the 3 April 2020; and
- Ramboll, 2020, Suitability of Residential Parcel 1 for land uses, received on the 22 July 2020.

Relevant correspondence e-mails during the course of the Site Audit are included in **Appendix C** of this SAR. The landuse Addenda letters from Ramboll (2020) are included in **Appendix H**.

2.0 The Site Audit Purpose

2.1 Legislative Background

The Contaminated Land Management Act 1997 (CLM Act) provides the following definition: '*a site audit is a review:*

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

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

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

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

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

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

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

This audit was performed to address item b(iii) (i.e. landuse suitability). The audit was undertaken as a "non-statutory" audit (i.e. undertaken at the request of the site owner without any legislative triggers).

The site audit process is undertaken by a Site Auditor, accredited by the NSW EPA under the CLM Act and comprises an independent review of reports prepared by a consultant. This site audit has been undertaken by Ross McFarland of AECOM (accreditation number 9819) with assistance from Anna Lundmark, Dr Erla Hafsteinsdottir, and Mark Tiedeman of AECOM.

Note that NSW EPA, the body that administers the CLM Act, was previously incorporated in the Office of Environment and Heritage (OEH) and was also formerly known as the NSW Department of Environment, Climate Change and Water (DECCW), the Department of Environment and Climate Change (DECC) and the Department of Environment & Conservation (DEC).

It is noted that the National Environment Protection Council (NEPC) National Environment Protection (Assessment of Site Contamination) Measure, 1999, as amended in 2013 (ASC NEPM, 2013) came into effect on 16 May 2013. The earlier stages of works at the Site were undertaken prior to endorsement of *ASC NEPM* (2013). However, this is not considered to impact on the overall outcomes of this Site Audit.

2.2 Stages of a Site Audit

The Site Audit process generally includes review of assessment and investigation reports developed by an environmental consultant pertaining to the environmental condition of the land and the suitability of the land for a given land use. The Site Audit may also include the review of a RAP which, if implemented, may render the land suitable for a given land use. Until the RAP has been implemented, the Site Auditor cannot certify the suitability of the land. The Site Audit may also include a review of a Validation Plan, prepared by an environmental consultant to document the requirements for successful completion of the requirements of a RAP. At the conclusion of any remedial works, the Site Audit process also includes review of a Validation Report.

The Site Audit process is completed by preparation of a SAR, which summarises the results reported by the consultant, and a SAS, which determines the purpose of the Site Audit as either Part A or Part B. Part A certifies the suitability of the land for one or more uses, whereas Part B certifies whether the extent of contamination has been appropriately determined and / or the appropriateness of an investigation / RAP / management plan and / or the Site can be made suitable for one or more uses if it is remediated / managed in accordance with a RAP / management plan.

The investigation of the environmental condition of the land and any required remediation is carried out by the environmental consultant by reference to guidelines endorsed by the NSW EPA under Section 105 of the CLM Act. If the report(s) prepared by the consultant are in substantial conformance with the guidelines the Site Auditor is entitled to accept the results and conclusions stated therein and complete the SAR and issue a SAS. The Site Auditor is also entitled to form other opinions based on the results and conclusions stated in the report(s) by the consultant.

The Site Auditor does not normally carry out independent sampling or chemical analyses of soil, fill, groundwater or other media on the subject site, but rely on the testing and reporting that has been carried out by the consultant if it has been demonstrated to be of adequate reliability by reference to quality indicators listed in the endorsed guidelines.

It is expressly recognised that, even when a qualified environmental consulting firm has substantially followed guidelines endorsed by the NSW EPA, unidentified contamination or sub-surface structures may remain present. The processes of investigation, remediation and validation are statistically based and no liability is accepted by the Site Auditor for unidentified contamination or sub-surface structures subsequently found to be present on a site, which has been subjected to investigation, remediation and validation processes that are in substantial conformance to guidelines endorsed by the NSW EPA. In addition, Site Audits do not address heritage, geotechnical or engineering suitability of the site, for which specialist advice is required to be obtained outside the Site Audit process.

2.3 Site Inspection

The Site Auditor's assistants (Anna Lundmark and Mark Tiedeman) and the Site Auditor (Ross McFarland) undertook inspections of the Site on the following dates:

- 16 April 2014: Site visit to obtain an overview of the complete Site (Ross McFarland and Anna Lundmark).
- 13 November 2014: Site visit / inspection of the remedial works associated with the Fill Areas at completion of the Western Fill Zone (WFZ) (Anna Lundmark).
- 27 November 2014: Site Visit / Inspection of the remedial work at completion of the South Western Fill Zone (SWFZ) (Anna Lundmark).
- 03 February 2019: Site Visit / Inspection (Ross McFarland and Mark Tiedeman).

3.0 Site Information

3.1 Site Identification

The Site information details are presented in **Table 1** below, and were summarised from the Validation Report and the DSI Report.

Table 1 Site Identification

Item	Description
Parcel	Residential Parcel 1
Site owner	Hydro Aluminium Kurri Kurri Pty Ltd
Street address	Cessnock Road, Cliftleigh, New South Wales, Australia
Local government area (LGA)	Maitland City Council
Distance from nearest CBD	Approximately 35 km north west of the city of Newcastle and 150 km north of Sydney, in New South Wales, Australia
Lot and DP numbers	Lots 1, 2, 3, 4, 5, 7, 8 and 9 in DP456946, Lots 54, 55, 69, 70 & 71 in DP975994 and Part Lot 1 in DP 1206034. The Auditor notes that it was stated in the Validation Report that the Site was larger than the actual Site confirmed by Ramboll (the e-mail confirmation dated 26 September is included in **Appendix C**). This Audit only applies to the lots and DPs identified above.
Site Area	80.32 ha (noted to be defined as 78 ha in the Validation report, which was corrected by Ramboll in an e-mail dated 26 September 2016, included in **Appendix C** herein). In April 2019, Ramboll advised the Site Auditor that approximately 9.4 ha of part lot 3, part lot 4, part lot 7 and part lot 9 DP 456946 have since been incorporated into the site boundary to ensure Parcel 1 is comprised of complete lots (**Appendix D**), with the exception of Part Lot 1 in DP 1206034.
Zoning (past)	According to Ramboll Environ (e-mail dated 30 August 2016, **Appendix C**), the past zoning of the land is as per the current zoning, i.e.: RU2 – Rural Landscape under the Maitland Local Environmental Plan
Zoning (current)	RU2 – Rural Landscape under the Maitland Local Environmental Plan
Zoning (proposed)	In accordance with the response Letter, the Proposed Zoning is: • R1: General Residential; and • R2: Low Density Residential However; an addendum to Residential Parcel 1 ESA (Ramboll, 2020) was provided to AECOM in July 2020 (**Appendix H**). This addenda states that a Rezoning Masterplan has been developed by Hydro that identifies Residential Parcel 1 to comprise land proposed for: • General residential (R1), • Rural landscape (RU2) and • Public recreation (RE1). There are restrictions on residential development on the following areas of the site: • Active railway line. Proposed Zoning is: SP2 Special Purposes Infrastructure. • Buffer around active railway line. Proposed Zoning is: RE1 Public Recreation. • Mine subsidence areas. Proposed Zoning is: RU2 Rural Landscape and E2 Environmental Conservation.

Item	Description
	See Ramboll (2017) Addenda to Phase 2 Environmental Site Assessment Report and Validation Report, Residential Parcel 1: Environmental Conservation and Rural Landscape Boundary in **Appendix C**.
Land use (past)	Coal mining (Glen Main Colliery), mine subsidence areas were infilled with illegal dumping, farm materials and some smelter waste. The South Maitland Railway Line dissects the site; however does not form part of Parcel 1 (**Figure 2** in **Appendix A**). Ramboll advised that Part Lot 1 in DP 1206034 is a narrow portion of land that is not fenced and was assessed as part of the environmental investigations undertaken (**Appendix C**).
Land use (current)	Low density Residential, Cattle agistment
Land use (proposed)	Residential with Gardens / Accessible Soil, and other uses including environmental conservation, public recreation and rural landscape (refer to **Appendix B**, Figure 1 of the Response Letter for clarification from Ramboll Environ regarding the proposed landuses).
Site Elevation	Approximately 40 m AHD at the gate, sloping in a radial pattern to lower lying, flat areas at the north, northwest, south and southwest site boundaries at approximately 10 – 20 m AHD.
Site Figures	Figures from the Validation Report: **Appendix A** Proposed Landuse Figure provided in Ramboll Environ's Response Letter: **Appendix B**.
Surrounding environment	East: Cessnock Road and rural / residential beyond North: Rural and residential properties West: Rural and residential properties, and Wentworth Swamp South: Bushland, rural properties and cattle agistment

3.1.1 Auditor's Opinion

The Site Auditor considers that the Site was appropriately identified (when taking all the documents reviewed into consideration) in accordance with the requirements of NSW OEH, 2011, *"Guidelines for Consultants Reporting on Contaminated Sites"*. Discrepancies in the proposed landuse and zoning were clarified in Ramboll Environ's Response Letter (**Appendix B**), including a Figure of the proposed zoning.

The Auditor notes that the land zoning was described by the Consultant as RU1 – Primary Production; however the Maitland LEP 2011 zoning plans show the site zoning as RU2 – Rural Landscape.

It should also be noted that scale bars and north arrows were missing from some of the figures in the Validation Report. However, this discrepancy is not considered to impact on the overall outcome of the Audit.

3.2 Site Conditions

The Site Conditions are summarised from the Validation Report.

3.2.1 Geology and Soils

According to the Consultant, the Site is underlain by the Branxton Formation comprising conglomerate, sandstone and siltstone. An outcropping of the Greta Coal Measures with conglomerate, sandstone, siltstone and coal goes through the western part of the Site.

On a regional level, the Consultant described the geology as Undifferentiated Quaternary alluvium associated with surface water bodies to the northwest, southwest and west of the Site. Quaternary sediments associated with Wentworth Swamp and the Hunter River were described as consisting of gravel, sand, silt and clay.

3.2.2 Topography

The Consultant described the Site as being located on a small hill at approximately 40 m AHD. From the main entrance to the Site (off Cessnock Road) the land slopes down to flat land at the north, northwest, south and southwest where the Site boundaries are at approximately 10 – 20 m AHD. Wentworth Swamp (approximately 1 km west of the Site) is at an elevation of approximately 10 m AHD.

3.2.3 Hydrology and Hydrogeology

In the Validation Report, the Consultant summarised information relating to surface water drainage, provided in the DSI Report, as follows:

- Surface water from the Site discharges via man-made and natural drainage lines to the northwest.
- The SWFZ drains to the northwest through natural drainage pathways into a large dam.
- The WFZ drains to the northwest through man-made and natural drainage lines into Wentworth Swamp.
- The northern part of the Site drains towards a small dam close to the northern boundary but is then directed via a drainage channel to the northwest into Wentworth Swamp.
- The southern drainage line drains into a mine void via a series of farm dams in the south western portion of the site. Water then drains off-site to Wentworth Swamp via a natural drainage channel.
- Wentworth Swamp discharges to the Hunter River approximately 5 km northeast of the Site near Maitland.

The Consultant further described that the Wentworth Swamp System was within the Fishery Creek Catchment, where water quality and biodiversity has declined over the last ten years due to population growth in the area according to the Hunter-Central Rivers Catchment Management Authority.

The Consultant stated that the groundwater is assumed to follow the regional topography, northeast towards surface waters that ultimately discharge to the Hunter River. Groundwater at the Site was assumed to flow northwest to Wentworth Swamp. In the mine workings, groundwater is expected to flow toward the south and east in the direction of the coal seam dip.

A bore search through the NSW Office of Environment and Heritage Natural Resource Atlas revealed that there are 31 licensed groundwater bores located approximately 7.5 km northeast of the Site (Maitland and South Maitland). The bores were stated to be located within the coal measures and also the Quaternary Alluvium associated with Wentworth Swamp and other surface water bodies in the area. The bores were reported to be used for domestic, recreation, monitoring, irrigation and stock watering purposes. Detailed information was presented for two bores:

- A bore approximately 3 km northeast of the site (GW066948) with a standing water level (SWL) at 7.5 m and a water bearing zone reported from 7.5 m – 14 m.
- A bore approximately 3 km northwest of the site (GW029088) indicates a SWL of 3 m and a water bearing zone of 6 m – 24 m. The drillers log at this bore reported the lithology as clayey sand (0 m – 6 m) underlain by shale (6 m – 24 m) and then sandstone (24 m – 39 m).

The Consultant also noted that the Hunter River Alluvium Groundwater Management Unit (GMU) is considered an important groundwater resource in this region since groundwater is used for irrigation, urban supply (not the primary drinking water supply), drought supply, stock, domestic and commercial / industrial use. Aquifer storage and recovery was also noted as an important function of the GMU.

3.2.4 Auditor's Opinion

In the Site Auditor's opinion, the Site condition summary included in the Validation Report was appropriate for the purposes of the report and generally in accordance with the requirements of NSW OEH (2011).

4.0 Site History

The Consultant summarised the Site's history from the information provided in the DSI Report.

It was stated that the Site was part of the "Wangara Property", which historically was used for coal mining activities as the Glen Main Colliery from 1930 to 1939 (although the Consultant noted that there was conflicting information since the Mines Department records showed that the lease was abandoned in 1932). The colliery mined the Greta and Holmesville Coal Measures, which were coal seams that extended in a north-south direction between Cessnock Road and the South Maitland Railway line. At the Site the area extends from South Maitland Railway line to Cessnock Road. Mine rail tracks and the short branch line to the South Maitland Railway line which were present at the Site were removed by the mid-1940s.

During operation, the mine had three tunnel entrances, using a board and pillar operation. Records showed that the maximum depth of the mine as indicated in the 1928 Mines Department Annual Report was 1200 feet (366 m) from the surface. A Site Plan from 1938 showed an office, garage, bowser, engine house, furnace and bath at the mine top area.

According to the Consultant, Newcastle Geotech (August 2013) reported that the specific Coal Measures showed to have a much greater propensity for self-ignition and for generating acid mine water than the Newcastle seams. As a result, there were many shallow mine fires and explosions associated with these seams, which resulted in mines being abandoned earlier than anticipated.

The Consultant reported that historical aerial photographs from 1966, 1975 and 2001 showed dams and disturbed land along the coal seam due to mine subsidence. The locations were also marked on the 1938 site plan.

Two mine subsidence gullies (WFZ and SWFZ) were partially filled with smelter derived materials, municipal wastes, farm wastes and soils. These are the areas subject to the remediation undertaken at the Site.

Mining operations ceased in 1939 and since that time the Site has been used for low intensive agricultural purposes. During its use for agricultural purposes, site security (including fencing and closed gates) has been maintained by both the agricultural lease holder as well as through Hydro's routine security surveillance program. There have been no reports of illegal dumping at the Site.

4.1 Auditor's Opinion

The Auditor notes that the Consultant stated that the mine was operational between 1930 and 1939, but that there was a record of the maximum depth from 1928. However, this apparent discrepancy is minor and is not considered to impact on the overall outcome of the Audit.

In general, the Site History was reported in accordance with the requirements of NSW OEH (2011).

5.0 Previous Investigations

The Consultant provided summaries of the investigations undertaken for the Site to date, as described below.

Where information was limited, additional information was sought in the DSI Report.

5.1 Detailed Site Inspection Report

According to the Consultant, the DSI Report [1]included a review of previous investigations undertaken for the Site and a systematic assessment of soil and groundwater at the Site by the following works:

- Ten (10) test pits;
- Five (5) shallow test pits (0.3 – 0.4 m);
- Seventeen (17) surface soil samples; and
- Two (2) water sampling events for four (4) locations (i.e. eight (8) water samples).

The Contaminants of Potential Concern (CoPC) included in the investigation were:

- **Smelter waste**: polycyclic aromatic hydrocarbons (PAH's), fluoride and cyanide
- **Fill material / uncontrolled filling**: asbestos, PAH, metals, total cyanide and fluoride
- **Surface Samples**: fluoride (to assess fallout from the smelter operation)
- **Pit Top**: total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene and xylenes (BTEX), and PAH
- **Surface Water**: TRH, BTEX, PAH, metals, cations / anions.

Results were assessed against the ASC NEPM (2013) Table 1A (1) Column A – Residential. Further, a Site-specific soil assessment criterion of 440 mg/kg was adopted for fluoride[2].

The Consultant stated that the conclusions in the DSI Report were that remediation of groundwater and surface water would not be needed, but that surface water management would be required during remediation. In the DSI Report, two Areas of Environmental Concern (AEC) where illegal dumping and infill of mine subsidence with smelter derived materials in need of remediation by removal of material were identified (presented on **Figures 4** – **5** from the Validation Report, included in **Appendix A** herein):

- **AEC-1: Western Infilled Area (now known as WFZ)** (depth of materials to be removed identified as approximately 6 m): Concrete slabs, broken and larger pieces, timber fence posts, fencing wire, metal posts, car parts, metal pipes, household bricks, plastic hose, cast house and bake furnace refractory, steel, soil matrix, non-putrescible domestic wastes. Waste comprises approx. 60% concrete, 30% soil and 10% farm and domestic waste; and
- **AEC-2: South-Western Infilled Area (now known as SWFZ)** (depth of materials to be removed identified as approximately 3 m): Fluorescent commercial lighting, concrete bricks, concrete slab pieces (cast house and bake furnace refurbishment), soil matrix, television parts, timber, plastic pipes, tree trunks, cardboard, corrugated iron, barbed wire, bitumen / asphalt slabs, broken, metal sheeting, plastic sheeting, blast furnace pipe and fittings, orange solid bricks (possibly refractory) household bricks, tyres. Waste comprises approximately 35% smelter waste, 35% domestic waste and 35% soil.

[1] • Ramboll Environ, 2013, "Phase 2 Environmental Site Assessment, Residential Parcel 1", dated 5 November 2013 (herein referred to as "the DSI Report");

[2] • Environ, 2013, "Preliminary Screening Level, Health Risk Assessment for Fluoride and Aluminium Part of the Kurri Kurri Aluminium Smelter", dated 2 April 2013 ("the HRA");

Estimated volumes of materials to be removed were presented as follows:

- Smelter Material: 6,850 m³
- Contaminated Soil: 3,500 m³
- Municipal Wastes: 300 m³

Apart from the two areas, Ramboll stated that the contamination did not pose an unacceptable risk for the landuse of residential or open space based on comparison against ASC NEPM residential landuse threshold levels.

An addendum to Phase 2 Environmental Site Assessment, Residential Parcel 1: Change to Boundary was provided to AECOM in April 2019. This addendum was prepared as the western boundary of the Residential Parcel 1 site has expanded to include the western portion of four part lots that are separated by the South Maitland Railway Line. This will allow for the Site Audit Report and Site Audit Statement for Residential Parcel 1 to refer to whole lots. Five surface samples were collected from the affected lots in November 2013 and submitted for laboratory analysis for Soluble Fluoride (**Appendix D**). The consultant concluded that the laboratory results indicate that the portion of Residential Parcel 1 that was formerly part of Parcel 2 has not been impacted by the aerial deposition of fluoride associated with the operation of the former aluminium smelter.

5.1.1 Auditor's Opinion

The Auditor notes that the Consultant stated that the DSI Report included a systematic assessment of soil and groundwater. It should be clearly noted, that groundwater was not part of the DSI. The Site Auditor requested further justification around the conclusion that groundwater did not pose a risk to the future landuse scenario. Ramboll Environ included the following response in the Response Letter:

"Surface water sampling was completed as part of the Phase 2 ESA and included collection of surface water samples representative of dry and wet conditions from within the mine void water storage dam, two downstream farm dams and Wentworth Swamp to assess the quality of water discharging from the mine workings and any down gradient impacts. Water at the upstream dam formed within the mine void is known to contain water of a low pH (acidic). Surface water was assessed against the criteria for protection of aquatic ecosystems, irrigation, stock watering and recreational use. Field parameters identified surface water in dams onsite, immediately down gradient and the nearby swamp can be described as fresh to slightly brackish with an acidic to neutral pH and a high amount of dissolved oxygen. Surface water sampling on Residential Parcel 1 found concentrations for all analytes to be below the relevant guidelines for stock watering. Concentrations of TRH, BTEX and PAHs were all below the trigger levels for ecological protection. Concentrations of metals cobalt, chromium (total) and manganese were identified above ecological protection criteria in the dry monitoring period but not the wet monitoring event. Due to an absence of on-site sources of these compounds as demonstrated during soil sampling, the observed concentrations are likely to be related to background concentrations, rather than attributable to activities at Residential Parcel 1. The results of surface water monitoring demonstrate that the conditions at Residential Parcel 1 were not significantly impacting on the surface water receptors and do not represent an unacceptable human or ecological health risk. Groundwater from within the former mine void was suspected to discharge to the surface water bodies and thus, assessment of surface water quality was sufficient for the Phase 2 ESA. As no unacceptable human or ecological health risks were identified, remediation of surface water or groundwater was not required."

It should also be noted that the adopted fluoride criteria is for Human Health and as such, the potential ecological impacts were not assessed as part of the DSI.

It is the Auditor's opinion that the Phase 2 Report and the Consultant's response above were adequate for developing a remedial response for the identified impacts, and to make the land suitable for the proposed landuse.

The Auditor notes that threshold levels associated with the potential for impacts from mixtures were not developed. This is not considered to be a significant non-conformance as the landuse criteria are adequately conservative to assess the potential impacts from mixtures for the types of contaminants that have been identified at the Site.

6.0 Data Quality Objectives

The Consultant used the seven step Data Quality Objectives (DQO), which were summarised in a table, replicated below in **Table 2**.

Table 2 Data Quality Objectives (from Table 6a in the Validation Report)

Step No	Item	Consultant's Inclusion
1	State the Problem	*"Previous land use activities such as rehabilitation activities have affected the land use suitability of the Site for Residential A as defined by NEPM 2013. Remediation is required to make the site suitable for the intended landuse."*
2	Identify the Decisions	• "*Do contaminant concentrations in the soil comply with the stated Health Investigation Levels (HIL)?* • *Do soils on the Site currently require any remedial action or implementation of risk management?* • *Have the previous land uses affected the environmental quality of the land?* • *Are there any identifiable risks to human health or the environment on Site?*"
3	Identify Inputs to Decisions	• "*Systematic / representative soil sampling across the Site;* • *The proposed land use;* • *Determination of the general concentrations of heavy metals, hydrocarbons, pesticides, PCBs and other chemicals across the Site; and,* • *Identifying current and future potential receptors and the likelihood of exposure to unacceptable levels of contamination both on and off the Site*."
4	Define Study Boundaries	*"The physical study will focus on natural, fill materials and PAH-impacted soils within the confines of the Site's boundaries."*
5	Develop Decision Rule	*"The Site will be considered suitable for its intended land use if soils comply directly with the Health Investigation Levels (HIL) provided in NEPM 2013, Schedule B1 Table 1a(1) Column A – Residential with garden / accessible soil, Ecological Screening Levels (ESL) in Table 1B(6) and by Environ in the RAWP amendment."*
6	Specify Limits on Decision Errors	*"Field and laboratory quality controls are implemented to avoid error and to ensure the action levels exceed the measurement detection limits. The performance of decision-making inputs will be enhanced through the application of Data Quality Indicators (DQI)."*
7	Optimise Design for Obtaining Data	*"Identify the most resource-effective sampling and analysis design for general data that are expected to satisfy the DQOs. This may involve defining minimum sample numbers required to investigate fill and natural soils as determined with procedures provided in the NSW EPA 1995 Sampling Design Guidelines and AS4482.1 – 2005."*

The Consultant also included the Data Quality Indicators (DQI) in a table, which is replicated in **Table 3** below.

Table 3 Data Quality Indicators (from Table 6b in the Validation Report)

Parameter	Consultant's Inclusions	Consultant's Limits
Data Precision and Accuracy	Adequate Sampling Density	Sampling carried out in accordance with Procedure B of the NSW EPA, 1995, "Contaminated Sites: Sampling Design Guidelines". Use of analytical laboratories with adequately trained and experienced testing staff experienced in the analyses undertaken, with appropriate national Association of Testing Authorities (NATA) certification.
	Adequate Laboratory Performance	Based on acceptance criteria of laboratory as specified on certificate of analysis: includes: blank samples, matrix spikes, control samples, and surrogate spike samples.
Data Representativeness	Sample and Analysis Selection	Representativeness of all potential contaminants.
	Trip Blanks	No Detection above the laboratory Limit of Reporting (LOR).
	Trip Spikes	Recoverable concentrations of volatiles between 60 – 140%.
	Laboratory selection	Adequate laboratory internal quality control and quality assurance methods, complying with *ASC NEPM* (2013).
Documentation Completeness	Chain of Custody Records	Laboratory sample receipt information received confirming receipt of samples intact and appropriate chain of custody. NATA registered laboratory results certificates provided.
Data Completeness		Analysis for site validation and waste classification parameters to meet data accuracy, precision representativeness and completeness. Trip spike samples prepared and sent with field samples.
Comparability		Use of NATA registered laboratories. Detailed logs of all sample locations recorded.

6.1 Auditor's Opinion

The Site Auditor considers that:

- The problem stated in Step 1 was "remediation was required to make the Site suitable for the proposed landuse". However, the step should also have included that validation was also required to confirm that the land suitable for its intended landuse.
- In Step 2, the decisions identified were for a detailed site investigation (DSI) rather than assessment and validation stages.
- In Step 3, the temporal boundary (i.e. assessment, remediation and validation were required to enable the site's redevelopment stage to meet DA conditions) was omitted.
- Step 3 and 4 also appear to relate more to the DSI than to assessment, remediation and final site validation.
- In Step 5, it would have been sagacious to include actions triggered if the guidelines are not met (e.g. further excavation and re-sampling, etc.).
- In Step 5, waste classification should also have been addressed, as should material tracking and transport.
- Further in Step 5 and 6, any statistics used and potential limitations should have been clearly defined.
- In step 7, the Consultant outlined what needed to be included under this step rather than addressing the issues identified in the DQO process outlined above.

Although the Consultant's DQOs were generally not targeted to the validation stage, it is the Auditor's Opinion that it did not impact on the outcome of the Audit since suitable validation sampling was undertaken for the purpose of the validation and the data was of sufficient quality, as discussed further below.

7.0 Conceptual Site Model

The Consultant provided a Conceptual Site Model (CSM) for the Site's status prior to remediation and validation. The CSM is summarised in the below **Table 4**.

Table 4 CSM pre-remediation

Consultant's CSM element	Consultant's Description
Potential Contaminants	According to the Consultant, the main CoPCs were PAH and bonded asbestos. Other contaminants mentioned to be of concern in the fill areas were TRH, fluoride and cyanide. Domestic waste and smelter derived materials were also stated to cause aesthetic impacts.
Release Mechanisms	The Consultant stated that if the areas were disturbed through excavation for a residential area in the pre-remediation condition, the contaminants would be exposed and may cause migration. Disturbance could also cause bonded asbestos to become friable. They further stated that the contaminants were not volatile and there should be limited vapour intrusion risk.
Transport Mechanisms	According to the Consultant the contaminants in the WFZ were not considered to be at risk of migrating to groundwater as these contaminants did not interact with groundwater. However, the Consultant stated that surface water running through the area may transport contamination. From the SWFZ channelised flow running adjacent was described as a potential means of transport for contamination away from the SWFZ. It was stated that the flow has been diverted from the SWFZ through upstream swales. However, during heavy rainfall, surface water still flows in the channels.
Potential Receptors	Receptors were identified as: • Future residential homes and residents • Downstream receptors of surface water from the SWFZ, such as cattle and human use of the dams (although the Consultant stated that no contamination had been found in the surface water during the DSI). • For asbestos, the Consultant also stated that staff on Site is a potential receptor.
Exposure Pathways	Exposure pathways identified were: • Direct contact with soil contamination • Inhalation / ingestion of contamination • The Consultant also stated that asbestos could become a risk if it became airborne and that it could affect remediation staff.

7.1 Auditor's Opinion

The Site Auditor notes that the CSM was for a scenario of leaving the contamination in place. However, the CSM sources and pathways were subsequently removed through the remediation and the approach was validated through chemical sampling and visual assessment.

The Site Auditor considers that the pre-remediation CSM was sufficient for the purposes of the Validation Report and generally in accordance with the requirements of NSW OEH (2011).

The Site Auditor notes a post-remediation CSM was not provided but this does not adversely impact on the landuse suitability assessment.

8.0 Adopted Criteria

The Consultant referred to the following documents for the adopted guideline values:

- ASC NEPM, 2013, Schedule B1, "*Guideline on the Investigation Levels for Soil and Groundwater*"
- Friebel and Nadebaum, 2011, "*Health Screening Levels for petroleum Hydrocarbons in Soil and Groundwater, Part 1: Technical Development Document*"
- Environ, 2014, "*Remedial Action Work Plan - Residential Parcel 1, Kurri Kurri*", amended November 2014
- NSW EPA, 2017, "*Guidelines for the NSW Site Auditor Scheme (3rd edition)*".

The criteria adopted by the Consultant are replicated in **Table 5** and **Table 6** below.

Table 5 HILs and EILs adopted by the Consultant (from Table 6c of the Validation Report and Table 3 of Ramboll Addenda (2017))

Analyte	Residential A HIL (mg/kg)	EIL * (mg/kg)	NEPM (2013) Areas of Ecological Significance****	Rural Landscape Guidelines****
Arsenic	100	100	40	20
Cadmium	20	-	-	5
Chromium	100	190	60	250
Copper	6000	220**	85	375
Lead	300	1100	470	150
Mercury	40	-	-	4
Nickel	400	30	45	128
Zinc	7400	630**	220	700
BaP TEQ	3	-	0.7	-
Total PAHs	300	-	-	-
PCB	1	-	-	<0.3
Soluble Fluoride	440***	-	2.4	290
Cyanide	250	-	-	-
Aldrin / Dieldrin	6	-	-	-
Chlordane	50	-	-	-
DDT+DDE+DDD	240	-	-	-
Bonded ACM	0.01%	-	-	-
Friable Asbestos/Asbestos fines	0.001%	-	-	-
Surface Asbestos (0.1 m)	No Visible		-	-

*EILs calculated for Urban Residential and open public space, for aged contaminants.

**Provided by Environ in the Amendments to the RAWP.

***Derived by Environ in the HRA

****Provided in the Addenda to Phase 2 Environmental Site Assessment Report and Validation Report, Residential Parcel 1: Environmental Conservation and Rural Landscape Zoning

Table 6 Soil Criteria for TRH Vapour Intrusion (from Table 6d of the Validation Report)

Analyte	Vapour Intrusion Criteria for Sand 0.0-1.0 m (mg/kg)	Direct Contact Criteria (mg/kg)
Benzene	0.5	100
Toluene	160	14000
Ethylbenzene	55	4500
Xylenes	40	12000
F1: C_6-C_{10}	45	4400
F2: C_{10}-C_{16}	110	3300
F3: C_{16}-C_{34}	NL	4500
F4: C_{34}-C_{40}	NL	6300

8.1 Auditor's Opinion

The Auditor notes that the adopted criteria was for residential landuse, whereas the final proposed landuse (as identified by Environ in the Response Letter, included in **Appendix B**), is Environmental Conservation (E2) for the SWFZ and Public Recreation (RE1) for the WFZ. However, it is the Auditor's opinion that the removal of contaminated material from the two areas was undertaken to a level suitable for the intended uses, and as such, it does not impact on the outcome of the Audit.

At the time of completing this Audit, the 2006 auditor guidelines were used. It is the Auditor's opinion that this does not impact the landuse suitability assessment.

The Addenda to Phase 2 Environmental Site Assessment Report and Validation Report, Residential Parcel 1: Environmental Conservation and Rural Landscape Zoning (Ramboll, 2017) provides screening criteria for the assessment of land for the purpose of E2 Environmental Conservation and RU2 Rural Landscape use in the future.

The criteria for excavated material assessment and VENM classification were lacking from this section. However, since the criteria were used for the assessments in their respective Appendices, the Site Auditor considers that the adopted criteria were adequate and in accordance with NSW EPA guidelines.

The Auditor also notes that the EILs for Copper and Zinc were derived by Environ and included in the RAWP Addendum. The relevant correspondence associated with that is included in **Appendix C** (e-mail dated 1/12/14).

9.0 Remediation Works

9.1 Remediation

The Consultant described the adopted remediation strategy as excavation of the fill materials in the two fill zones, and sorting it into separate waste streams:

- Smelter Waste to go to the Smelter Site to form part of the whole-of-site strategy for smelter related wastes; and
- Disposal of municipal waste to licenced facilities.

It was noted by the Consultant that the remediation works were undertaken in accordance with the RAP, but that the RAP was amended throughout the works.

A specific staging area was used for sorting of the excavated material, and all remedial works were stated to be supervised by experienced DLA staff.

The Consultant described the sequence of events for the remediation as follows:

- Removal of trees by qualified arborists and removal of site fencing above fill areas;
- Installation of sediment fencing and preparation of primary staging area;
- Removal of concrete material from the northern section surface of the WFZ;
- Importation of gravel 75 minus aggregate for drainage and secondary access construction;
- Secondary access road installed with cattle grid;
- Excavation of WFZ fill materials (main section) to natural material;
- Coarse sorting of excavated material to rubble (concrete, municipal waste) and soils (fines);
- Chemical and asbestos analysis of some stockpiles;
- Validation sampling in the WFZ;
- Establishment of Asbestos Exclusion Zones;
- Visual clearance and analysis for asbestos within the WFZ (southern portion);
- Bonded asbestos hen picking and excavation of soil for the clearance of the surface for the known asbestos area in the SWFZ;
- Establishment of secondary staging area;
- Removal of large concrete from SWFZ with grabs;
- Excavation of fill materials from the SWFZ;
- Landfarming of WFZ;
- Importation of Virgin Excavated Natural Material (VENM) 40 mm minus sub base for backfilling of WFZ;
- Haulage of stockpiled material to the Hydro Aluminium Smelter site in Kurri Kurri;
- Disposal of municipal wastes at a licenced landfill;
- Landfarming of the SWFZ; and
- Scraping and validation sampling of the stockpile staging areas including visual clearance of bonded asbestos and foreign materials.

After removal of all materials from both zones the walls and base of the excavations were scraped clean of residual soils to the natural layer using a 30 tonne excavator with a mud bucket. The remaining surfaces were chemically and visually assessed (see **Section 10.0**). The excavated material was sorted initially by type; concrete, soil, rubble. Materials were then transported to recycling, landfill or the smelter site depending on the suitability of the material. The Consultant summarised the volumes of material going to each location in a table, provided in **Table 7** herein.

Table 7 Material Volumes and Disposal Location (from Table 5a of the Validation Report)

Material Type	Volume (tonnes)	Destination
Contaminated Soil	2,103	Hydro Stockpiling Area
Returned Smelter Waste	1,618	Hydro Stockpiling Area
Asbestos Contaminated Soil	3,536	Hydro Stockpiling Area
Asbestos Contaminated Smelter Waste	1,270	Hydro Stockpiling Area
Over Sized Concrete	782	Hydro Stockpiling Area
Tyres	1.7	Summer Hill Waste Facility
C&D Demo Waste	71	Raymond Terrace Landfill

The Consultant stated that there was no reuse of materials excavated, but that concrete was transported to the Smelter Site for later potential reuse.

During the tender Site walkover for contractors, asbestos was found in part of the SWFZ. As a consequence, an unexpected finds protocol was implemented and followed for the management of asbestos, which the Consultant stated was in accordance with the RAWP. During the remediation, materials containing asbestos from the WFZ was stockpiled separately and transported under the strict controls required by the NSW WorkCover asbestos handling, monitoring and management regulations.

Due to the findings in the later part of the excavation, earlier stockpiles were tested for asbestos using the ASC NEPM (2013) bulk sample methodology, and were visually assessed for asbestos. One of the stockpiles from the southern end of the WFZ had asbestos identified. The whole of the SWFZ was declared asbestos contaminated after fragments were found in the initial stages of excavation, both visually and in samples sent to the laboratory. Following the initial finds, each dump truck load was checked visually for asbestos for one day. Nine loads out of 21 had suspected asbestos material present. As such, the Contractor declared the SWFZ asbestos contaminated and the Consultant stated that it was thereafter treated accordingly, including transport to the Smelter Site under the strict asbestos handling controls required by the WorkCover's asbestos regulations.

9.2 Auditor's Opinion

The Auditor notes that the Consultant stated that the asbestos (asbestos containing material, ACM) was managed in accordance with the RAWPs unexpected finds protocol. The protocol was outlined in Section 14.2.3 of the RAWP as follows:

"*ACM has not been encountered at depth during previous investigations at the site. However there is the potential for ACM to be present and uncovered when undertaking the earthworks to remove the fill materials.*

In the event that unexpected potential ACM is unearthed, the Contractor would be required to undertake the following:

- *Notify the Principal of the discovery.*
- *Continue to remove and manage the material in accordance with the Asbestos Removal Control Plan and the Code, (refer to Section 14.2.2).*
- *Transport the contained material to a location as directed by the Principal. This could include disposal at a licensed waste management facility or temporary storage at the Smelter site.*"

Section 14.2.2 of the RAWP referred to in the above section was as follows:

"A small amount of ACM (fragments of bonded asbestos containing sheeting) was identified on the surface, in a localised part of the South-Western Fill area. The fragments of asbestos sheeting were observed to be in good condition.

The Contractor is to develop and implement an Asbestos Removal Control Plan consistent with How to Safely Remove Asbestos: Code of Practice (WorkCover NSW, 2011) ("the Code"), addressing the following:

- *Delineation of and installation of warning signage around the asbestos removal area as appropriate as described in Section 4.2 of the Code.*
- *Provision of the appropriate personal protective equipment to all asbestos removal personnel as described in Section 4.5 of the Code.*
- *Removal and containment of asbestos fragments as described in Section 4.8 of the Code.*
- *Disposal of disposable personal protective equipment in accordance with Section 3.9 of the Code.*
- *Notification of the waste management facility of the requirement to dispose of ACM waste (refer to previous section).*
- *Transportation of the contained ACM waste to the licensed waste management facility (including defining the route to be travelled by the disposal vehicle), disposal in accordance with facility requirements, and a disposal docket attained and presented to the Contractor's Environmental Consultant.*
- *The requirement for a clearance inspection to be undertaken by an appropriate person as described in Section 3.10 of the Code upon completion of the ACM removal.*
- *The procedures to be implemented in the event that unexpected ACM is uncovered (refer to Section 14.2.3).*

Further, the RAWP included mandatory requirements relating to asbestos related permits and approvals as follows:

"The Contractor is required to possess a Class A friable asbestos removal licence issued by WorkCover NSW or an equivalent asbestos removal licence issued in another Australian jurisdiction.

The Contractor is responsible for notifying WorkCover NSW of the asbestos removal work five days prior to the commencement of the works. The Notification of Asbestos Removal Work is to address the removal of the known ACM and ACM that may be encountered below the surface.

The Contractor is required to prepare an Asbestos Removal Control Plan consistent with this Protocol, which is to be amended (as required) in the event that additional ACM is encountered.

The Contractor must notify a licensed waste management facility of the requirement to dispose of ACM prior to transporting the material to the facility. The Contractor would be required to provide the Contractor's Environmental Consultant with a docket from the facility confirming that the material was appropriately disposed as ACM at the facility and for that docket to be included in the Validation Report"

The Consultant included the asbestos clearance reports and the waste dockets in their Appendices D and F. In accordance with the RAWP, the material was transported to the Smelter for disposal. In another section of the Validation Report the Consultant stated that hard hats, safety boots and high visibility vests were required as a minimum for Personal Protective Equipment (PPE), with the addition of disposable overalls and P2 masks as mandatory PPE in the asbestos exclusion zones. Further, the Consultant described that Licensed Asbestos Assessor, Anthony Richard (LAA000181) and Simon Spyrdz (LAA000116) from DLA instructed all DLA staff for work related to asbestos and reviewed all asbestos related work for the program.

The Auditor notes that according to the asbestos clearance report in Appendix D of the Validation Report, the removalist used (EnviroPacific Services Pty Ltd) was a WorkCover NSW Class B Licensed Asbestos Removalists, not Class A as required in the RAWP.

Overall, the Site Auditor considers this section sufficient and in accordance with the requirements of NSW OEH (2011).

9.3 Imported Fill

Imported fill from Martins Creek Quarry located at Station Street, Martins Creek was used to fill in the WFZ (40 minus sub aggregate). Visual assessment of the material was undertaken at the Quarry, and chemical analysis before the material was brought onto the Site. The material was stated to be VENM. The estimated volume was 4,060 tonnes, 2,390 m3 for the WFZ. The landform was shaped to be free draining and non-ponding (a v-shaped drainage channel was cut across the Site to avoid erosion which had been observed at the Site following backfilling).

The SWFZ was left open (i.e. no imported fill was placed in the area) with a free draining and non-ponding landform. To prevent surface water from entering the excavation, a swale drain and berm was formed up-gradient of the Zone.

In January 2019, Ausgrid upgraded the crossing over the unnamed creek without Hydro's knowledge. This upgrade was observed by the Auditor during the site visit in March 2019. Ramboll have advised that the upgrade was undertaken to provide Ausgrid access to their easement (**Appendix E**). Ausgrid provided to Hydro a VENM certificate for the material imported to Residential Central which is provided in **Appendix F**. The VENM certificate describes the imported material as fine crushed rock in the size range of 20 mm to 40 mm (FCR20-40mm) and larger rock in the size range of 100 mm to 250 mm (100-250 Gabion) from Seaham Quarry and indicates that the material supplied classifies as Virgin Excavation Natural Material (VENM) as defined by NSW EPA waste classification guidelines.

The Consultant included all Import documentation for the fill material, which was classified VENM.

9.3.1 Auditor's opinion

It is the Site Auditor's opinion that the documentation relating to imported fill was sufficient and that the reporting was in accordance with NSW OEH (2011).

9.4 Material Tracking

Materials from the WFZ were stored in numbered stockpiles in the primary staging area. The materials were sorted into piles of large concrete and large pieces of municipal wastes separately to unsorted rubble and soils. The unsorted rubble / soil was then sieved using a 70 mm screen. Rubble, concrete and soil were transported to the smelter site for later re-use or disposal as part of the whole-of-site remediation strategy. Asbestos containing stockpiles were transported under asbestos conditions and stockpiled separately at the smelter site.

Some of the Stockpiles (1 (SP-A), 4 (SP-C), 8 (SP-I), 10 (SP-O) and 13 (SP-M)) were sampled for the purpose of waste classification. According to the Consultant, it was then decided (by the Principal) that material was re-entering the overall smelter site through a different gate, and it was considered to be movement of material within the overall smelter site rather than off-site.

9.4.1 Auditor's opinion

It is the Site Auditor's opinion that the material tracking was reported in general accordance with NSW OEH (2011) and was sufficient for the purpose of the remediation and validation program.

9.5 Environmental Management

The Consultant stated that the receptors were limited during the remediation due to the location of the Zones. However, controls included erosion control with a perimeter sediment fence and surface water control by channels and bunds. The sediment and surface water controls were checked after rainfalls and maintained by EnviroPacific when needed.

Water spray was used to supress dust from stockpiles, roads and excavations. During heavy rain or wind, no work was undertaken.

9.5.1 Auditor's opinion

It is the Site Auditor's opinion that the environmental management was sufficient for the purpose of the remediation and validation program. However, not all the management measures were reported in this section, for example asbestos management measures for the remediation and validation staff and the PPE used to avoid exposure was described elsewhere in the report.

Overall, it is the Auditor's opinion that the environmental management was reported in accordance with the NSW OEH (2011).

9.6 Health and Safety

The Consultant stated that the following health and safety measures were in place during the remediation:

- Principal (EnviroPacific) implemented a standard induction process for the Site in accordance with WorkCover requirements;
- To secure the Site, temporary wire mesh and chain link fencing was used;
- Hard hats, safety boots and high visibility vests were required as a minimum for PPE. In the asbestos exclusion zones, disposable overalls and P2 masks were mandatory;
- Barrier tape and signposts were used when excavations were left open overnight;
- EnviroPacific undertook all asbestos removal works (Licence number AD211328);
- Licensed Asbestos Assessor, Anthony Richard (LAA000181) and Simon Spyrdz (LAA000116) from DLA instructed all DLA staff for work related to asbestos and reviewed all asbestos related work.

9.6.1 Auditor's Opinion

The Auditor notes that the Consultant did not mention health and safety plans, safe work method statements, or toolbox talks in this section. However, it does not impact on the outcome of the Audit, and the Section was reported in general accordance with NSW OEH (2011).

9.7 Approval and Licences

According to the Consultant the remediation works were Category 2 under State Environmental Planning Policy (SEPP) 55. Notification was given to the Council 30 days prior to commencement of remediation.

The Waste Classification letter is provided in Appendix E of the DLA (2015) Report, with the associated waste disposal receipts provided in Appendix F of the DLA (2015) report.

9.7.1 Auditor's Opinion

The Auditor notes that the Consultant did not mention that, in accordance with the RAWP and relevant guidelines "*The Contractor is responsible for notifying WorkCover NSW of the asbestos removal work five days prior to the commencement of the works*". However, this discrepancy does not impact on the overall outcome of the Audit.

The Waste Classification and lawful waste disposal documentation provided was adequate.

9.8 Contractors

The Consultant stated that they were commissioned to oversee the remediation, validate the final surfaces, undertake waste classification sampling, material classification, review of imported fill quality, and produce a Validation Report. Advice and guidance was also provided by the Consultant based on the results from sampling.

The Principal commissioned EnviroPacific to project manage the remediation and excavation / transport of material. Import of VENM, material handling and off-site disposal were overseen by EnviroPacific and conducted by a local earthworks contractor in accordance with WorkCover Guidelines, NSW EPA Guidelines and EnviroPacific's Safe Work Method Statement (SWMS).

9.8.1 Auditor's Opinion

It is the Auditor's opinion that the section relating to roles and responsibilities of the remedial works was reported in accordance with NSW OEH (2011).

9.9 Excavations

The excavations and volumes excavated from the two zones were reported by the Consultant as follows:

- WFZ: 90 metres north-south, 15 metres east-west at widest point and up to 6 metres depth. Survey showed that the volume excavated was 2,970 cubic metres; and
- SWFZ: 25 metres north-south at widest point, 60 metres length and up to 4 metres depth. Survey showed that the volume excavated was 2,140 cubic metres.

Surveys of the excavations were included in the Validation Report (see **Appendix E**).

The materials found in each excavation were listed by the Consultant in the Validation Report, and are presented in **Table 8 b**elow.

Table 8 Materials Removed for each Zone (from Table 5b of the Validation Report)

Zone	Materials Encountered
Western Fill Zone (WFZ)	Large concrete (>0.5 m length) Medium sized concrete (0.1-0.5 m lengths) Concrete gravel Discarded 200 Litre drums (empty) Fencing wire Discarded buckets Corrugated sheets Chairs Vinyl sheets Soil Wooden fencing posts Tiles Tyres Asphalt Refractory material Abandoned cars Bonded asbestos sheets General municipal waste (toys, household items) Carbon anodes (3)
South-Western Fill Zone (SWFZ)	Large concrete (>0.5 m length) Medium sized concrete (0.1-0.5 m length) Concrete gravel Discarded 200 Litre drums (empty) Corrugated sheets Chairs Hot water heater Soil Tyres Refractory material Bonded asbestos sheets General municipal waste (toys, household items)

9.9.1 Auditor's Opinion

The Site Auditor considers that the information relating to the excavations is adequate and in accordance with NSW OEH (2011).

10.0 Validation Scope of Works

10.1 Sample Selection and Analysis

The Consultant stated that the sampling pattern for the two zones was adopted from the RAWP, and consisted of sampling every ten metres of walls and every 30 m of the floor of the excavation with representative samples collected from each soil type. The Consultant also collected additional surface samples both from within and outside of the excavation to check if contamination had spread during remediation, and to check background values.

The following samples were collected:

- 52 primary validation soil samples in the WFZ excavation pit;
- 20 primary validation soil samples in the SWFZ excavation Pit;
- QA / QC samples: 5 inter laboratory duplicate soil samples and 10 intra laboratory duplicate soil samples;
- 2 bulk soil samples for asbestos validation in the WFZ;
- 8 bulk soil samples for asbestos validation in the SWFZ;
- 17 asbestos samples from stockpiles;
- 15 validation samples from the Primary staging area (**Figure 6** in **Appendix A**);
- 8 validation samples from the Secondary staging area (**Figure 7** in **Appendix A**);
- 10 validation samples of imported fill (VENM); and
- 17 operational samples including surface samples, stockpile samples and failed validation samples from the site.

Validation was also conducted by visual assessment as follows:

- Visual inspection of the removal of fill materials;
- Visual identification of potential ACM;
- Visual clearance for asbestos of the two zones and the two staging areas.

The Consultant referred to three figures (**Figures 3** – **5**) for validation sampling locations (included in **Appendix A**).

10.1.1 Auditor's Opinion

The Site Auditor considers that the sampling program was adequate for the purpose of the validation and in accordance with NSW OEH (2011).

10.2 Analysis

The Consultant stated that the samples were analysed by Envirolab Services Pty Ltd and SGS Australia Pty Ltd. Photoionization detector (PID) was not conducted since all samples were analysed for TRH. The analytes were chosen based on the potential contamination in the area analysed. The purpose of sampling was earlier in the report stated to be to validate the Contaminants of Concern (CoCs) against adopted remediation criteria, and to provide the Auditor with a general suit of analytes allowing for an SAR / SAS for "Residential A" landuse in accordance with the *ASC NEPM* (2013) for the Site.

The following analytes were included in the validation program:

- 8 metals (As, Cd, Cr, Cu, Pb, Hg, Ni, and Zn)
- Asbestos
- TRH / BTEX

- Volatile TRH
- Organochlorine Pesticides / Organophosphate Pesticides (OCP / OPP)
- PAH
- Polychlorinated biphenyls (PCB)

The RAWP included analysis for PAH and asbestos whereas the Consultant added the other contaminants and referenced the following guidelines:

- DEC, 2017, "*Guidelines for the NSW Site Auditor Scheme (3rd edition)*"
- OEH, 2011, "*Guidelines for Consultants Reporting on Contaminated Sites*"
- NSW EPA, 1995, "*Sample Design Guidelines*"

The Consultant stated that the results were assessed using statistical analysis; Upper Control Limit (UCL) on the average data values. They further stated that the concentrations need to satisfy the statistical criteria to ensure the absence of a hotspot.

10.2.1 Auditor's Opinion

It is the Auditor's opinion that the analytes were sufficient for the purpose of validating the remediation, and reporting was in general accordance with NSW OEH (2011).

At the time of completing this Audit, the 2006 auditor guidelines were used. It is the Auditor's opinion that this does not impact the landuse suitability assessment.

10.3 Validation Reporting

According to the Consultant, the NSW EPA requirement for validation reporting is to:

- Confirm if remaining concentrations comply with the adopted clean-up criteria; and
- Confirm compliance with EPA and other regulatory authorities' licence conditions and approvals. Documentary evidence confirming the appropriate off-site disposal of soil was highlighted as particularly important by the Consultant.

The Consultant outlined the information that the Validation Report should present and referred to the DEC (2006) "*Guidelines for the NSW Site Auditor Scheme*":

- A brief Site history summary;
- Site description, infrastructure and the surrounding environment;
- Summary of geology and hydrogeology at the Site;
- Summary of the contamination status prior to remediation;
- Brief outline of the regulatory approvals and licences, health and safety, and environmental pollution control measures implemented during remedial works;
- Detailed explanation of sampling and analysis procedures including quality control measures; and
- Detailed explanation of analysis results with an appropriate interpretation and conclusions.

10.3.1 Auditor's Opinion

The Consultant then referred to the DEC (2006) "*Guidelines for the NSW Site Auditor Scheme*" for the items to be addressed in the Validation Report. The Auditor notes that the appropriate reference for reporting requirements is the NSW OEH, 2011, "*Guidelines for Consultants Reporting on Contaminated Sites*". However, the reporting was considered sufficient for the purpose of the Audit and where information was lacking, the Auditor sought clarification from other documents, or from the Consultants involved in the program (relevant correspondence is included in **Appendix C** herein).

11.0 Results

11.1 Field Observations

The Consultant's field observations have been summarised in **Table 9** below.

Table 9 Field Observations during Remediation

Area	Observation
Western Fill Zone (WFZ)	The Consultant stated that concrete, concrete footings, lawn mower, car bodies, PAH impacted soils, general solid wastes, refractory bricks, scrap metal and a small amount of bonded asbestos (southern portion of the excavation) was observed in the excavation. Visual observations and two bulk samples indicated that the asbestos was removed from the area. The asbestos clearance report for the WFZ was included as an appendix to the Validation Report. The zone was excavated in three sections, and extended into natural clay and rock. Where validation sampling failed, the area was scraped further and resampled. An area adjacent to the excavation was scraped to avoid contaminating the imported fill material which was stored in the location should any contaminated material have ended up there during the remediation. The imported fill was pushed into the excavation by a dozer. The final landform was shaped to allow free drainage and no ponding. The surfaces were hydro-seeded for stabilisation. No odours or staining was observed in samples or final surfaces. The soil was described as brown to red / orange / brown clay and rock.
South-Western Fill Zone (SWFZ)	The Consultant observed concrete and concrete footings, a water heater, domestic waste, soils and some bonded asbestos in the excavation. Asbestos fragments were found in surface soils before the excavation commenced. The fragments were removed and the top layer scraped off, which revealed that asbestos was present in sub-soils (top 50 mm). Asbestos was removed and the area visually assessed and sampled. A clearance report was included as an appendix to the Validation Report. The excavation was taken into natural clays, and the final shape was constructed so that it was free draining and none ponding. To stabilise the material, hydro-seeding was conducted. The area was visually cleared from asbestos and was cleared by sample analysis.
Staging Areas	The main and secondary staging areas were scraped back after removal of the stockpiles. The final surfaces were visually assessed for foreign material and asbestos, and chemical analysis was undertaken for PAH. After EnviroPacific removed foreign materials, the area was visually cleared by the Consultant.

11.1.1 Auditor's Opinion

It is the Auditor's opinion that the field observations were adequate and reported in general accordance with NSW OEH (2011). The Photographic Log provided by the Consultant is included in **Appendix F**. Relevant correspondence relating to the field observations and validation sampling is included in **Appendix C** (e-mails dated 20/11/14, 24/11/14, and 2/12/14).

11.2 Sample Results

The Consultant's sample results tables are included in **Appendix G**. A summary is provided below.

11.2.1 Hydrocarbons

The Consultant stated that all samples collected were analysed for Monocyclic Aromatic Hydrocarbons (MAH, BTEX fractions), Volatile TRH (vTRH) and Semi-Volatile TRH (TRH). BTEX and vTRH fractions were not detected in any of the samples analysed, whereas the TRH fractions analysed were detected in several samples but below EILs and HILs adopted.

11.2.2 Polycyclic Aromatic Hydrocarbons

The consultant stated that all samples collected were analysed for PAHs. There were 21 samples with concentrations above the limit of reporting (LOR) and 12 exceeding the adopted criteria (3 mg/kg). Three of the samples exceeding the criteria were “validation” samples from the WFZ, and the remaining were from stockpiled material, although one sample was from the surface before the excavation started (taken for in-situ waste classification purposes).

The “validation” sample locations from the WFZ were re-sampled following further excavations and results indicated levels of PAH below the adopted criteria and / or the LOR.

11.2.3 Pesticides

The Consultant reported fifty-five (55) samples were analysed for pesticides (Organochlorine (OC) and Organophosphate (OP)). All samples were below the LOR except one, in which Fenitrithion was detected. The Consultant reported that all concentrations were below the adopted criteria.

11.2.4 Polychlorinated Biphenyls

The Consultant reported fifty-five (55) samples were analysed for PCBs. All concentrations were below the LOR, and as such, below the adopted criteria.

11.2.5 Heavy Metals

The Consultant reported that all seventy-two (72) primary samples collected were analysed for eight metals (As, Cd, Cr, Cu, Pb, Hg, Ni and Zn). There were no exceedances of the HILA criteria, and according to the Consultant, statistical analysis of the Validation Results indicated compliance with the HILs and EILs for the Residential “A” landuse scenario.

11.2.6 Fluoride and Cyanide

The Consultant stated that one sample reported an elevated fluoride concentration resulting in further excavation and resampling of the area. The final sample for this area was WFZ-Base-S3-1. The Consultant noted that the results were for total rather than soluble fluoride, and that selected samples (noted to be one sample; WFZ_N_B_1) were subsequently reanalysed for soluble fluoride. The soluble concentration was below the adopted criteria.

The Consultant subsequently reported that all validation samples were below the adopted criteria for cyanide.

11.2.7 Asbestos

The Consultant reported twenty-seven (27) samples were analysed for asbestos in soil. No sample had levels above the LORs for asbestos fines (<7 mm). Thirteen samples of suspected bonded asbestos pieces were analysed. Four of those were confirmed asbestos; three from stockpiled material and one from the face of the excavation in the SWFZ.

11.2.8 Auditor’s Opinion

It is the Auditor’s opinion that the results for waste classification / transport to Smelter Site and validation samples should have been separately reported as the relevant threshold levels are quite different and the data summaries were confusing.

The Consultant also referred to exceedances of guidelines but, in some cases, failed to state which guideline they referenced.

There were also several apparent transmittal errors in the sample result tables (included in **Appendix G**), which is non-conformance of the Auditor’s Checklist for the Validation Report (included in **Appendix B**). However, the discrepancies independently reviewed by the Site Auditor and were not considered to adversely impact on the outcome of the Audit, and the raw data were included and reported in general accordance with NSW OEH (2011).

In relation to the analysis of soluble fluoride rather than total fluoride, relevant Correspondence regarding the discussion at the time is included in **Appendix C** (e-mail dated 20/11/14).

11.3 Quality Assurance and Quality Control

The Consultant's QA / QC Report was included as an appendix to the Validation Report, and a summary was provided within the main report.

In the main report, the Consultant stated that the laboratory reports include QA / QC with Relative Percent Difference (RPD) calculations, matrix spike recovery and blank determinations. The Consultant reported that all matrix spike recovery and blank determinations were within acceptable limits, and concluded that the sampling methods and transportation of samples were therefore considered appropriate.

In relation to field QA / QC, the Consultant stated that the intra-laboratory duplicate sampling rate was 12%, and the inter-laboratory duplicate sampling rate was 6%. The Consultant subsequently reported all of the RPDs were within the Project's QA / QC acceptance criteria.

In the QA / QC Appendix, the Consultant stated that the following protocols were followed during sampling:

- **Sample Containers**: Soil samples were immediately placed into laboratory prepared glass jars with Teflon lid inserts. Samples were labelled with depth, date, sampling team and media collected.
- **Decontamination**: Equipment used, including hand auger, spades and mixing bowl, was decontaminated prior to each sample being collected to prevent cross contamination as follows:
  - Rinsing in potable water;
  - Cleaning in a solution of Decon 90;
  - Rinsing with demineralised water; and
  - Wiping with a clean lint free cloth.
- **Sample Tracking, Identification and Holding Times**: According to the Consultant, the samples were sent to EnviroLab Services and SGS Australia under chain of custodies (COC) stating the date, location, sampler and sample ID. Both laboratories were stated to be NATA registered for the analyses performed. The Consultant further stated that all holding times were met and that the laboratory reported that all the samples arrived intact.
- **Sample Transport**: Samples were immediately placed in eskies with ice. Trip blanks and trip spikes were also placed in the eskies. Samples were kept below 4°C.

The Consultant's results and discussion around QA / QC Samples are included in **Table 10**.

Table 10 QA / QC Samples Results Discussion

Type of QA / QC Samples	Criteria	Consultant's Discussion
Field Samples		
Trip Spike	No criteria identified by the Consultant.	Six trip spikes were analysed for BTEX and were all within the acceptable range. The range of results was 89% – 116%.
Trip Blank	No criteria identified by the Consultant.	Six trip blanks were analysed for BTEX and all had concentrations below the LOR.
Intra-laboratory Duplicates	**Sample frequency**: 10% of primary samples **Relative Percent Difference (RPD)**: Less than 30% for inorganics and 50% for organics. The Consultant also noted that results were considered to have met the criteria if the concentrations were less than five times the LOR, and also if the difference between concentrations was less than 5% of the relevant HIL.	Sample frequency stated by Consultant: 12% Some exceedances were noted by the Consultant, and discussed as follows: "*The RPD exceedance in duplicate pairs SWFZ_2E Wwall_1/SWFZ_2E Wall 1A, WFZ_S3-2-EWall_5.0/WFZ_S3-2-EWall_5.0A, SP_VENM_5/SP_VENM5A and WFZ-S3-2-Wwall1.0/WFZ-S3-2-Wwall1.0A were for reported concentrations of less than 5% of the relevant HIL concentration.*"
Inter-laboratory Duplicates	**Sample frequency**: 5% of primary samples **RPD**: Less than 30% for inorganics and 50% for organics. The Consultant also noted that results were considered to have met the criteria if the concentrations were less than five times the LOR, and also if the difference between concentrations was less than 5% of the relevant HIL.	Sample frequency stated by Consultant: 6% Some exceedances were noted by the Consultant, and discussed as follows: *"The RPD exceedances in duplicate pairs SWFZ_2E_Wwall_1/ SWFZ_2E_Wwall_1B and SP_VENM_5/SP_VENM_5B were for reported concentrations of less than five times the LOR"* And: *"The RPD exceedance in duplicate pair WFZ_VENM-S3-2_1/ WFZ_VENM-S3-2_1B and WFZ_S3-2Wwall1.0/WFZ_S3-2Wwall1.0B were for reported concentrations of less than 5% of the relevant HIL concentration."*
Laboratory Samples		
Blanks	None identified by the Consultant.	According to the Consultant, all blanks show concentrations below the levels of detection.
Control Spikes	Acceptable recovery criteria was stated to be 60% – 140%	All samples were stated to be within the acceptable range.
Duplicates	The Consultant discussed the field duplicates in this section.	
Surrogates	None identified by the Consultant.	All samples were stated to be within recommended control limits.

The Consultant also included the laboratory methods and detection limits for the analytes included in the program, both for the primary and secondary laboratory used.

11.3.1 Auditor's Opinion

The Consultant stated that the laboratory QA / QC results were within acceptable limits, and that the sampling methods and transport of samples were therefore considered appropriate. The Consultant notes that the laboratory QA / QC performance criteria only related to the laboratory methods, not the Consultant's field methods. Although this is considered a non-conformance in data interpretation, it does not significantly impact on the outcome of the Audit.

The Consultant did not assess and discuss the data in accordance with the SPARCC parameters: (Sensitivity, Precision, Accuracy, Representativeness, Comparability and Completeness). However, adequate data was present for the Auditor's review in accordance with the SPARCC parameters, and as such, this did not adversely impact on the outcome of the Audit.

The Consultant did not collect rinsate samples to confirm the adequacy of the decontamination. Although this is a non-conformance in the QA / QC program, cross contamination of the samples would have caused a conservative response (e.g. further excavation of a validation sample failed, or a more stringent waste classification if a stockpile sample was cross-contaminated). Hence, the discrepancy is not considered to adversely impact on the outcome of the Audit.

The Auditor also noted that the Consultant stated the intra-laboratory duplicate frequency to be 12% (i.e. ten duplicates samples). This statement was true for PAH analysis, but only QC six samples were analysed for metals. Further, for the duplicate sampling program only PAH and metals were analysed.

It was also noted that QC protocols dictate that the labelling of duplicate samples should be such that it hides the relationship with the primary sample from the laboratory. However, the duplicates for this project were labelled with the same name as the primary sample with the addition of an "A" at the end, clearly revealing the relationship with its primary sample.

In the Section on laboratory QA / QC, the Consultant did not appear to realise the difference between laboratory duplicates and field duplicates. However, in the laboratory certificates, it was confirmed that the laboratory duplicates indicated an adequate data quality for the purpose of the Validation Report.

Notwithstanding the identified non-conformances in the assessment and validation program and their subsequent interpretation, it is the Auditor's opinion that the data was of adequate quality for the purpose of the Assessment and subsequent Validation Report.

12.0 Need for Construction Environmental Management Plan (CEMP)

The environmental investigations and associated site inspections did not identify any significant contamination at the Site. Furthermore, ongoing Site security to prevent illegal access and possible illegal dumping has been maintained and is planned to continue until the Site's redevelopment commences.

However, the Site is large (more than 80 hectares) and relatively remote and so there is a potential for undiscovered low-level contamination to exist within the site characterisation process.

To address this low but plausible contamination uncertainty, the Site Auditor notes that it is common practice for the development of a Construction Environmental Management Plan (CEMP) for the civil earthworks Contractor, and by a suitably qualified environmental consultant **at the time of the Site's redevelopment** as an effective method to address this potential contamination/waste management issue during the Site's civil earthworks.

12.1 Auditor's Opinion

Due to the potential for undiscovered low-level contamination/waste issues remaining at the Site, it is common practice that a Construction Environmental Management Plan (CEMP) be prepared by a suitably qualified environmental consultant for the civil works Contractor, immediately prior to the commencement of the civil works program.

13.0 Evaluation of Landuse Suitability

13.1 Decision-making Process

The Site Auditor has assessed landuse suitability by use of the decision-making process for assessing urban redevelopment sites[3]. The key considerations for consideration of the proposed low density urban residential land use are presented in **Table 11**.

Table 11 NSW EPA Decision-making Procedures for Evaluation of Urban Residential Landuse Suitability

Auditor to Check that:	Auditor Review	Relevant SAR Section
All site assessment, remediation and validation reports follow applicable guidelines.	YES	**Sections 5.0, Section 8.0, Section 10.0** and **Section 11.0**
Any aesthetic issues relating to site soils have been adequately addressed.	YES	**Section 7.0, Section 11.0**
Soils have been assessed against relevant health-based investigation levels and potential for migration of contamination from soils to groundwater has been considered.	YES	**Section 8.0, Appendix H**
Groundwater (where relevant) has been assessed against relevant health-based investigation levels and, if required, any potential impacts to buildings and structures from the presence of contaminants considered.	Not Applicable [4]–	**Section 13.1.1**
Hazardous ground gases (where relevant) have been assessed against relevant health-based investigation levels and screening values.	Not Applicable[5]	**Section 13.1.2**
Any issues relating to local area background soils concentrations that exceed relevant investigation levels have been adequately addressed in the site assessment report(s)	YES	**Section 5.0** and **Section 10.0**
The impacts of chemical mixtures have been assessed.	YES	**Section 5.1.1**
Any potential ecological risks have been assessed.	YES	**Section 6.0**
Any evidence of, or potential for, migration of contaminants from the site has been appropriately addressed, including potential risks to off-site receptors, and reported to the site owner or occupier.	YES	**Section 7.0**, **Section 8.0**
The site management strategy (where relevant) is appropriate including post-remediation environmental plans.	YES	**Section 12.0**

Source: NSWEPA (2017) Guidelines for the NSW Site Auditor Scheme (3rd Edition), Appendix A.

(https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/contaminated-land/17p0269-guidelines-for-the-nsw-site-auditor-scheme-third-edition.pdf, accessed on 6 March 2019)

[3] Appendix A of NSWEPA (2017) Guidelines for the Site Auditor Scheme (3rd Edition).
[4] The Consultant determined that on a weight-of-evidence basis, a site-specific groundwater assessment was not required. Based on the Site Auditor's review of available data outlined above, the lack of any specific groundwater assessment is not considered to adversely impact on the ability to assess the Site's proposed landuse suitability.
[5] The Consultant did not perform and ground gas assessment and no justification for approach was provided. As a result the Site Auditor reviewed the background information against the NSWEPA's Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gas (November 2012). Based on the Site Auditor's review of available data outlined above, the lack of any specific ground gas assessment is not considered to adversely impact on the ability to assess the Site's proposed landuse suitability.

13.1.1 Groundwater

The Consultant determined, on a "weight-of-evidence" basis, that a site-specific groundwater assessment was not required. The justification for this determination was not provided. As a result the Site Auditor reviewed the background information against the 2013 ASC NEPM protocols, including Schedule B6 (Risk-Based Assessment of Groundwater Contamination).
The Auditor's review considered a range of available parameters as outlined in **Table 12**:

Table 12 Groundwater Risk Assessment

Consideration	Comment
The nature and extent of contamination (mass) identified in the soil assessment studies	Relatively small amount of contaminated material has been identified with contamination apparently arising from surface dumping.
The nature and extent of potential for contaminant mobility (flux) from identified on-site sources (i.e. impacted soils)	Contamination is believed to have been placed at the site more than 70 years prior and it is expected to have been heavily weathered over this time. The type of contaminants identified are generally of low contaminant mobility potential, especially when atmospherically weather for an extended period (e.g. more than 70 years). Waste classification of the contaminated soils confirmed the contaminants to be of low migration potential.
Whether the source(s) have been or will be removed	Identified contamination has been removed and validated so there is no potential for any continuing "source".
Permeability and porosity of the Site's strata	Native soils are low porosity, low permeability clays with some sandy lenses, resulting in low potential for contaminant migration, if present.
Known or expected depth to local water table	Regional water table is reported to be discontinuous with perched lenses, typically reported at depths of around 3.0 mbgs
Ambient groundwater quality	Ambient water quality is reported to be declining and impacted by historical mining (Section 2.2.3 of consultant's report).
Identification of actual and potential receptors	There are no identified groundwater users within 1.0 km (Wentworth Swamp) and 3.0 km (registered groundwater bore) of the Site and there are no future plans for making use of groundwater, primarily due to its unknown water quality and low potential yield.

Source: 1999 ASC NEPM Schedule B6

Based on the Site Auditor's review of available data outlined above, the lack of any specific groundwater assessment is not considered to adversely impact on the ability to assess the Site's proposed landuse suitability.

13.1.2 Ground Gas

The Consultant did not perform and ground gas assessment and no justification for approach was provided. As a result the Site Auditor reviewed the background information against the NSWEPA's Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gas (November 2012).

The Auditor's review considered a range of available parameters as outlined in **Table 13**:

Table 13 Ground Gas Risk Assessment

Consideration	Comment	Relative Risk
Is there a potential source for hazardous ground gas?	Yes – sources described in Table 1 of NSWEPA guidelines have been reported at the Site including general uncontrolled fill and coal measures strata	Low as likely degree and extent is small.
Total mass of contamination that may result in hazardous ground gas?	Total mass reported is small and this material was subsequently removed and validated.	Negligible residual risk
Whether the source(s) have been or will be removed	Identified contamination has been removed and validated so there is no potential for any continuing "source".	Negligible residual risk.
Permeability and porosity of the Site's strata	Native soils are low porosity, low permeability clays with some sandy lenses, resulting in low potential for contaminant migration, if present.	Negligible residual risk.
Identification of actual and potential receptors	There are no identified groundwater users within approximately 1.0 km of the Site and there are no future plans for making use of groundwater, primarily due to its unknown water quality and low potential yield.	Negligible residual risk to current or future plausible receptors.

Source: NSWEPA's Guidelines for the Assessment and Management of Sites Impacted by Hazardous Ground Gas (November 2012)

Based on the Site Auditor's review of available data outlined above, the lack of any specific ground gas assessment is not considered to adversely impact on the ability to assess the Site's proposed landuse suitability.

14.0 Discussion

The Consultant's overarching process of assessment, remediation and validation was undertaken in a manner consistent with the 2017 Site Auditor Scheme guidelines and the 2013 amended NEPM.

The assessment was completed in a manner generally consistent with site characterisation protocols.

The areas that were identified to require remediation were appropriately addressed and subsequent validation met the adopted validation threshold levels.

The Consultant summarised that soils from the excavations were confirmed to contain contamination at levels that posed a moderate risk to future landuse receptors. As such, the materials from the excavations were sorted into waste streams and transported either to the Smelter Site for the future whole-of-site remediation strategy, or to a licenced facility for the type of waste disposed of. The remaining surfaces were validated following waste removal, and the excavation pits were filled with material from the Martins Creek Quarry (considered to be VENM). The Consultant explained that a PID was not used for the Validation as the CoCs were not volatile, but also that the validation samples from the excavation pits were analysed for volatile hydrocarbons.

Bonded ACM was found in a Stockpile from the southern Section of the WFZ. The stockpiles were subsequently inspected, including sieve samples. No more ACM was found in the Stockpiles from the WFZ. The Stockpile affected was transported to the Smelter Site under asbestos conditions and was placed in an existing soil stockpile containing asbestos.

Bonded ACM was also found in the excavation for the SWFZ. Hence, the area was excavated, and the material transported, under asbestos conditions.

The staging areas where the Stockpiles were located were visually cleared of asbestos following the final scrape of the area. According to the Consultant, validation sampling undertaken for the two areas remediated indicated that the remediation was successful.

According to the Consultant the levels of CoCs in the soils remaining on Site were all below the adopted criteria, apart from:

- One sample (WFZ_Surface_4), which exceeded the ESL for F2 (calculated as the difference between the >C10–C16 fraction and naphthalene). However, the Consultant reasoned that the area had previously been vegetated and as such did not appear to limit vegetation growth, and that the concentration was well below the adopted HSL criteria.
- Fenitrithion was detected in one validation sample from the WFZ. The Consultant reasoned that the pesticide is commonly used on grain storage and wheat crops to control pests such as locusts. Since the detection was at the bottom of the excavation it is likely that a container of the material had been present in the material removed. The concentration found in the sample was 15 mg/kg which was compared to the planned exposure to grains in storage for future human consumption, which is 12 ppm. Based on the relatively low concentrations and a half-life of three days when in sunlight and exposed to air resulted in the Consultants statement that it was not considered to pose a risk to human health.
- Total fluoride was initially analysed and was found to be above the adopted criteria. One sample had a total concentration of 1800 mg/kg. However, when re-analysed for soluble fluoride, the concentration dropped significantly to 30 mg/kg. Further, in the soils remaining on Site, the 95% UCL was stated to meet the adopted criteria.

The Consultant concluded that the land is suitable for the proposed residential landuse in accordance with ASC NEPM (2013).

Addendums to the Residential Parcel 1 ESA was provided to the Auditor by Ramboll on 3 April 2020 and 22 July 2020 (**Appendix H**). The addendums provided additional information regarding the suitability of land use for Parcel 1.

Ramboll (2020) stated in the addendums that additional landuses not previously presented were considered suitable for Residential Parcel 1 without further investigation. This conclusion was presented by the Consultant on the basis that the site is considered suitable for 'Residential with accessible soil'. The Consultant stated that the soil, water and vapour investigation and screening criteria relevant to this 'Residential with accessible soil' site use are consistent with those required for day care and primary school, and lower (i.e. more sensitive) than the criteria for secondary schools and commercial/ industrial sites for all contaminants assessed. Ramboll concluded that while not specifically assessed, the following specific landuses are therefore suitable for the site:

- Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry
- Park, recreational open space, playing field
- RU2 Rural Landscape and E2 Environmental Conservation
- Day care centre, preschool, primary school
- Residential with minimal opportunity for soil access, including units
- Secondary school
- Commercial/industrial

14.1 Auditor's Opinion

It is the Site Auditor's opinion that the discussion was adequate for the purpose of the Assessment and Validation Reporting and that the work was in general accordance with NSW OEH (2011).

It was noted that the term "moderate" in relation to risks from the material from the excavation for the proposed future landuse scenario was not adequately defined. However, this does not adversely impact on the outcome of the Audit.

It is the Auditor's opinion that the addenda provided to the ESA reports with specific landuses stated for suitability is adequate for the purposes of this landuse suitability audit.

15.0 Conclusions

The Consultant stated that the reporting was undertaken in accordance with the NSW EPA, 2000, *"Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites"*. They further stated that *"No evidence can be found to infer chemical contamination by asbestos, hydrocarbons, PAH, pesticides, PCBs, Heavy Metals, Cyanide or Fluoride at the Site"*, and that the validation samples complied with the adopted criteria including ASC NEPM (2013) Residential A criteria (HSLs and ESLs) and the Consultant's site-specific criteria.

The Consultant concluded by stating that: "*The Site is suitable with regards to PAH, Fluoride, Cyanide and asbestos contamination associated with the historical tipping areas. All samples recorded concentrations of analytes in compliance with the NEPM Residential A screening levels. Site assessment objectives have therefore been achieved in accordance with NSW EPA recommended guidelines. All chemical and asbestos validation samples collected from the Site are compliant with the NEPM 2013 Residential A criteria and indicate that the Site is suitable for the intended land use of Residential."*

15.1 Auditor's Opinion

It is the Auditor's opinion that it was unclear in the Validation Report if the Consultant referred to the Site as defined on Figure 1 in the response Letter included in **Appendix B**, or if the landuse suitability statement referred to the two remediated zones only. Further, the Consultant stated that the Site is suitable with regards to certain analytes, failing to include all the analytes included in the assessment.

Hence, the Auditor requested clarification regarding the landuse suitability. In the Response Letter, Ramboll Environ stated:

"Ramboll Environ note that DLA, the Consultant who undertook supervision of the remedial works, were contracted by the Client, Hydro Aluminium Kurri Kurri Pty Ltd, to complete these specific works in accordance with the ENVIRON (2014) Remedial Action Work Plan, Residential Parcel 1, Kurri Kurri, NSW. Ramboll Environ completed the Phase 1 Environmental Site Assessment (ESA) and Remedial Action Work Plan (RAWP) and were the Client's Environmental Representative during the remedial works. The Phase 2 ESA identified two areas of the site that were not considered suitable for the future landuse and the RAWP outlined the remediation required. As the Client's Environmental Representative, Ramboll Environ attended weekly meetings during the completion of the remedial works. Following the completion of the remedial works, Ramboll Environ consider that Residential Parcel 1 is suitable for the proposed residential landuse and other uses including environmental conservation, public recreation and rural landscape."

Addendums to the Residential Parcel 1 ESA was also provided to the Auditor by Ramboll on 3 April 2020 and 22 July 2020 (**Appendix H**). The addendums provided additional information regarding the suitability of land use for Parcel 1.

The Consultant stated in the addendums that additional landuses not previously presented were considered suitable for Residential Parcel 1 without further investigation. This conclusion was presented by the Consultant on the basis that the site is considered suitable for 'Residential with accessible soil'. The Consultant stated that the soil, water and vapour investigation and screening criteria relevant to this 'Residential with accessible soil' site use are consistent with those required for day care and primary school, and lower (i.e. more sensitive) than the criteria for secondary schools and commercial/ industrial sites for all contaminants assessed. Ramboll (2020) concluded that while not specifically assessed, the following specific landuses are therefore suitable for the site:

- Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry
- Park, recreational open space, playing field
- RU2 Rural Landscape and E2 Environmental Conservation
- Day care centre, preschool, primary school
- Residential with minimal opportunity for soil access, including units
- Secondary school
- Commercial/industrial

The Auditor has reviewed the information provided and has independently inspected the Site and based on a "weight-of-evidence", the Auditor considers that the Site is suitable for the proposed landuses as shown above, subject to the recommendation that a Construction Environmental Management Plan (CEMP) is developed at the time of the future residential civil works to ensure that the Site remains suitable for its intended uses.

16.0 Audit Conclusions

The Site Auditor has reviewed the Assessment and Validation Reporting for the Site, and considers that the works were generally undertaken and reported in accordance with the requirements of NSW EPA and the requirements of the RAWP and the RAWP Addendum.

The Site had two areas where waste material required removal and off-Site management. The areas, labelled the Western Fill Zone (WFZ) and the South-Western Fill Zone (SWFZ) were excavated and the materials from the excavations were sorted into waste streams and transported either to the Smelter Site for future containment cell management or to a licenced landfill disposal facility that was lawfully approved for acceptance of the classified waste.

The remaining surfaces in the excavation pits were validated by chemical analysis (including asbestos) following waste removal. The final validation sample results indicated that the land is suitable for the proposed landuse as Residential A.

In a clarification from Ramboll (Response Letter included in **Appendix B**), the final proposed landuses are Environmental Conservation (E2) for the SWFZ and Public Recreation (RE1) for the WFZ. It is the Auditor's opinion, that the targeted remediation was undertaken in a manner that led to the subject areas meeting the landuse criteria for the intended uses. The excavation pits were filled with verified "VENM" obtained from the nearby Martins Creek Quarry.

Asbestos was found in the stockpiled material. Hence this stockpile material was treated as "asbestos contaminated" and was transported to the Smelter Site under asbestos conditions where it was placed in an existing stockpile containing asbestos for future management on the Smelter site.

After stockpile removal, the surfaces under the former stockpiles were visually inspected for asbestos following the "final scrape" of the area.

Based on review of the Validation Report, the Site Auditor noted groundwater assessment was not included in the characterisation or validation works. However, the Site Auditor notes that a justification for the lack of groundwater assessment was provided in the Phase 2 Report[6] and was also included in the Consultant's Response Letter.

Overall, the Site Auditor considers that the assessment, remediation and validation works undertaken at the Site were completed in general accordance with the requirements of NSW EPA guidance, and that the Site may be considered to be suitable for the proposed landuse of residential with some areas proposed for environmental conservation, public recreation and rural landscapes (as shown in Figure 1 in the Response Letter included in **Appendix B**).

Ross McFarland

NSWEPA Site Auditor No.9819

[6] Ramboll Environ, 2013, "Phase 2 Environmental Site Assessment, Residential Parcel 1", dated 5 November 2013

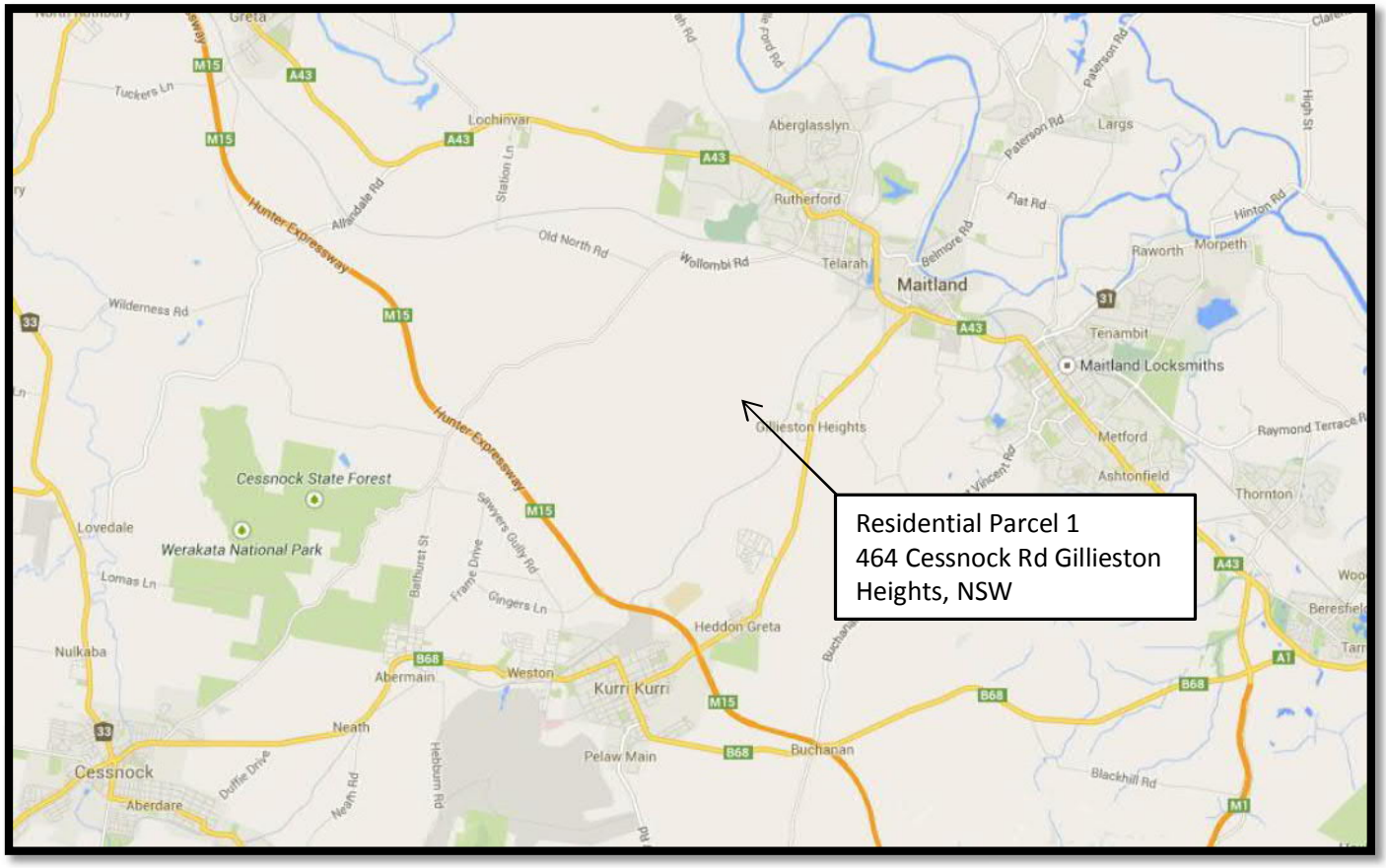
Appendix A

Figures

Appendix A Figures

Figure 1

Site Location



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Maitland
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Maitland NSW

Tel: 02-49330001

Title:	Hydro Aluminium Residential Parcel 1 Site 464 Cessnock Rd Gillieston Heights, NSW
Figure: 1	Project no:: DLH1152
Date: 20/05/2014	Revision: 2

Figure 2

Residential Parcel 1 Site Boundaries and Layout

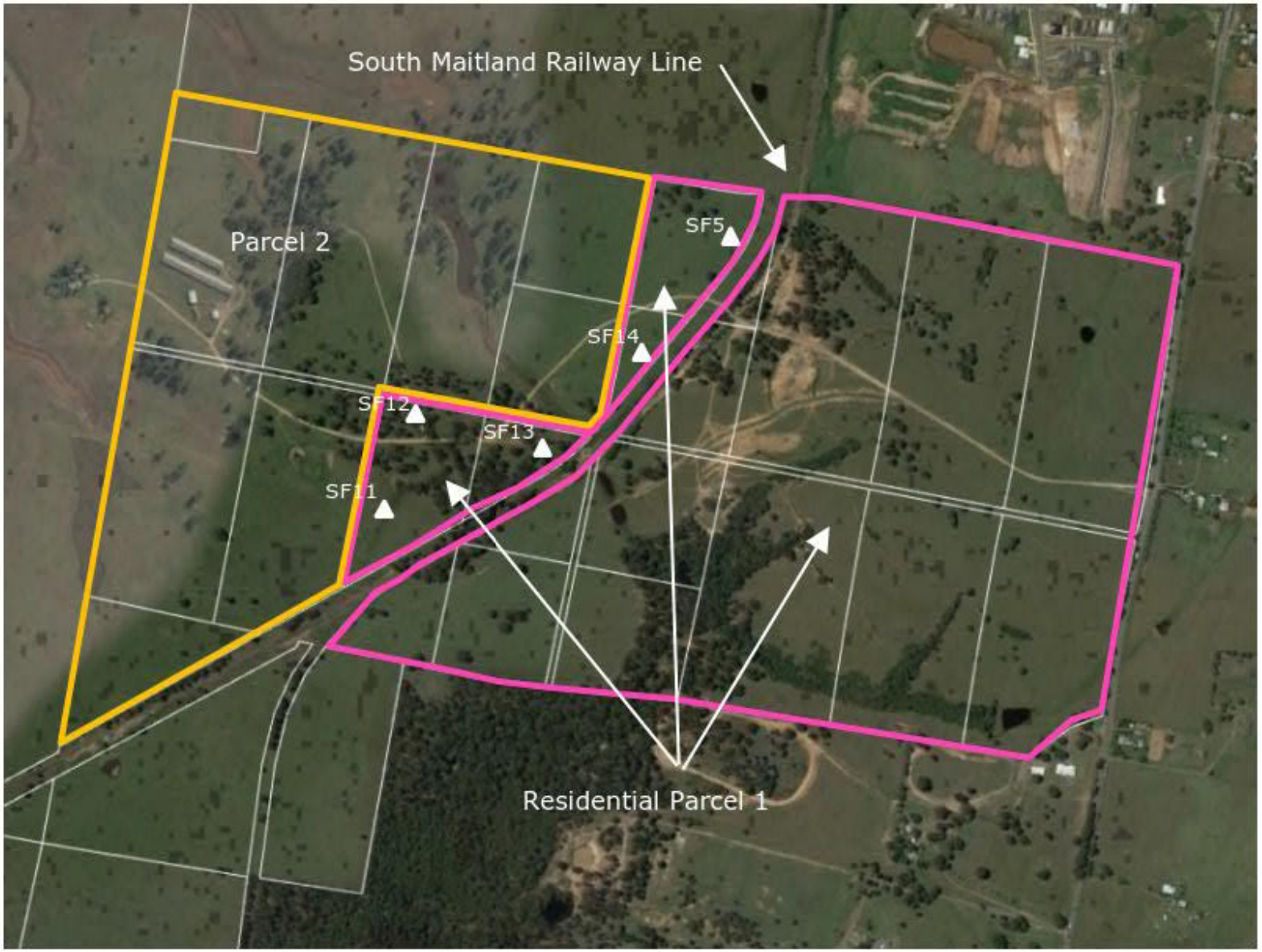

Figure 2: New Boundaries of Residential Parcel 1 and Parcel 2

Figure 3

Former Residential Parcel 1 boundaries with Fill Zones

N

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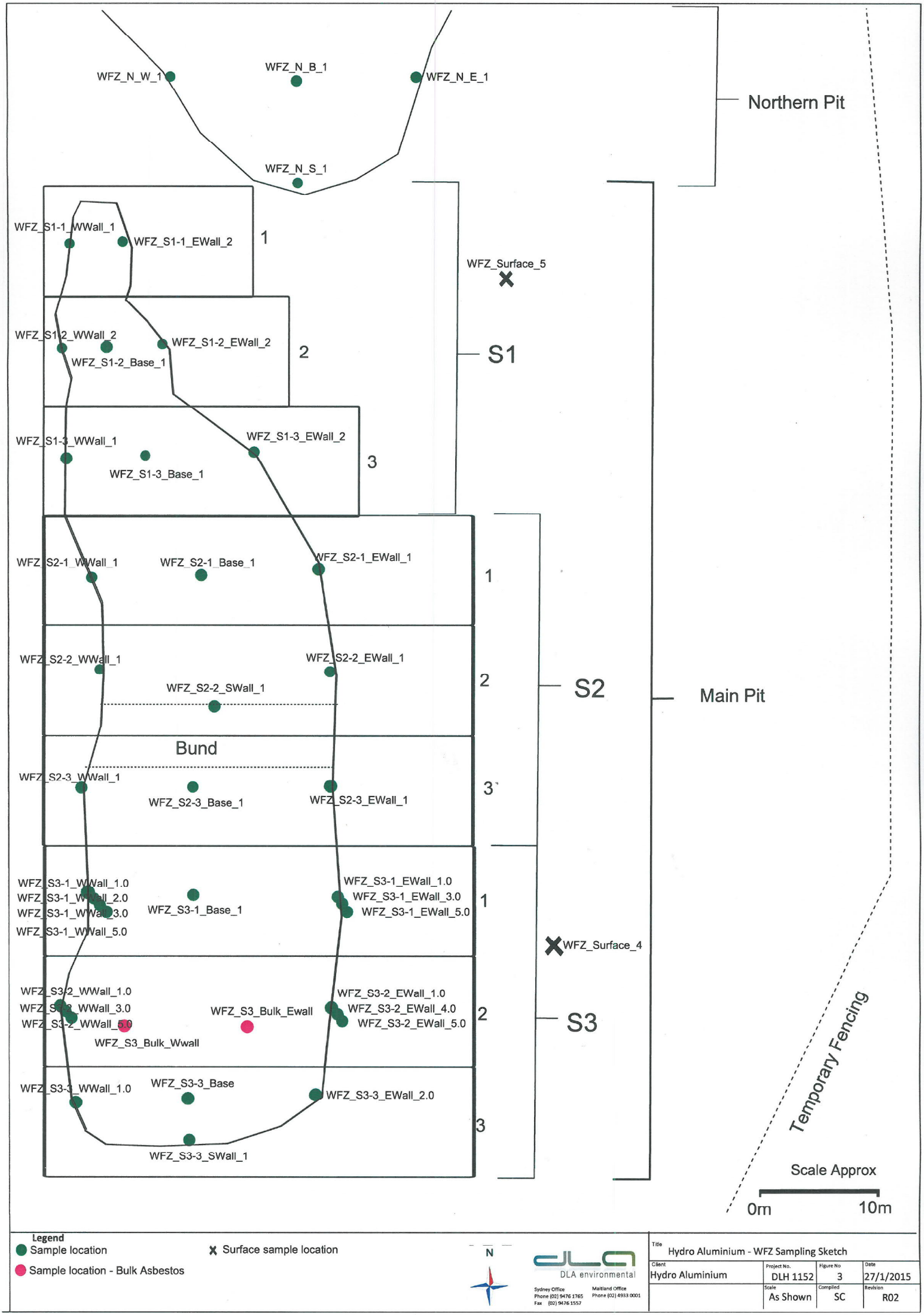
Title: Residential Parcel 1 with Fill Zones

Client	Project No.	Figure No	Date
Hydro Kurri Kurri Pty	DLH 1152	2	27/1/2015
	Scale: N/A	Compiled: SC	Revision: R00

Figure 4

WFZ Sampling Map



Legend

- Sample location
- Sample location - Bulk Asbestos
- Surface sample location

N

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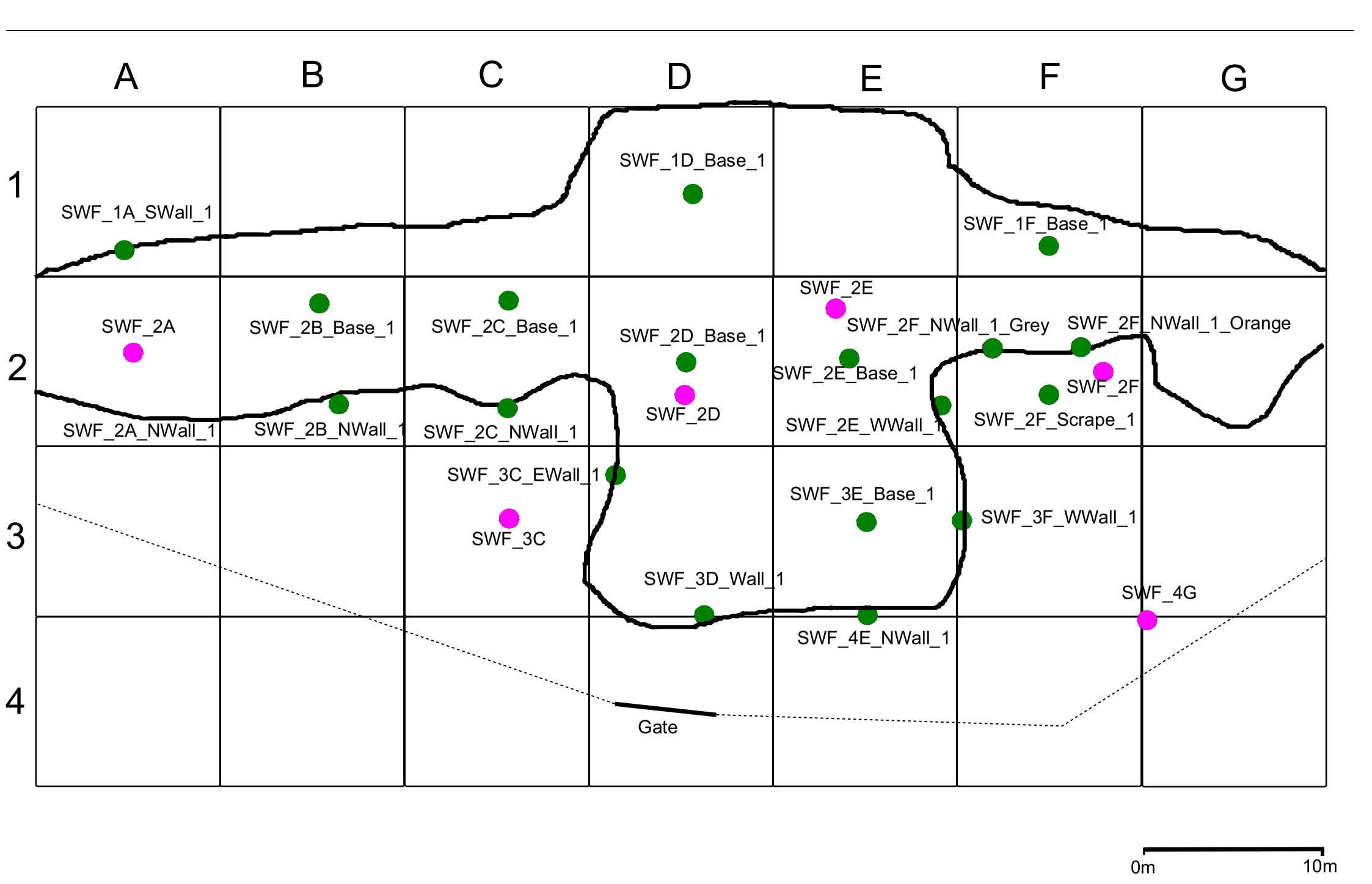
Title: Hydro Aluminium - WFZ Sampling Sketch

Client	Project No.	Figure No	Date
Hydro Aluminium	DLH 1152	3	27/1/2015
	Scale: As Shown	Compiled: SC	Revision: R02

Figure 5

SWFZ Sampling Map



Legend

- Sample Locations
- Asbestos Sample Locations

N

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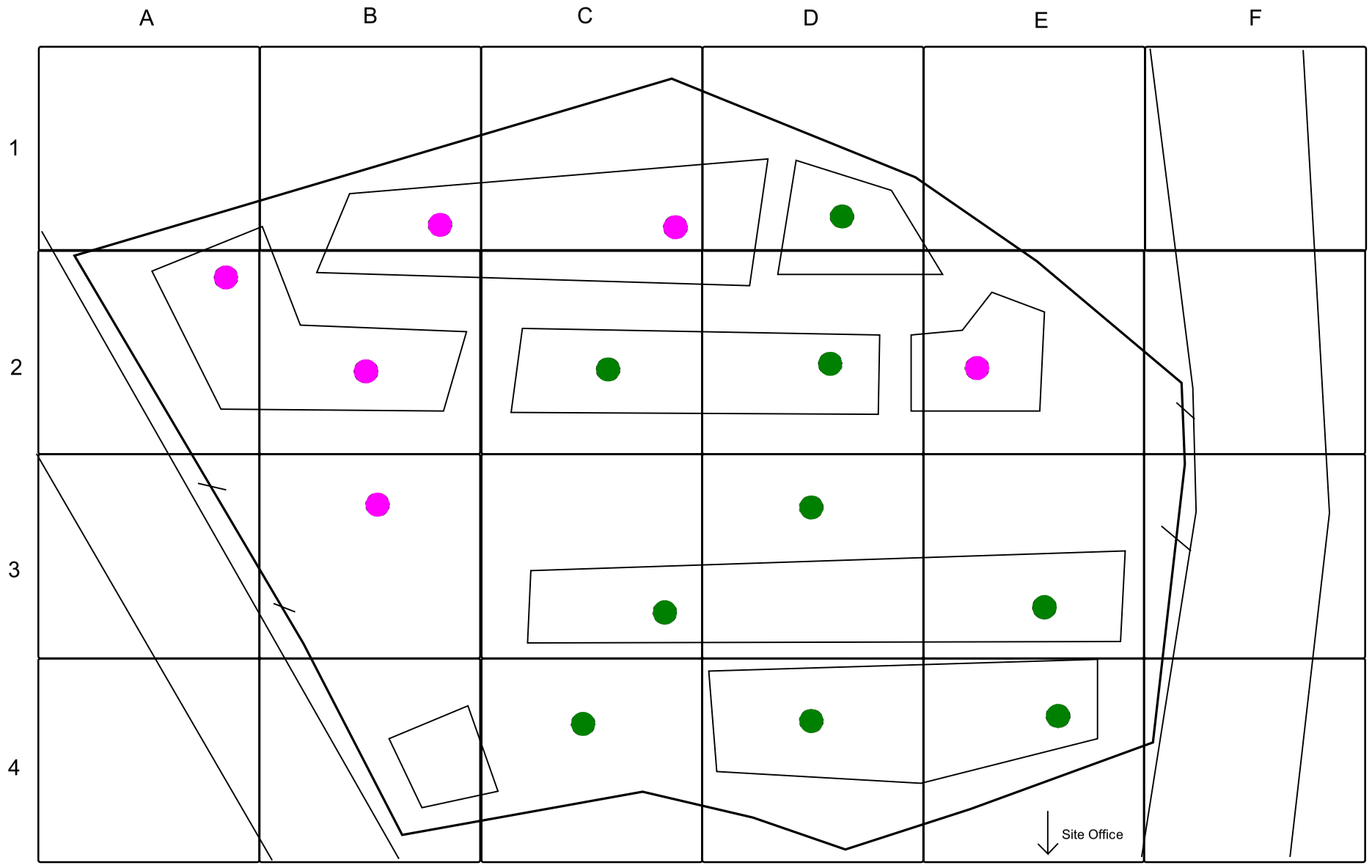
Title: Hydro Aluminium - SWFZ Sampling Map

Client	Project No.	Figure No	Date
Hydro Aluminium	DLH 1152	4	25/11/2014
	Scale: As Shown	Compiled: SM	Revision: R00

Figure 6

Primary Staging Area



Legend

- PAH Sampling
- Visual Asbestos

N

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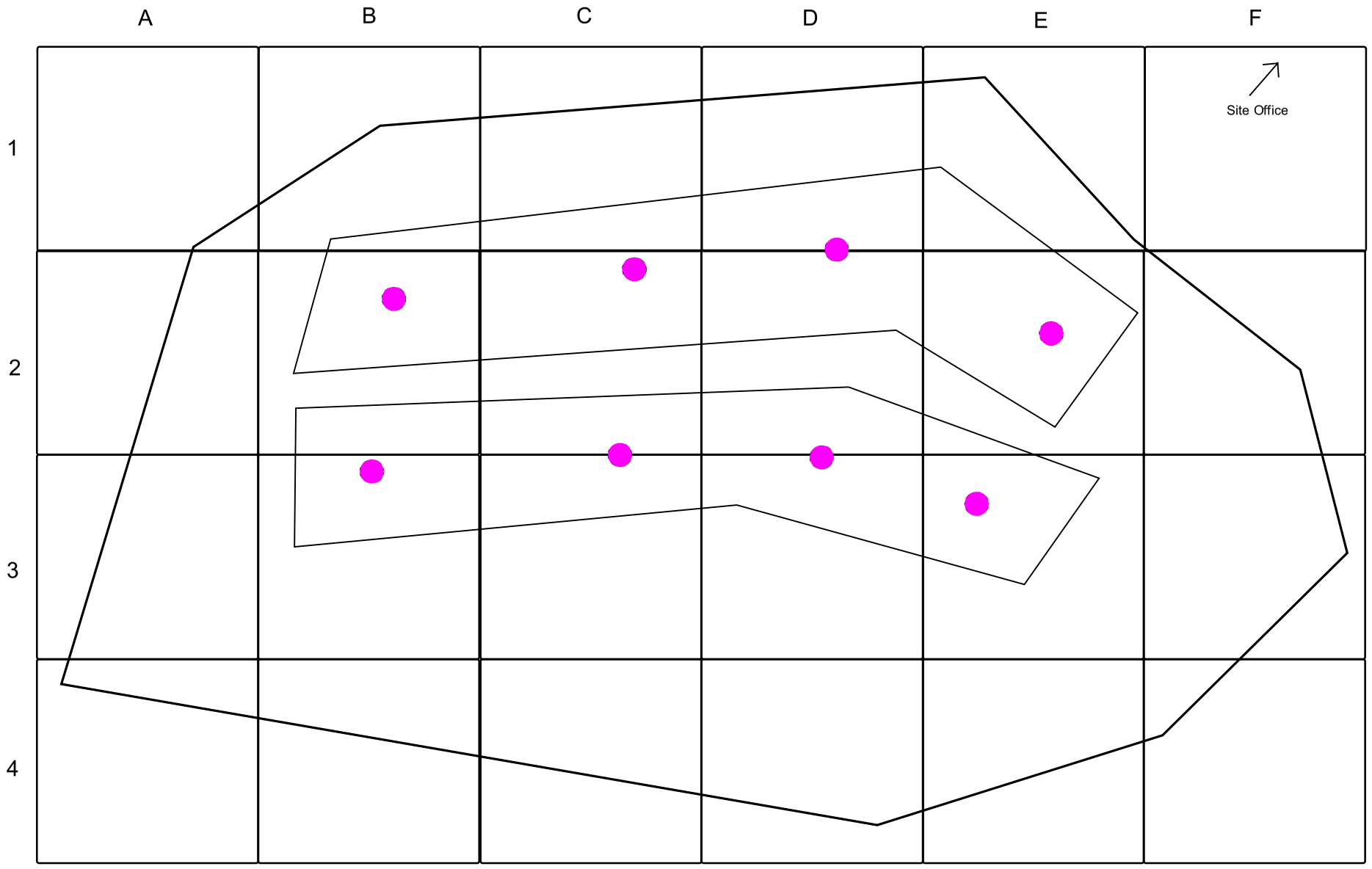
Title				
Hydro Aluminium - Primary Staging Area				
Client	Project No.	Figure No	Date	
Hydro Kurri Kurri	DLH 1152	5	12/12/2014	
	Scale	Compiled	Revision	
		SM	R00	

Figure 7

Secondary Staging Area



Legend

- PAH/Metals
- PAH Sampling

N

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Title: Hydro Aluminium - Secondary Staging Area

Client	Project No.	Figure No	Date
Hydro Kurri Kurri	DLH 1152	6	12/12/2014
	Scale	Compiled	Revision
		SM	R00

Appendix B

Response Letter

Appendix B Response Letter

EPA 1997 Reporting Guidelines Compliance Checklist – Validation

Client	**Hydro Aluminium Krurri Kurri Pty Ltd**
Site Name	**Residential Parcel 1, Hydro Aluminium Kurri Kurri, off Cessnock Road, Cliftleigh, New South Wales (2321)**
Report Title	**Validation Report, Residential Parcel 1, Lot 1 through 9 in DP456946, Lots 54, 55, 69, 70 & 71 DP975994**
Report Date / Version / Reference	**18 June 2015 / Final / DLH1152_H00485**
Report Author / Consultant	**Steve McAleer / Stephen Challinor / Ben Fleming / DLA Environmental**
AECOM Auditor Assistant	**Erla Hafsteinsdottir / Anna Lundmark**
AECOM Auditor Reviewed (initials / date)	**Ross McFarland 5 May 2016**

Background:

The NSW EPA guidance on preparing a site **remedial action plan (RAP)** states:

Where remedial action has been carried out, the site must be 'validated' to ensure that the objectives stated in the RAP have been achieved. A report detailing the results of the site validation is required.

The extent of validation required will depend on:

- *the degree of contamination originally present*
- *the type of remediation processes that have been carried out*
- *the proposed land use.*

Validation must confirm statistically that the remediated site complies with the clean-up criteria set for the site. For guidance, see the NSW EPA's Contaminated Sites Sampling Design Guidelines. Where applicable, the US EPA's Methods for Evaluating the Attainment of Cleanup Standards (1989) can also be used.

The validation report must assess the results of the post-remediation testing against the clean-up criteria stated in the RAP. Where targets have not been achieved, reasons must be stated and additional site work proposed to achieve the original RAP objectives.

The validation report should also include information confirming that all EPA and other regulatory authorities' licence conditions and approvals have been met. In particular, documentary evidence is needed to confirm that any disposal of soil off-site is done in accorance with the RAP.

The following checklist is based on that provided by the NSW EPA. The code system is:

ü Include this section
(S) A summary is adequate if detailed information was included in an available referenced previous report
(N) Include only if there is to be no further site investigation
(N/A) Not applicable

EPA 1997 Reporting Guidelines Compliance Checklist – Validation

Section	Ref / Sec in Report	Comments on Specific Information to be Included	Overall Conclusion for this Section	Consultants Reply / Section Amended
Executive Summary ü			Throughout document, please ensure that abbreviations are spelled out the first time they are used, e.g. OEH (Office of Environment and Heritage?) and VENM (Virgin Excavated Natural Material?). In the summary (and later in the report) the Consultant stated that this investigation was undertaken to assess historical contamination and potential impacts. This is the objective of a DSI rather than a validation report.	
· Background	ü	-		
· Objectives of the Investigation	ü	-		
· Scope of work	-	Summarise the scope		
· (Where appropriate) a summary of sampling results in tabulated format containing minimum, maximum, arithmetic average and 95% upper-confidence limit on arithmetic average for each analyte	-	-		
· Summary of conclusions and recommendations	ü	-		
Scope of Work and Objectives ü				
· A clear statement of the scope of work	ü	-		
· A clear statement of the objectives.	ü	In the objective, the Consultant stated that the Site "…*shall pose no future unacceptable risk to human health or to the environment*…" This statement is considered too strong and it would be advised to reword it to say that the Site is considered suitable for the proposed (residential) landuse based on the current post-remedial status.		
Site Identification ü			It is unclear if there are to be restrictions on parts of the parcel (eg. Mine subsidence areas, former railway, buffer to current railway etc) where residential development will not be allowed. Such details need to be included and clarified for the purpose of the SAR / SAS.	
· Street number, street name and suburb		Although the address is included in the Executive Summary, please also include in Table 1 (the address there are the DP numbers)		
· Lot number and Deposited Plan number	ü	-		
· Geographic coordinates related to a nearby cadastral corner of a State Survey Control Mark		Please include (e.g. Table 1)		Ramboll Environ can provide a plan showing restrictions. We can provide a letter noting areas that are not considered suitable for residential landuse have been zoned for other uses including recreation and public open space, environmental conservation etc.
· Locality map	ü	Please refer to Figure 1 in Sections 1.0 and 2.0 Please include scale bar and north arrow		
· Current site plan with scale bar, showing north, local water drainage and other local environmentally significant features	ü	Please include scale bar and north arrow, local water drainage and identify main water bodies visible on Figure 2. Also, please include the name of the main roads on the fig.		
Site History ü (S)				
· Summary of previous investigations	ü	-		
· Zoning-previous, present and proposed	ü	Only present zoning in Table 1, please also include previous and proposed zoning		Ramboll Environ can note the proposed zoning in a letter.
· Land use-previous, present and proposed	ü	In Table 1 please also include previous land use		
· Summary of Council rezoning and relevant development and building approvals records	-	Please include		
· Chronological list of site uses, indicating information gaps and unoccupied periods	-	Please include		
· Review of aerial photographs	ü	Please include the aerial photographs mentioned in section 2.6 in an appendix, or refer to the report where they can be found.		
· Site photographs (with date and location indicated on site maps)	ü	Please include dates on photos in Appendix J – Print Gallery		
· Inventory of chemicals and wastes associated with site use and their on-site storage location	-	Please include		
· Possible contaminant sources and potential off-site effects including potential issues associated with migration of contaminants	ü	-		
· Site layout plans showing present and past industrial processes		Please include a figure showing the historical mining areas / former railway associated with the mining areas, sensitive receptors (see DSI report), and any other relevant historical information.		Covered in Phase 2 report.
· Sewer and service plans	-	-		

EPA 1997 Reporting Guidelines Compliance Checklist – Validation

Section	Ref / Sec in Report	Comments on Specific Information to be Included	Overall Conclusion for this Section	Consultants Reply / Section Amended
· Description of manufacturing processes	ü	-		
· Details and locations of current and former underground and aboveground storage tanks		Please include whether or not these were present (including historically), in particular since there was a bowser in the former mining area.		Covered in Phase 2 report.
· Product spill and loss history	-	Please include comment		
· Discharges to land, water and air	ü			
· Disposal locations	ü			
· Relevant complaint history	-	Please include comment		
· Local site knowledge of residents and staff-both present and former	-	Please include comment		
· Summary of local literature about the site, including newspaper articles	ü	-		
· Details of building and related permits, licences, approvals and trade waste agreements	-	Please include comment		
· Historical use of adjacent land	-	Please include comment		
· Local usage of ground/surface waters, and locations of bores/pumps	-	Please include comment (noting there were comments relating to bore searches)		
· Integrity assessment (assessment of the accuracy of information)	-	Please include assessment		
Site Condition and Surrounding Environment ü (S)				
· Topography	ü	-		
· Conditions at site boundary such as type and condition of fencing, soil stability and erosion	-	Please include information		
· Visible signs of contamination such as discolouration or staining of soil, bare soil patches-both on-site, and off-site adjacent to Site boundary	-	Please include information		
· List potential contaminants of concern at or near the site	ü	-		
· Visible signs of plant stress	-	Please include observations		Covered in Phase 2 report.
· Presence of drums, wastes and fill materials	ü	-		
· Odours	-	Please include		
· Condition of buildings and roads	-	Please include observations		
· Quality of surface water	ü	-		
· Flood potential	-	Please include		
· Details of relevant local sensitive environment-e.g Rivers, lakes, creeks, wetlands, local habitat areas, endangered flora and fauna.	-	Please include and identify water bodies on site location figure as per comment above		
· Identification of sensitive receptors, e.g. kindergarten, parks, etc.	ü	-		
Geology and Hydrogeology ü(S)				
· Soil stratigraphy using recognised classification methods, e.g. Australian Standard 1726, Unified Soil classification Table	ü	-		
· Location and extent of imported and locally derived fill	ü	-		
· Site borehole logs or test pit logs showing stratigraphy	NA	NA		
· Detailed description of the location, design and construction of on-site wells.	NA	NA		Covered in Phase 2 report.
· Description and location of springs and wells in the vicinity	ü	-		
· Depth to groundwater table	ü	-		
· Direction and rate of groundwater flow	ü	Please include rate of GW flow if available		
· Direction of surface water run-off	ü	-		

EPA 1997 Reporting Guidelines Compliance Checklist – Validation

Section	Ref / Sec in Report	Comments on Specific Information to be Included	Overall Conclusion for this Section	Consultants Reply / Section Amended
· Background water quality	ü	-		
· Preferential water courses	ü	-		
· Summary of local meteorology	-	Please include summary		
Acid Sulphate Soils ü(S)			There is no mention of ASS in the document	
· Identification of extent and potential for ASS	-	Please include		
· Assessment of management and remedial strategies to work with ASS	-	Please include comment		
Sampling and Analysis Plan and Sampling Methodology ü			The Consultant needs to make it clear throughout the report that the Site refers to the whole residential parcel one, and also make it clear when only the two remediated areas are referred to.	
· Sampling, analysis and data quality objectives (DQOS)	ü	Step 2, 3 and 4 are relating to a DSI rather than a validation report. In step 7, the Consultant outlined what needs to be included under this step rather than addressing the item. In Step 5, it would be sagacious to include what happens if the guidelines are not met (eg. Further excavation and re-sampling etc). Waste classification should also be addressed as should material tracking and transport. Further in Step 5 and 6, any statistics used and potential limitations should be discussed.		
· Rationale for the selection of:				
- sampling pattern	ü	-		
- sampling density including an estimated size of the residual hot spots that may remain undetected	NA	NA		
- sampling locations including locations shown on a site map	ü	-		
- sampling depth	-	Include sampling depth		
- samples for analysis and samples not analysed	-	-		
- sampling of relevant environmental media (soil, air, water)	ü	-		
- analytical methods	ü	-		
- analytes for samples	ü	The list of analytes should be made consistent throughout the report		
· Detailed description of the sampling methods including:	Appendix C			
- sample containers and type of seal used	ü	-		
- sampling devices and equipment e.g. auger type	ü	-		
- equipment decontamination procedures	ü	-		
- sample handling and transport procedures	ü	-		
- sample preservation methods and reference to recognised protocols, e.g. APHA or US EPA SW 846	ü	-		
· Detailed description of field screening protocols and validation of field measurements	ü	-		
Field Quality Assurance and Quality Control (QA/QC) ü				
· Details of sampling team	-	Clearly define the members of the remediation / validation team.		
· Decontamination procedures carried out between sampling events	ü	Appendix C		
· Logs for each sample collected—including time, location, initials of sampler, duplicate locations, duplicate type, chemical analyses to be performed, site observations and weather conditions.	-	Include log		
· Chain of custody fully identifying—for each sample—the sampler, nature of the sample, collection date, analyses to be performed, sample	ü	-		

EPA 1997 Reporting Guidelines Compliance Checklist – Validation

Section	Ref / Sec in Report	Comments on Specific Information to be Included	Overall Conclusion for this Section	Consultants Reply / Section Amended
preservation method, departure time from the site and dispatch courier(s).				
· Sample splitting techniques				
· Statement of duplicate frequency	ü	-		
· Field blank results	-	-		
· Background sample results	-	-		
· Rinsate sample results	-	Unclear if rinsate samples were collected		
· Laboratory-prepared trip spike results for volatile analytes	ü	Appendix C		
· Trip blank results	ü	Appendix C		
· Field instrument calibrations (when used).	NA	NA		
· Acceptance limit for each calibration standard	NA	NA		
Laboratory QA/QC ü				
· A copy of signed chain-of-custody forms acknowledging receipt date and time, and identity of samples included in shipments	ü	-		
· Record of holding times and a comparison with method specifications	ü	-		
· Analytical methods used	ü	-		
· Laboratory accreditation for analytical methods used	ü	-		
· Discussion of non-standard methods used	ü	-		
· Laboratory performance in inter-laboratory trials for the analytical methods used, where available	ü	Appendix C		
· Description of surrogates and spikes used	ü	-		
· Per cent recoveries of spikes and surrogates	ü	-		
· Instrument detection limits	-	-		
· Method Detection Limits	-	-		
· Matrix or practical quantification limits	ü	-		
· Standard solution results	-	-		
· Reference sample results	-	-		
· Reference check sample results	-	-		
· Daily check sample results	-	-		
· Laboratory duplicate results	ü	-		
· Laboratory blank results	ü	-		
· Laboratory standard charts.	-	-		
QA/QC Data Evaluation ü				
· Evaluation of all QA/QC information listed above against the stated DQIs, including a discussion of:		These items are to be addressed specifically in Appendix C (noting that control sample results were discussed in the Appendix)		
- documentation completeness	-	-		
- data completeness	-	-		
- data comparability (see next point)	-	-		
- data representativeness	-	-		
- precision and accuracy for both sampling and analysis for each analyte in each environmental matrix informing data users of the reliability, unreliability, or qualitative value of the data	-	-		
· Data comparability checks, which should include e.g. bias assessment – which may arise from various sources, including:	-	-		
- collection and analysis of samples by different personnel	-	-		
- use of different methodologies	-	-		

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Section	Ref / Sec in Report	Comments on Specific Information to be Included	Overall Conclusion for this Section	Consultants Reply / Section Amended
- collection and analysis by the same personnel using the same methods but at different times	-	-		
- spatial and temporal changes (because of the environmental dynamics)	-	-		
· Relative per cent differences for intra-and inter-laboratory duplicates.	ü	-		
Basis for Assessment Criteria ü				
· Table listing all selected assessment criteria and references	ü	The consultant needs to provide the calculation for EILs from the NEPM toolbox in an appendix, or refer to a report where calculations can be found. Waste classification criteria needs to be included.		Completed in Phase 2 report.
· Rationale for and appropriateness of the selection of criteria	ü	-		
· Assumptions and limitations of criteria.	-	Include comments		
· Compliance with Guidelines for Consultants Reporting on Contaminated Sites (2011)	ü	The document is referred to in the report, but this checklist needs to be addressed for compliance with the guideline. Also, the Consultant needs to check the dates on the references.		
Results ü			Data Tables: · LOR's for Xylene change throughout the table. The Consultant needs to double check the LORs and if needed add a note at the bottom of the table or in QA / QC section to discuss. · The results in the table for samples WFZ_Surface_1 – 3 for F3, F4, BaP TEQ and Total PAH are different to what appears on the COA (118748) · Heavy metal results for samples under the 119577 COA have all been entered incorrectly. A row of results have been repeated, throwing out the order of the rest of results for that COA. · The same as above has happened on COA 119306. This is for heavy metals as well as F3, F4, BaP TEQ and Total PAHs. · The COA 120306 did not have any results listed for samples VENM_6 and VENM_7. Unsure where the results in the table have come from. In section 7.2.1, the Consultant noted that 'All other samples reported concentrations of TRH in the F2 Fraction below the LOR' but there were three samples (WFZ_OS_3,4 and 5) which did slightly exceed the LOR. The Consultant needs to ensure that ESL / EIL have been labelled consistently within the document.	
· Summary of previous results, if appropriate	-	-		
· Summary of all results, in a table that:	ü			
- shows all essential details such as sample numbers and sampling depth	ü	Appendix A: The Tables are named "metals and inorganics", which is incorrect. The formatting needs to be amended as there are unnamed columns to the right (one with a number in it), and it is also hard to read numbers even when printed on A3. Further, the headings are missing from the last page of the table – please ensure the headings are repeated on all pages.		Although the data has not been entered into the tables correctly, overall it does not change the outcome of the validation.
- shows assessment criteria	ü	-		
- highlights all results exceeding the assessment criteria	ü	It is understood that some waste classification was undertaken prior to changing strategy to transport all material within the Site rather than on public roads. The results need to be presented.		
· Site plan showing all sample locations, sample identification numbers and sampling depths	ü	-		
· Site plan showing the extent of soil and groundwater contamination exceeding selected assessment criteria for each sampling depth.	NA	NA (Validation sampling)		
Site Characterisation and Risk Assessment ü			The CSM included in Section 4 is for the pre-remediation situation. It should be made clear in the introduction to this section that the CSM is included for the purpose of justifying that remediation is needed.	
· Assessment of type of all environmental contamination, particularly soil and groundwater	ü	-		
· Assessment of extent of soil and groundwater contamination, including off-site effects	ü	-		
· Assessment of the chemical degradation products	-	-		
· Assessment of possible exposure routes and exposed populations (human, ecological).	ü	-		
· Assessment of type of risks particularly to human	ü	-		

EPA 1997 Reporting Guidelines Compliance Checklist – Validation

Section	Ref / Sec in Report	Comments on Specific Information to be Included	Overall Conclusion for this Section	Consultants Reply / Section Amended
health and the environment				
· Assessment of mathematical modelling or other method to justify conclusions of risk assessment	NA	NA		
· Detection limits for each chemical appropriate for risk assessment process	NA	NA		
· Appropriateness of site specific risk assessment	NA	NA		
· Compliance with requirements in Human Health Risk Assessment checklist	NA	NA		
Remedial Action Plan ü(S)				
· Remediation goal	-	Please include at the start of section 5.0 as per the remediation goals in Environ's RAWP		
· Remediation category under SEPP55 (where applicable)	ü	-		
· Discussion of the extent of remediation required	ü	-		
· Discussion of possible remedial options and how risk can be reduced including consideration of vertical soil mixing and capping	-	This was discussed in the Phase 2 report / RAWP		
· Where cap and contain is to be used:	-	-		
- Maximises long term engineering security of the works	-	-		
- Minimises leachate formation and volatilisation	-	-		
- Notification mechanism to ensure protection of capped material	-	-		
- Structures built n capped area will not pose a future significant risk of harm	-	-		
· Where bioremediation option is used:	-	-		
- Consideration of local rather than foreign species	-	-		
- Quarantine license and laboratory identification for foreign organisms	-	-		
- Potential risks from release of organisms	-	-	In Section 3.1, the Consultant stated that no remediation of groundwater and surface water was considered needed. This needs to be justified further.	This was closed out in the Phase 2 ESA.
- Monitoring and contingency measures	-	-		
· Consideration of chemical wastes subject to a Chemical Control Order (CCO) and compliance	-	Please include comment		
· Rationale for the selection of recommended remedial option including reference to ANZECC/ NHMRC preferred order of options for remediation	-	Please include comment		
· Proposed testing to validate the site after remediation	ü	-		
· Contingency plan if the selected remedial strategy fails	-	Please include strategy (eg. If validation samples fail, further excavation will be undertaken followed by validation sampling)		Included in the RAWP.
· Interim site management plan (before remediation), including e.g. fencing, erection of warning signs, stormwater diversion	ü	-		
· Boundary conditions and extent of remediation	ü	Please include boundary conditions		
· Site management plan (operational phase):		Please clarify if a management plan will be needed, or if there will be a requirement for a management plan to deal with potential contamination during future development.		Ramboll Environ can discuss this in a letter.
- site stormwater management plan	ü	-		
- soil management plan	-	Please include soil management measures implemented		
- noise control plan	-	Please include noise management measures implemented		
- dust control plan, including wheel wash (where applicable)	ü	-		
- odour control plan	-	Include measures implemented		
- occupational health and safety plan	ü	-		

EPA 1997 Reporting Guidelines Compliance Checklist – Validation

Section	Ref / Sec in Report	Comments on Specific Information to be Included	Overall Conclusion for this Section	Consultants Reply / Section Amended
· Compliance with Part A in checklist (C1) for the EMP	-	-		
· Remediation schedule	ü	-		
· Hour of operation	-	Please include		
· Contingency plans to respond to site incidents, to obviate potential effects on surrounding environment and community	ü	-		
· Identification of regulatory compliance requirements such as licenses and approvals	ü	-		
· Names and phone numbers of appropriate personnel to contact during remediation	-	Please include roles and responsibilities during the remediation		
· Community relations plans, where applicable	-	Please include if one was implemented		
· Staged progress reporting, where applicable	-	-		
· Long-term site management plan	-	Please include a discussion relating to on-going management and / or if an environmental management plan will be needed for the development phase.		Not required based on the RAWP.
Validation ü				
Rationale and justification for the validation strategy including:	ü	In Table 6a, step 7, the consultant needs to refer to *ASC NEPM* (2013).		
- clean-up criteria and statistically based decision-making methodology	ü	Include waste classification criteria		
- validation sampling and analysis plan	ü	-		
· Details of a statistical analysis of validation results and evaluation against the clean-up criteria	-	Include information in Table 6a.		
· Verification of compliance with regulatory requirements set forth by the EPA, WorkCover and local government	ü	-		
Ongoing site monitoring ü			A discussion needs to be included relating to on-going monitoring and / or a plan to deal with potential contamination during development. Also, it needs to be made clear if there are areas within the Site that are considered unsuitable for residential use, such as mine subsidence areas, rail line and a buffer around it, former mine top area etc.	
· Scope of ongoing site monitoring requirements (if any), including monitoring parameters, targets and frequency	-			
· Results of monitoring analyses including all relevant QA/QC reporting requirements stated above	-			
· Corrective/preventative action taken (where monitoring has indicated that performance targets have not been met)	-			This is a low risk site for additional contamination. Ramboll Environ don't think on-going monitoring or a plan to deal with contamination during development is necessary.
· Ongoing site/equipment maintenance, e.g. containment cap integrity	-			
· Details of party(ies) responsible for maintenance and monitoring program	-			
· Maintenance records for plant and equipment	-			
· Data management – indicate where, for how long and by whom, monitoring and maintenance records will be kept	-			
· Regulatory compliance for ongoing monitoring	-			
Conclusions and Recommendations ü			In the Conclusions (Section 9) the Consultant stated that the tipping areas were validated. It needs to be made very clear in this section (and throughout the report) that the Site is larger than the two tipping areas, and that when the Consultant states that the Site is suitable for its intended landuse (residential), it is for the entire Residential Parcel 1.	
· Brief summary of all findings	ü	-		
· Assumptions used in reaching the conclusions	-	Include assumptions		
· Extent of uncertainties in the results	-	Include a discussion		Ramboll Environ could include comment on overall site suitability in a letter.
· Where remedial action has been taken, a list summarising the activities and physical changes to the site	-	Include or refer to list		

EPA 1997 Reporting Guidelines Compliance Checklist – Validation

Section	Ref / Sec in Report	Comments on Specific Information to be Included	Overall Conclusion for this Section	Consultants Reply / Section Amended
· A clear statement that the consultant considers the subject site to be suitable for the proposed use (where applicable)	ü	See comments to the right.		
· A statement detailing all limitations and constraints on the use of the site (where applicable)	-	See comments throughout this checklist – any areas considered unsuitable for residential development needs to be defined.		
· Recommendations for further work, if appropriate.	-	Discussion relating to potential need for EMP for on-going use and / or for construction phase needs to be considered.		

EPA 1997 Reporting Guidelines Compliance Checklist – Stage 2 Investigation

Client	**Hydro Aluminium Kurri Kurri Pty Ltd**
Site Name	**Residential Parcel 1, Hydro Aluminium Kurri Kurri, off Cessnock Road, Cliftleigh, New South Wales (2321)**
Report Title	**Phase 2 Environmental Site Assessment, Residential Parcel 1**
Report Date / Version / Reference	**5 November 2013 / Draft 1 / AS130339_Phase 2_D2**
Report Author / Consultant	**Fiona Robinson / ENVIRON Australia Pty Ltd**
AECOM Auditor Assistant	**Erla Hafsteinsdottir / Anna Lundmark**
AECOM Auditor Reviewed (initials / date)	**Ross McFarland, 19 May 2016**

Background:

The NSW EPA guidance on **Stage 2** (**detailed) site investigation reporting** states:

The detailed site investigation report should give comprehensive information on:

- *issues raised in the preliminary investigation*
- *the type, extent and level of contamination*

and assess:

- *contaminant dispersal in air, surface water, groundwater, soil and dust*
- *the potential effects of contaminants on public health, the environment and building structures*
- *(where applicable) off-site impacts on soil,sediment and biota*
- *the adequacy and completeness of all information available to be used in making decisions on remediation*

Where it is preferred that site-specific clean-up levels be developed by applying risk assessment methods, the consultant must contact the EPA to discuss appropriate procedures.

If the results of the detailed site investigation indicate that the site poses unacceptable risks to human health or the environment – on-site or off-site, and under either the present or the proposed land use – then a remedial action plan needs to be prepared and implemented.

The following checklist is based on that provided by the NSW EPA. The code system is:

- ✓ Include this section
- (S) A summary is adequate if detailed information was included in an available referenced previous report
- (N) Include only if there is to be no further site investigation
- (N/A) Not applicable

EPA 1997 Reporting Guidelines Compliance Checklist – Stage 2 Investigation

Section	Ref / Sec in Report	Comments on Specific Information to be Included	Overall Conclusion for this Section	Consultants Reply / Section Amended
Executive Summary ✓			It was noted that page numbers are missing for the whole report	
• Background	Executive Summary	-		
• Objectives of the Investigation	Executive Summary	-		
• Scope of work	Executive Summary	-		Noted
• (Where appropriate) a summary of sampling results in tabulated format containing minimum, maximum, arithmetic average and 95% upper-confidence limit on arithmetic average for each analyte	-	-		
• Summary of conclusions and recommendations	-	-		
Scope of Work and Objectives ✓			Clear statement is provided. However, for future reporting please ensure that how you refer to the samples collected remains consistent throughout the report, e.g. the soil samples (pit top, shallow soil, trench/tranche/trenche, test pits etc.). Note that this extends to figures (Figure 4 in this case should be labelled consistently; Trench / Trenche?)	Noted
• A clear statement of the scope of work	1.2			
• A clear statement of the objectives.	1.2			
Site Identification ✓			Most of the relevant information has been included, except for the missing information noted for each relevant topic. Note that Figure 2 shows a triangular area in SE corner but other figures seem to exclude this area. Is this area included in the Assessment and is it included in the Property Identification (Table 1)?	
• Street number, street name and suburb	2.1	-		
• Lot number and Deposited Plan number	2.1	-		
• Geographic coordinates related to a nearby cadastral corner of a State Survey Control Mark	-	Please provide coordinates in the right-hand column		
• Locality map	Figures 1, 2 & 3	-		
• Current site plan with scale bar, showing north, local water drainage and other local environmentally significant features	Figures 1, 2 & 3	Please include scale bar on all maps/plans in future reporting. It was noted that the local water drainage was not included in Figure 3. The feature will be required in the validation report. Site sensitivity is outlined in section 2.3 – it was noted that the location of Hunter River and Fishery Creek Catchment were not presented on maps. The information will be required for the validation report.		The portion in the south eastern corner is excluded and should have been excluded on Figure 2.
Site History ✓ (S)				
• Summary of previous investigations	3	-		
• Zoning-previous, present and proposed	1, 2.1	This is not clear in the report (the present zoning is mentioned in section 2.1). Although it is understood that this is a proposed residential area, any limitations in specific areas such as mine subsidence (it should be noted that this matter is not included in the Audit) and the rail line. For the validation report, it will be required that the proposed landuse, including any exclusion zones and limitations are presented.		This has been addressed in the Letter Response to Auditor Comments on Residential Parcel 1_27June2016.
• Land use-previous, present and proposed	2.1, 3, 8.1 and 10	Although this information has been mentioned in sections, in order to clarify this, please include a table detailing this in section 3 and then refer to it where appropriate in text.		
• Summary of Council rezoning and relevant development and building approvals records	-	-		
• Chronological list of site uses, indicating information gaps and unoccupied periods	3	-		
• Review of aerial photographs	3	-		
• Site photographs (with date and location indicated on	Appendix C	Site photographs are included in Appendix C – for future		Noted.

Section	Ref / Sec in Report	Comments on Specific Information to be Included	Overall Conclusion for this Section	Consultants Reply / Section Amended
site maps)		reporting, please include dates for photographs.		
• Inventory of chemicals and wastes associated with site use and their on-site storage location	3, 4, 7.1, figures	Please include a comment in the right-hand column regarding any searches regarding chemicals stored on site.		No searches regarding chemicals stored at the site were undertaken.
• Possible contaminant sources and potential off-site effects including potential issues associated with migration of contaminants	4	Contaminant sources and contaminants of concern included in section 4. There is no mention of potential off-site effects or migration of contaminants – please include.		There is a low risk of off-site contamination associated with the partially filled gullies, the former mine pit top area, areas where wastes and other fill materials have been buried and dust deposition of fluoride due to the nature of the contamination and the depth to groundwater. Migration of contamination within the farm dams may occur, with the potential to impact the off-site receptor of Wentworth Swamp. Sampling of Wentworth Swamp was completed as part of the investigation.
• Site layout plans showing present and past industrial processes	3, Figure 1 & 2	In Section 3, a mine rail track was mentions, which was stated to be removed in the mid-40s. The former location of this rail line should be presented on a figure, which will be requested in the validation report.		The mine rail track is not actually located on the site. It branches from the main railway line at the south-western corner of the site and extends south into Parcel 3. This former rail spur was sampled and reported and ENVIRON (2015) Phase 2 Environmental Site Assessment, Parcel 3.
• Sewer and service plans	-	-		
• Description of manufacturing processes	3	-		
• Details and locations of current and former underground and aboveground storage tanks	3	Bowser was mentioned relating to the former minetop area. It needs to be clarified if USTs and ASTs are or were located on the site, and their locations (if present).		No evidence was observed of petroleum hydrocarbon storage infrastructure at the former minetop area.
• Product spill and loss history	3 & 9.5	-		
• Discharges to land, water and air	9.5 & 10	-		
• Disposal locations	3 & Figure 4	-		
• Relevant complaint history	-	Please include information in the column to the right if available		None available
• Local site knowledge of residents and staff-both present and former	-	Please include information in the column to the right if available		Local site knowledge was provided by Kerry McNaughton, Environmental Manager from Hydro, who indicated two mine subsidence areas were backfilled with smelter wastes to improve ground stability. Mr McNaughton also indicated domestic wastes had also been illegally dumped in one of the mine subsidence areas.
• Summary of local literature about the site, including newspaper articles	-	Please include information in the column to the right if available		None available.
• Details of building and related permits, licences, approvals and trade waste agreements	9.5	Section 9.5 outlines what might be required but there is no mention of current permits/licences/approvals – please clarify.		The site is part of land that is licensed under Hydro Aluminium Kurri Kurri's Environment Protection Licence.
• Historical use of adjacent land	2.1 & 6.1 Figure 2	Although some mention of historical use of adjacent land can be found in the report, this is not very clear - please clarify. Please indicate on maps where the South Maitland Railway line is located. Please include what the green, purple and beige colours represent on Figure 2.		Adjacent land to the west and south forms part of the larger Wangara farm, used for the agistment of cattle. Adjacent land to the north is currently being developed as a residential subdivision. Adjacent land to the east is mainly vacant farmland with some residential use. South Maitland Railway Line forms the

Section	Ref / Sec in Report	Comments on Specific Information to be Included	Overall Conclusion for this Section	Consultants Reply / Section Amended
				western site boundary. The green, purple and beige colours in Figure 2 represent coal seams that were mined.
• Local usage of ground/surface waters, and locations of bores/pumps	2.2.4 & 2.3 Appendix A	-		
• Integrity assessment (assessment of the accuracy of information)	12	-		
Site Condition and Surrounding Environment ✓ (S)				
• Topography	2.2.1	-		
• Conditions at site boundary such as type and condition of fencing, soil stability and erosion	-	Please include comment in the right hand column		
• Visible signs of contamination such as discolouration or staining of soil, bare soil patches-both on-site, and off-site adjacent to Site boundary	4	Although section 4 provides a good list of areas of concern, there is no actual mention of bare soil, discolouration or staining – please include comment in right hand column.		The site walkover did not identify any areas of bare soil, discolouration or staining that were significant enough to mention in the report.
• List potential contaminants of concern at or near the site	4	-		
• Visible signs of plant stress	-	include comment in the right hand column		No visible signs of plant stress were observed during the field investigations.
• Presence of drums, wastes and fill materials	1.2, 3, 4, 6.1, 6.2, 7.1, 7.2, 8.1, 8.2, 9.3, 10, Figure 4, Appendix C, Appendix D, Appendix G	-	-	
• Odours	-	Some mention of odour for test pit samples. Odours or the lack of odours should be included on logs. Please include a comment in the right hand column.		A lack of odour was included in the log for Trench 10 within the Western Filled Area.
• Condition of buildings and roads	-	-		
• Quality of surface water	7.4 & 8.1	-		
• Flood potential	-	Please provide information in right hand column		There is potential for low lying areas of the site along the railway line (western boundary) and within the mine subsidence areas to flood during heavy rain.
• Details of relevant local sensitive environment-e.g. Rivers, lakes, creeks, wetlands, local habitat areas, endangered flora and fauna.	2.3	Section 2.3 addresses surface water and groundwater. Please include information regarding endangered flora and fauna in the right hand column if available		A biodiversity Study has been completed over the Hydro Smelter Site and Buffer Zone. No endangered flora species have been identified in Residential Parcel 1.
• Identification of sensitive receptors, e.g. kindergarten, parks, etc.	2.3			
Geology and Hydrogeology ✓				
• Soil stratigraphy using recognised classification methods, e.g. Australian Standard 1726, Unified Soil classification Table	Appendix D	-		
• Location and extent of imported and locally derived fill	Figure 3 & 4	-		
• Site borehole logs or test pit logs showing stratigraphy	Appendix D	-		
• Detailed description of the location, design and	2.2.4,	-		

EPA 1997 Reporting Guidelines Compliance Checklist – Stage 2 Investigation

Section	Ref / Sec in Report	Comments on Specific Information to be Included	Overall Conclusion for this Section	Consultants Reply / Section Amended
construction of on-site wells.	Appendix A			
• Description and location of springs and wells in the vicinity	2.2.4	-		
• Depth to groundwater table	2.2.4	-		
• Direction and rate of groundwater flow	2.2.4	Please include info on rate of GW flow in the right hand column if available.		Rate of groundwater flow is not known.
• Direction of surface water run-off	2.2.3	-		
• Background water quality	-	-		
• Preferential water courses	2.2.3	-		
• Summary of local meteorology	-	Include comment in right hand column		A summary of meteorology is included in the updated report ENVIRON (October 2015) Phase 2 Environmental Site Assessment, Smelter Site, Additional Investigations (Section 5.9).
Acid Sulphate Soils ✓(S)				The Acid Sulfate Soils Risk Map for Beresfield (attached) indicates there is no risk of acid sulfate soils at the site. There is potential for acid sulfate soils in Wentworth Swamp, to the west of the site.
• Identification of extent and potential for ASS	-	No mention of possible ASS. Please include comment in right hand column.		
• Assessment of management and remedial strategies to work with ASS	-	As above – please provide response		There is no risk of acid sulfate soils at the site.
Sampling and Analysis Plan and Sampling Methodology ✓				
• Sampling, analysis and data quality objectives (DQOs)	-	For future reporting, the seven step DQO process will be required as per EPA guidelines, noting that some of the points have been addressed throughout this document in various places.		Noted.
• Rationale for the selection of:				
– sampling pattern	6.2 (Soil), 6.3 (Water)	-		
– sampling density including an estimated size of the residual hot spots that may remain undetected	6.2 (Soil), 6.3 (Water)	Noted that targeted sampling was undertaken since the buffer zone is very large and has had limited potentially contaminating history.		
– sampling locations including locations shown on a site map	6.2 (Soil), 6.3 (Water) Figure 3	-		
– sampling depth	6.2 (Soil)	Please define (in right hand column) at what depth the natural sandy clay was found for the test pits mentioned at the start of section 6.2. Please include (in right hand column) at what depth the surface water was collected – assumed to be surface? (Section 6.3).		The natural sandy clay was found at depths ranging between 0.8m and 3.4m in test pits Trench 1 to 10. Test pit Trench 9 did not intersect natural clay, terminating in fill at 4.5m below ground level (limit of the excavator).
– samples for analysis and samples not analysed	-	-		
– sampling of relevant environmental media (soil, air, water)	6.2, 6.3	-		
– analytical methods	Appendix G Table B	-		
– analytes for samples	6.2 (Soil)	Surface water analytes were not presented.		

EPA 1997 Reporting Guidelines Compliance Checklist – Stage 2 Investigation

Section	Ref / Sec in Report	Comments on Specific Information to be Included	Overall Conclusion for this Section	Consultants Reply / Section Amended
• Detailed description of the sampling methods including:	Appendix G Table A			
– sample containers and type of seal used	Appendix G Table A	No mention of seal. Please clarify in right hand column		Laboratory-supplied soil jars had a Teflon-lined lid.
– sampling devices and equipment e.g. auger type	Appendix G Table A	-		
– equipment decontamination procedures	Appendix G Table A	-		
– sample handling and transport procedures	Appendix G Table A	-		
– sample preservation methods and reference to recognised protocols, e.g. APHA or US EPA SW 846	Appendix G Table A	Please clarify the type of preservatives in right hand column.		The sample bottles were provided by the laboratory. No preservatives are required for analysis of cations and anions.
• Detailed description of field screening protocols and validation of field measurements	Appendix G Table A	-		
Field Quality Assurance and Quality Control (QA/QC) ✓	**7.5**			
• Details of sampling team	-	Please include in right hand column		The soil sampling was completed by Fiona Robinson and Kate Woods. Surface water samples were collected by Fiona Robinson.
• Decontamination procedures carried out between sampling events	Appendix G Table A	-		
• Logs for each sample collected—including time, location, initials of sampler, duplicate locations, duplicate type, chemical analyses to be performed, site observations and weather conditions.	Appendix D Appendix F (some info in COCs)	Information regarding site observations and weather conditions on day of sampling is missing – please clarify (include field notes).		
• Chain of custody fully identifying—for each sample—the sampler, nature of the sample, collection date, analyses to be performed, sample preservation method, departure time from the site and dispatch courier(s).	Appendix F, Table A Appendix G	-		
• Sample splitting techniques	-	Please clarify in right hand column.		Duplicate soil samples were split by collection of one soil sample and division into two laboratory-supplied glass jars.
• Statement of duplicate frequency	Appendix G Table B	-		
• Field blank results	-	No mention of field blanks – please include justification and discussion in right hand column.		Field blanks were not collected as part of this investigation.
• Background sample results	-	No mention of background sample results – include comment in right hand column.		Background samples were not collected as part of this investigation as samples were targeted to areas where contamination was evident.
• Rinsate sample results	Appendix G Table B	No rinsate blank samples were collected. Please include justification (eg. Use of dedicated sampling tools?) in right hand column.		No rinsate blanks were required as soil samples were collected from the centre of the backhoe bucket and water samples were collected directly into laboratory-supplied bottles.
• Laboratory-prepared trip spike results for volatile analytes	-	Include comment in right hand column		No trip spikes were collected as the main contaminants of concern were not volatile.
• Trip blank results		No mention of trip blanks – please clarify.		Trip blank samples were not collected as part of this investigation as the main contaminants of concern were not volatile.
• Field instrument calibrations (when used).	AppendixG Table A	-		
• Acceptance limit for each calibration standard	-	-		

EPA 1997 Reporting Guidelines Compliance Checklist – Stage 2 Investigation

Section	Ref / Sec in Report	Comments on Specific Information to be Included	Overall Conclusion for this Section	Consultants Reply / Section Amended
Laboratory QA/QC ✓				
• A copy of signed chain-of-custody forms acknowledging receipt date and time, and identity of samples included in shipments	Appendix F	-		
• Record of holding times and a comparison with method specifications	Appendix G Table B	-		
• Analytical methods used	Appendix F	-		
• Laboratory accreditation for analytical methods used	Appendix G Table B	-		
• Discussion of non-standard methods used	Appendix F	-		
• Laboratory performance in inter-laboratory trials for the analytical methods used, where available	Appendix G Table B	-		
• Description of surrogates and spikes used	Appendix G Table B	-		
• Per cent recoveries of spikes and surrogates	Appendix G Table B	-		
• Instrument detection limits	-	-		
• Method Detection Limits	-	-		
• Matrix or practical quantification limits	Appendix G Table B	-		
• Standard solution results	-	-		
• Reference sample results	-	-		
• Reference check sample results	-	-		
• Daily check sample results	-	-		
• Laboratory duplicate results	-	-		
• Laboratory blank results	Appendix G Table B Appendix G Table B	-		
• Laboratory standard charts.		-		
QA/QC Data Evaluation ✓				
• Evaluation of all QA/QC information listed above against the stated DQOs, including a discussion of:	Table D & E Appendix G	-		
– documentation completeness		-		
– data completeness		-		
– data comparability (see next point)		-		
– data representativeness		-		
– precision and accuracy for both sampling and analysis for each analyte in each environmental matrix informing data users of the reliability, unreliability, or qualitative value of the data		-	Although the data was valuated in Appendix G, it was noted that the SPARCC parameters were not adopted. This is expected in future reporting. It was not noted as part of the QA/QC that Holding times were met. Holding times were breached in ES1220909, ES1223726 and ES1220097	Noted.
• Data comparability checks, which should include e.g. bias assessment – which may arise from various sources, including:		-		
– collection and analysis of samples by different personnel		-		
– use of different methodologies		-		
– collection and analysis by the same personnel using the same methods but at different times		-		
– spatial and temporal changes (because of the environmental dynamics)		-		
• Relative per cent differences for intra-and inter-	Appendix E			

EPA 1997 Reporting Guidelines Compliance Checklist – Stage 2 Investigation

Section	Ref / Sec in Report	Comments on Specific Information to be Included	Overall Conclusion for this Section	Consultants Reply / Section Amended
laboratory duplicates.	Table D & Table E Appendix G Table B			
Basis for Assessment Criteria ✓				
• Table listing all selected assessment criteria and references	5	Values are tabulated for soil but not water. However, water guidelines were included in the result tables in Appendix E. Basis of assessment for asbestos is not provided. Given proposed sensitive landuse, aesthetics should be included in assessment discussions.		
• Rationale for and appropriateness of the selection of criteria	5	-		
• Assumptions and limitations of criteria.	5	-		
• Compliance with Guidelines for Consultants Reporting on Contaminated Sites (1997)	-	-		
Results ✓			On review of the results tables the majority of the data seemed to be entered correctly with the exception of: Table A: • A large amount of the data was entered differently to the COA that was provided to the auditor. Table B: • Metals for Tranche 1 through to T10a were not provided in the analytical results in Appendix F. • PT4 and PT5 both have values for TRH >16-C34 and should be <100 for each. • PT1, PT2 and PT3 have results that do not appear in the COA for PAHs. The Rounding is not correct and needs to be changed. Table C:	
• Summary of previous results, if appropriate	NA	-		
• Summary of all results, in a table that:	7 and Appendix E,	-		This appears to be a rounding error with Excel.
– shows all essential details such as sample numbers and sampling depth	7.2 (soil) and Appendix E,	Copper and zinc max concentrations in Table 8 do not appear to be exceeding the adopted criteria defined.		A revised laboratory report was provided with metals results but this was not included in the report. This laboratory report 96477 R01 is attached.
– shows assessment criteria	7.2 (soil)	-		
– highlights all results exceeding the assessment criteria	7.2 (soil)	-		
• Site plan showing all sample locations, sample identification numbers and sampling depths	Figure 3	-		

Section	Ref / Sec in Report	Comments on Specific Information to be Included	Overall Conclusion for this Section	Consultants Reply / Section Amended
• Site plan showing the extent of soil and groundwater contamination exceeding selected assessment criteria for each sampling depth.	-	-	• WWS (27/8/13) has a value of 537. The auditor is unsure where this value has come from. It was not included in Appendix F. • Fluoride values for FD2 and WWS (27/8/13) need to be swapped. FD2 should be 270 and WWS should be 870. • Water hardness results do not seem to be included in Appendix F. • Cations and Anion values have been reported as not what is on the COA. Table D: • QA2 has a Fluoride value of 0.77 – The COA records a value of 0.6. Table E: • FD2 fluoride results should be 270 according the COA. • FD1 and QAD Boron results should be 56 according to COA's provided. • Many cation and anion results for both primary and duplicate samples are not what is reported in the COA's provided. Result Section: On review of the results section of the report, the consultant has reported the correct data from the tables. The only query is below: 1. The auditor cannot comment on the values given in Table 8 for metals as no COA was provided to ensure the results table A and B were entered correctly. 2. Results for Table 10 are the correct values whereas the results table C have values which have been rounded and not reported what is in the COA. It also has not been stated on the results tables in Appendix F that the values have been rounded up or down. Laboratory Certificates: It is noted by the auditor that not all the laboratory certificates are included in Appendix F.	Laboratory report 96477 R01 is attached. There are rounding errors in Table C and the concentrations should not have been rounded. Laboratory report 96477 R01 is attached.
Site Characterisation and Risk Assessment ✓	**9**		No risk assessment was carried out as part of this ESA. However, it was suggested as an option in section 9 on remediation options.	
• Assessment of type of all environmental contamination, particularly soil and groundwater	7	-		
• Assessment of extent of soil and groundwater contamination, including off-site effects	8.1	-		
• Assessment of the chemical degradation products	-	-		
• Assessment of possible exposure routes and exposed populations (human, ecological).	8.1	-		
• Assessment of type of risks particularly to human health and the environment	NA	NA		
• Assessment of mathematical modelling or other method to justify conclusions of risk assessment	NA	NA		
• Detection limits for each chemical appropriate for risk assessment process	NA	NA		
• Appropriateness of site specific risk assessment	NA	NA		
• Compliance with requirements in Human Health Risk Assessment checklist	NA	NA		
Conclusions and Recommendations ✓			Despite being titled an "investigation" report, the document includes a preliminary assessment of remedial options. As the final determination of remedial response for this Site was developed and reported in the RAWP, the remedial options development has not been	
• Brief summary of all findings	10	-		
• Assumptions used in reaching the conclusions	10	-		
• Extent of uncertainties in the results	-	include comment in right hand column		

EPA 1997 Reporting Guidelines Compliance Checklist – Stage 2 Investigation

Section	Ref / Sec in Report	Comments on Specific Information to be Included	Overall Conclusion for this Section	Consultants Reply / Section Amended
• Where remedial action has been taken, a list summarising the activities and physical changes to the site	NA	NA	included in this auditor review for the DSI.	
• A clear statement that the consultant considers the subject site to be suitable for the proposed use (where applicable)	-	-		
• A statement detailing all limitations and constraints on the use of the site (where applicable)	-	-		
• Recommendations for further work, if appropriate.	10	-		

DEPARTMENT OF LAND AND WATER CONSERVATION

BERESFIELD

ACID SULFATE SOIL RISK MAP — EDITION TWO

151°30'00" 32°45'00" — 151°45'00" 32°45'00"

EAST MAITLAND · GILLIESTON HEIGHTS · METFORD · THORNTON · BERESFIELD · MILLERS FOREST · RAYMOND TERRACE · MOTTO FARM · HEDDON GRETA · HEXHAM · TOMAGO · KOORAGANG ISLAND · STOCKRINGTON · SHORTLAND

Wallis Creek · Hunter River · Pacific Highway · New England Highway · Cessnock Road · Mount Vincent Road · Raymond Terrace Road

63 62000 m N — 361000m E — 32°52'30" 151°30'00" — 32°52'30" 151°45'00"

KEY

Map Class Description	Depth to Acid Sulfate Soil Materials		Environmental Risk	Typical Landform Types
HIGH PROBABILITY High probability of occurrence of acid sulfate soil materials within the soil profile. The environment of deposition has been suitable for the formation of acid sulfate soil materials. Acid sulfate soil materials are widespread or sporadic and may be buried by alluvium or windblown sediments.	Below water level	Bottom sediments.	Severe environmental risk if bottom sediments are disturbed by activities such as dredging.	Bottom sediments of lakes, lagoons, tidal creeks, rivers and estuaries.
		At or near the ground surface.	Severe environmental risk if acid sulfate soil materials are disturbed by activities such as shallow drainage, excavation or clearing.	Estuarine swamps, intertidal flats and supratidal flats.
		Within 1 metre of the ground surface.	Severe environmental risk if acid sulfate soil materials are disturbed by activities such as shallow drainage, excavation or clearing.	Low alluvial plains, estuarine sandplains, estuarine swamps, backswamps and supratidal flats.
		Between 1 and 3 metres below the ground surface.	Environmental risk if acid sulfate soil materials are disturbed by activities such as deep excavation for pipelines, dams or deep drains.	Alluvial plains, alluvial swamps, alluvial levees and sandplains.
		Greater than 3 metres below the ground surface.*	Environmental risk if acid sulfate soil materials are disturbed by activities such as deep excavations, –e.g., large structure foundations or deep dams.	Elevated levees and sandplains, alluvial plains and alluvial swamps in estuarine reaches of catchments.
LOW PROBABILITY Low probability of occurrence of acid sulfate soil materials within the soil profile. The environment of deposition has generally not been suitable for the formation of acid sulfate soil materials. Soil materials are often Pleistocene in age. Acid sulfate soil materials, if present, are sporadic and may be buried by alluvium or windblown sediments.	Below water level	Bottom sediments.	The majority of these landforms are not expected to contain acid sulfate soil materials. Therefore, land management is generally not affected by acid sulfate soils. However, highly localised occurrences may be found, especially near boundaries with environments with a high probability of occurrence. Disturbance of these soil materials will result in an environmental risk that will vary with elevation and depth of disturbance.	Elevated alluvial plains and levees dominated by fluvial sediments. Plains and dunes dominated by aeolian soils. Pleistocene plains. Lacustrine and alluvial bottom sediments.
		At or near the ground surface.		
		Within 1 metre of the ground surface.		
		Between 1 and 3 metres below the ground surface.		
		Greater than 3 metres below the ground surface.*		
NO KNOWN OCCURRENCE Acid sulfate soils are not known or expected to occur in these environments.		No known occurrences of acid sulfate soil materials.	Land management activities not likely to be effected by acid sulfate soil materials.	Bedrock slopes, elevated Pleistocene and Holocene dunes, and elevated alluvial plains.
DISTURBED TERRAIN		Disturbed terrain may include filled areas, which often occur during reclamation of low lying swamps for urban development. Other disturbed terrain includes areas which have been mined or dredged, or have undergone heavy ground disturbance through general urban development or construction of dams or levees. Soil investigations re required to assess these areas for acid sulfate potential.		

*Deep occurrences of acid sulfate soil materials not able to be confirmed by field inspection and sampling.

SCALE 1:25000

metres 500 0 1 2 kilometres

G N

TRANSVERSE MERCATOR PROJECTION
Numbered grid lines are 1000 metre intervals of the Australian Map Grid, Zone 56. Grid values are shown in full only at the south-west corner of the map.

Cadastral information based on the Digital Cadastral Data Base courtesy of the Surveyor Generals Department of N.S.W. Waterbody boundaries are dynamic and show slight differences between cadastral and topographic information.

THIS MAP IS TO BE USED AS A GENERAL GUIDE FOR REGIONAL AND LOCAL SCALE LAND USE PLANNING AND LAND MANAGEMENT ONLY AND NOT FOR THE ASSESSMENT OF SPECIFIC SITES WHICH CAN ONLY BE ASSESSED BY A SITE SPECIFIC SOIL INVESTIGATION. THIS MAP HAS BEEN PREPARED ON THE BASIS OF CURRENT INDICATORS WHICH MAY VARY AS THE PROCESS OF DETECTING THE OCCURRENCE OF ACID SULFATE SOILS IS FURTHER DEVELOPED. ACID SULFATE SOILS MAY OCCUR IN AREAS SPECIFICALLY IDENTIFIED ON THE MAP AS NO KNOWN OCCURRENCE.

THE STATE OF NEW SOUTH WALES, THE DEPT. OF LAND AND WATER CONSERVATION, ITS EMPLOYEES, OFFICERS, AGENTS, OR SERVANTS ARE NOT RESPONSIBLE FOR THE RESULT OF ANY ACTIONS TAKEN ON THE BASIS OF THE INFORMATION CONTAINED ON THIS MAP OR FOR ANY ERRORS, OMISSIONS OR INACCURACIES CONTAINED ON THIS MAP. THE STATE OF NEW SOUTH WALES AND ITS EMPLOYEES, OFFICERS, AGENTS OR SERVANTS EXPRESSLY DISCLAIM ALL AND ANY LIABILITY AND RESPONSIBILITY TO ANY PERSON IN RESPECT OF ANYTHING AND OF THE CONSEQUENCES, OF ANYTHING DONE OR OMITTED TO BE DONE BY ANY SUCH PERSON IN RELIANCE, WHETHER WHOLLY OR PARTIALLY UPON THE INFORMATION CONTAINED ON THE MAP.

THIS MAP IS ONLY RELIABLE AT THE PUBLISHED SCALE OF 1:25000

LANDFORM CODES

Landform Process Class	Landform Element				Elevation#
W.....Aeolian	b.....Backplain		t.....Levee Toe		0.....0–1 m
A.....Alluvial	k.....Backswamp		o.....Ox–bow		1.....1–2 m
B.....Beach	m.....Bottom Sediments		p.....Plain		2.....2–4 m
E.....Estuarine	n.....Channel		a.....Sandplain		4.....>4 m
L.....Lacustrine	d.....Dune		s.....Swamp		
S.....Swamp	r.....Interbarrier Swamp		y.....Spivy		Additiond Descriptive Codes
	i.....Intertidal Flat		u.....Supratidal Flat		(p).....Pleistocene
X.....Disturbed Terrain*	g.....Lagoon		w.....Swale		(s).....Acidic Scald
	l.....Levee		c.....Tidal Creek		

*Elevation levels given on the map refer to the elevation of the ground surface at the time of mapping. Depending on the nature of the disturbance, these elevation levels may or may not represent the original ground surface elevation.

#Approximate AHD

EDITION TWO

MAP PREPARED BY CLMURPHY REVIEWED BY CLMURPHY

MAP COMPILED BY GIS OPERATIONS FROM DIGITISED FIELD INFORMATION AND DATA HELD IN THE DEPARTMENT OF LAND AND WATER CONSERVATIONS GEOGRAPHIC INFORMATION SYSTEM.

THIS MAP SHOULD BE USED IN CONJUNCTION WITH THE *GUIDELINES FOR THE USE OF ACID SULFATE RISK MAPS* SSNAYLOR et.al. (1995). DEPARTMENT OF LAND AND WATER CONSERVATION

THIS MAP IS PART OF A SERIES OF ACID SULFATE SOIL RISK MAPS ALONG THE ENTIRE NEW SOUTH WALES COAST. THE MAPPING HAS BEEN UNDERTAKEN BY A TEAM OF EXPERIENCED AND QUALIFIED SOIL SURVEYORS. THE MAPPING IS BASED ON THE ASSESSMENT OF GEOMORPHIC PROCESSES AND ENVIRONMENTS. ASSESSMENT METHODS INCLUDE, INTERPRETATION OF AERIAL PHOTOGRAPHY AND SATELLITE IMAGERY, EXTENSIVE FIELD WORK AND LABORATORY SOIL TESTING.

LEGEND

LANDFORM BOUNDARY.....
APPROXIMATE LANDFORM BOUNDARY.....
SOIL PROFILE DESCRIPTION SITE.....#7
RIVER or CREEK.....
CADASTRE.....

KEY TO ADJOINING MAPS IN THIS SERIES

GRETA 9132SI	MAITLAND 9232SW	KARUAH 9232SX
CESSNOCK 9132NE	BERESFIELD 9232NO	WILLIAMTOWN 9232NP
	WALLSEND 9232SO	NEWCASTLE 9232SP

Envirolab ref 96477 REV COC

CHAIN OF CUSTODY - Client

ENVIROLAB GROUP - National phone number 1300 42 43 44

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adelaide@envirolab.com.au

Client: ENVIRON - Hunter office
Contact Person: Kate Woods
Project Manager: Fiona Robinson
Sampler: KW / FR
Address: Lvl 2, Suite 19B, 50 Glebe Rd. The Junction, NSW 2291
Phone: 0249625444 **Mobile:** 0431459722
Email: kwoods@environcorp.com

Client Project Name / Number / Site *(ie report title)*: AS 130339
PO No.:
Envirolab Quote No.: 96477
Date results required: ___/___/___
Or choose: (standard) / same day / 1 day / 2 day / 3 day
Note: Inform lab in advance if urgent turnaround is required - surcharges apply
Report format: esdat / equis /
Lab Comments:

Envirolab Sample ID	Client Sample ID or information	Depth	Date Sampled	Type of Sample	Combo 3 (TRH/BTEX/PAH/8 metals)	Free Cn	Soluble F	Asbestos	Asbestos	Comments
1	Tranche - 1		27/8/13	S	X		X			Provide as much information about the sample as you can
2	Tranche - 2			S	X		X			
3	Tranche - 1 Fibre			fibrous					X	
4	Tranche - 3			S	X		X			
5	Tranche - 4			S	X		X			
6	Tranche - 7			S	X		X			
	QA			S	~~X~~		~~X~~			→ Please send to ALS for Analysis of TRH/BTEX/PAH, 8 metals and soluble F
7	T9		28/8/13	S	X	X	X			
8	T9a			S	X	X	X			
9	T10			S	X	X	X			
10	T10a			S	X		X			
11	Infill Area 5 - Fibrous			fibrous					X	

Relinquished by *(Company)*: Kate Woods ENVIRON
Print Name: Kate Woods
Date & Time: 28/8/13 3:00pm
Signature: KWoods

Received by *(Company)*: ELS.
Print Name: Thvst.
Date & Time: 30/8
Signature:

Lab use only:
Samples Received: Cool / Ambient *(circle one)*
Temperature Received at: _____ *(if applicable)*
Transported by: Hand delivered / courier *(circle one)*

WHITE - LAB COPY / BLUE - CLIENT COPY / PINK - RETAIN IN BOOK

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS 96477

Client:
Environ (Newcastle)
Suite 19B, Level 2
50 Glebe Rd
The Junction
NSW 2291

Attention: Fiona Robinson

Sample log in details:

Your Reference:	**AS130339**		
No. of samples:	2 materials, 9 soils		
Date samples received / completed instructions received	29/08/13	/	30/08/2013

This report replaces the R00 due to metal results added to the report.

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	6/09/13	/	6/09/13
Date of Preliminary Report:	Not issued		

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Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:

Jacinta Hurst
Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	96477-1	96477-2	96477-4	96477-5	96477-6
Your Reference	----------	Tranche-1	Tranche-2	Tranche-3	Tranche-4	Tranche-7
Date Sampled	----------	27/08/2013	27/08/2013	27/08/2013	27/08/2013	27/08/2013
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	02/09/2013	02/09/2013	02/09/2013	02/09/2013	02/09/2013
Date analysed	-	03/09/2013	03/09/2013	03/09/2013	03/09/2013	03/09/2013
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	101	100	101	98	99

vTRH(C6-C10)/BTEXN in Soil					
Our Reference:	UNITS	96477-7	96477-8	96477-9	96477-10
Your Reference	----------	T9	T9a	T10	T10a
Date Sampled	----------	28/08/2013	28/08/2013	28/08/2013	28/08/2013
Type of sample		soil	soil	soil	soil
Date extracted	-	02/09/2013	02/09/2013	02/09/2013	02/09/2013
Date analysed	-	03/09/2013	03/09/2013	03/09/2013	03/09/2013
TRHC$_6$ - C$_9$	mg/kg	<25	<25	<25	<25
TRHC$_6$ - C$_{10}$	mg/kg	<25	<25	<25	<25
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	93	97	100	96

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	96477-1	96477-2	96477-4	96477-5	96477-6
Your Reference	----------	Tranche-1	Tranche-2	Tranche-3	Tranche-4	Tranche-7
Date Sampled	----------	27/08/2013	27/08/2013	27/08/2013	27/08/2013	27/08/2013
Type of sample		soil	soil	soil	soil	soil
Date extracted	-	02/09/2013	02/09/2013	02/09/2013	02/09/2013	02/09/2013
Date analysed	-	03/09/2013	03/09/2013	03/09/2013	03/09/2013	03/09/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	150	120
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	240	180
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	130	140	<100	340	260
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	101	92	90	95	91

svTRH (C10-C40) in Soil					
Our Reference:	UNITS	96477-7	96477-8	96477-9	96477-10
Your Reference	----------	T9	T9a	T10	T10a
Date Sampled	----------	28/08/2013	28/08/2013	28/08/2013	28/08/2013
Type of sample		soil	soil	soil	soil
Date extracted	-	02/09/2013	02/09/2013	02/09/2013	02/09/2013
Date analysed	-	03/09/2013	03/09/2013	03/09/2013	03/09/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	160	160	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	190	210	110	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100
Surrogate o-Terphenyl	%	90	88	87	89

PAHs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	96477-1 Tranche-1 27/08/2013 soil	96477-2 Tranche-2 27/08/2013 soil	96477-4 Tranche-3 27/08/2013 soil	96477-5 Tranche-4 27/08/2013 soil	96477-6 Tranche-7 27/08/2013 soil
Date extracted	-	02/09/2013	02/09/2013	02/09/2013	02/09/2013	02/09/2013
Date analysed	-	03/09/2013	03/09/2013	03/09/2013	03/09/2013	03/09/2013
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.2	<0.1	<0.1	0.2	0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
Phenanthrene	mg/kg	0.6	0.5	0.2	2.1	1.1
Anthracene	mg/kg	0.1	0.1	<0.1	0.5	0.2
Fluoranthene	mg/kg	1.9	2.0	0.9	8.2	4.9
Pyrene	mg/kg	1.8	2.0	0.9	7.9	4.7
Benzo(a)anthracene	mg/kg	1.6	2.7	0.6	7.2	4.8
Chrysene	mg/kg	1.6	3.4	0.6	6.7	4.5
Benzo(b+k)fluoranthene	mg/kg	4.2	8.3	1.7	17	12
Benzo(a)pyrene	mg/kg	2.1	3.2	0.93	9.2	6.2
Indeno(1,2,3-c,d)pyrene	mg/kg	1.7	2.1	0.7	7.2	4.7
Dibenzo(a,h)anthracene	mg/kg	0.3	0.5	0.1	1.4	0.9
Benzo(g,h,i)perylene	mg/kg	1.7	2.1	0.7	6.8	4.4
Benzo(a)pyrene TEQ NEPM B1	mg/kg	3.0	5.0	1	14	9.0
Total +ve PAH's	mg/kg	18	27	7.3	75	48
Surrogate p-Terphenyl-d14	%	97	101	101	102	103

PAHs in Soil Our Reference: Your Reference Date Sampled Type of sample	UNITS ---------- ----------	96477-7 T9 28/08/2013 soil	96477-8 T9a 28/08/2013 soil	96477-9 T10 28/08/2013 soil	96477-10 T10a 28/08/2013 soil
Date extracted	-	02/09/2013	02/09/2013	02/09/2013	02/09/2013
Date analysed	-	03/09/2013	03/09/2013	03/09/2013	03/09/2013
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	0.2	<0.1
Fluorene	mg/kg	<0.1	<0.1	0.2	<0.1
Phenanthrene	mg/kg	<0.1	0.3	0.7	<0.1
Anthracene	mg/kg	<0.1	<0.1	0.1	<0.1
Fluoranthene	mg/kg	0.2	0.9	1.5	<0.1
Pyrene	mg/kg	0.2	0.8	1.3	<0.1
Benzo(a)anthracene	mg/kg	0.1	0.7	1.0	<0.1
Chrysene	mg/kg	0.1	0.8	1.0	<0.1
Benzo(b+k)fluoranthene	mg/kg	0.3	1.9	2.5	<0.2
Benzo(a)pyrene	mg/kg	0.14	0.95	1.3	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	0.7	1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	0.1	0.2	<0.1
Benzo(g,h,i)perylene	mg/kg	0.1	0.7	0.9	<0.1
Benzo(a)pyrene TEQ NEPM B1	mg/kg	<0.5	1	2	<0.5
Total +ve PAH's	mg/kg	1.2	8.0	12	NIL (+)VE
Surrogate p-Terphenyl-d14	%	99	99	98	99

Acid Extractable metals in soil						
Our Reference:	UNITS	96477-1	96477-2	96477-4	96477-5	96477-6
Your Reference	----------	Tranche-1	Tranche-2	Tranche-3	Tranche-4	Tranche-7
Date Sampled	----------	27/08/2013	27/08/2013	27/08/2013	27/08/2013	27/08/2013
Type of sample		soil	soil	soil	soil	soil
Date digested	-	06/09/2013	06/09/2013	06/09/2013	06/09/2013	06/09/2013
Date analysed	-	06/09/2013	06/09/2013	06/09/2013	06/09/2013	06/09/2013
Arsenic	mg/kg	5	8	<4	5	13
Cadmium	mg/kg	<0.4	<0.4	<0.4	0.4	0.7
Chromium	mg/kg	35	29	12	22	24
Copper	mg/kg	25	52	12	24	33
Lead	mg/kg	15	11	7	33	29
Mercury	mg/kg	0.2	<0.1	<0.1	0.2	0.1
Nickel	mg/kg	17	19	16	21	16
Zinc	mg/kg	140	61	68	230	560

Acid Extractable metals in soil						
Our Reference:	UNITS	96477-7	96477-8	96477-9	96477-10	96477-12
Your Reference	----------	T9	T9a	T10	T10a	Tranche-1 - TRIPLICATE
Date Sampled	----------	28/08/2013	28/08/2013	28/08/2013	28/08/2013	27/08/2013
Type of sample		soil	soil	soil	soil	soil
Date digested	-	06/09/2013	06/09/2013	06/09/2013	06/09/2013	06/09/2013
Date analysed	-	06/09/2013	06/09/2013	06/09/2013	06/09/2013	06/09/2013
Arsenic	mg/kg	6	<4	7	<4	6
Cadmium	mg/kg	<0.4	<0.4	0.4	<0.4	<0.4
Chromium	mg/kg	17	20	27	50	17
Copper	mg/kg	12	28	71	17	24
Lead	mg/kg	17	12	48	7	14
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Nickel	mg/kg	12	18	38	8	15
Zinc	mg/kg	92	130	340	5	130

Moisture						
Our Reference:	UNITS	96477-1	96477-2	96477-4	96477-5	96477-6
Your Reference	----------	Tranche-1	Tranche-2	Tranche-3	Tranche-4	Tranche-7
Date Sampled	----------	27/08/2013	27/08/2013	27/08/2013	27/08/2013	27/08/2013
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	02/09/13	02/09/13	02/09/13	02/09/13	02/09/13
Date analysed	-	03/09/13	03/09/13	03/09/13	03/09/13	03/09/13
Moisture	%	6.7	6.9	3.8	8.2	11

Moisture					
Our Reference:	UNITS	96477-7	96477-8	96477-9	96477-10
Your Reference	----------	T9	T9a	T10	T10a
Date Sampled	----------	28/08/2013	28/08/2013	28/08/2013	28/08/2013
Type of sample		soil	soil	soil	soil
Date prepared	-	02/09/13	02/09/13	02/09/13	02/09/13
Date analysed	-	03/09/13	03/09/13	03/09/13	03/09/13
Moisture	%	20	9.5	11	18

Miscellaneous Inorg - soil						
Our Reference:	UNITS	96477-1	96477-2	96477-4	96477-5	96477-6
Your Reference	----------	Tranche-1	Tranche-2	Tranche-3	Tranche-4	Tranche-7
Date Sampled	----------	27/08/2013	27/08/2013	27/08/2013	27/08/2013	27/08/2013
Type of sample		soil	soil	soil	soil	soil
Date prepared	-	31/08/2013	31/08/2013	31/08/2013	31/08/2013	31/08/2013
Date analysed	-	31/08/2013	31/08/2013	31/08/2013	31/08/2013	31/08/2013
Fluoride (1:5 soil:water)	mg/kg	110	110	75	54	90

Miscellaneous Inorg - soil					
Our Reference:	UNITS	96477-7	96477-8	96477-9	96477-10
Your Reference	----------	T9	T9a	T10	T10a
Date Sampled	----------	28/08/2013	28/08/2013	28/08/2013	28/08/2013
Type of sample		soil	soil	soil	soil
Date prepared	-	31/08/2013	31/08/2013	31/08/2013	31/08/2013
Date analysed	-	31/08/2013	31/08/2013	31/08/2013	31/08/2013
Fluoride (1:5 soil:water)	mg/kg	290	77	130	52
Total Cyanide	mg/kg	<0.5	<0.5	<0.5	[NA]

Asbestos ID - materials			
Our Reference:	UNITS	96477-3	96477-11
Your Reference	----------	Tranche-1/ Fibre	Infill Area 5
Date Sampled	----------	27/08/2013	28/08/2013
Type of sample		material	material
Date analysed	-	5/09/2013	5/09/2013
Mass / Dimension of Sample	-	64x60x55mm	127x60x5mm
Sample Description	-	White fibrous matted material	Grey compressed fibre cement material
Asbestos ID in materials	-	No asbestos detected	Chrysotile asbestos detected Amosite asbestos detected

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-012 subset	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Inorg-008	Moisture content determined by heating at 105+/-5 deg C for a minimum of 12 hours.
Inorg-026	Fluoride determined by ion selective electrode (ISE) in accordance with APHA 22nd ED, 4500-F-C.
Inorg-013	Cyanide - total determined colourimetrically after distillation, based on APHA 22nd ED, 4500-CN_C,E. Free cyanide determined colourimetrically after filtration and confirmed by diffusion.
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			02/09/2013	96477-2	02/09/2013 || 02/09/2013	LCS-3	02/09/2013
Date analysed	-			03/09/2013	96477-2	03/09/2013 || 03/09/2013	LCS-3	03/09/2013
TRHC$_6$ - C$_9$	mg/kg	25	Org-016	<25	96477-2	<25 || <25	LCS-3	110%
TRHC$_6$ - C$_{10}$	mg/kg	25	Org-016	<25	96477-2	<25 || <25	LCS-3	110%
Benzene	mg/kg	0.2	Org-016	<0.2	96477-2	<0.2 || <0.2	LCS-3	101%
Toluene	mg/kg	0.5	Org-016	<0.5	96477-2	<0.5 || <0.5	LCS-3	110%
Ethylbenzene	mg/kg	1	Org-016	<1	96477-2	<1 || <1	LCS-3	113%
m+p-xylene	mg/kg	2	Org-016	<2	96477-2	<2 || <2	LCS-3	112%
o-Xylene	mg/kg	1	Org-016	<1	96477-2	<1 || <1	LCS-3	108%
naphthalene	mg/kg	1	Org-014	<1	96477-2	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	103	96477-2	100 || 101 || RPD: 1	LCS-3	103%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			02/09/2013	96477-2	02/09/2013 || 02/09/2013	LCS-3	02/09/2013
Date analysed	-			03/09/2013	96477-2	03/09/2013 || 03/09/2013	LCS-3	03/09/2013
TRHC$_{10}$ - C$_{14}$	mg/kg	50	Org-003	<50	96477-2	<50 || <50	LCS-3	96%
TRHC$_{15}$ - C$_{28}$	mg/kg	100	Org-003	<100	96477-2	<100 || <100	LCS-3	111%
TRHC$_{29}$ - C$_{36}$	mg/kg	100	Org-003	<100	96477-2	<100 || <100	LCS-3	85%
TRH>C$_{10}$-C$_{16}$	mg/kg	50	Org-003	<50	96477-2	<50 || <50	LCS-3	96%
TRH>C$_{16}$-C$_{34}$	mg/kg	100	Org-003	<100	96477-2	140 || 110 || RPD: 24	LCS-3	111%
TRH>C$_{34}$-C$_{40}$	mg/kg	100	Org-003	<100	96477-2	<100 || <100	LCS-3	85%
Surrogate o-Terphenyl	%		Org-003	88	96477-2	92 || 92 || RPD: 0	LCS-3	113%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			02/09/2013	96477-2	02/09/2013 || 02/09/2013	LCS-3	02/09/2013
Date analysed	-			03/09/2013	96477-2	03/09/2013 || 03/09/2013	LCS-3	03/09/2013
Naphthalene	mg/kg	0.1	Org-012 subset	<0.1	96477-2	<0.1 || <0.1	LCS-3	110%
Acenaphthylene	mg/kg	0.1	Org-012 subset	<0.1	96477-2	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012 subset	<0.1	96477-2	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012 subset	<0.1	96477-2	<0.1 || <0.1	LCS-3	109%
Phenanthrene	mg/kg	0.1	Org-012 subset	<0.1	96477-2	0.5 || 0.3 || RPD: 50	LCS-3	108%
Anthracene	mg/kg	0.1	Org-012 subset	<0.1	96477-2	0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012 subset	<0.1	96477-2	2.0 || 1.1 || RPD: 58	LCS-3	110%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Pyrene	mg/kg	0.1	Org-012 subset	<0.1	96477-2	2.0 || 1.0 || RPD: 67	LCS-3	113%
Benzo(a)anthracene	mg/kg	0.1	Org-012 subset	<0.1	96477-2	2.7 || 1 || RPD: 92	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012 subset	<0.1	96477-2	3.4 || 1.1 || RPD: 102	LCS-3	106%
Benzo(b+k)fluoranthene	mg/kg	0.2	Org-012 subset	<0.2	96477-2	8.3 || 2.6 || RPD: 105	[NR]	[NR]
Benzo(a)pyrene	mg/kg	0.05	Org-012 subset	<0.05	96477-2	3.2 || 1.2 || RPD: 91	LCS-3	125%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012 subset	<0.1	96477-2	2.1 || 0.9 || RPD: 80	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012 subset	<0.1	96477-2	0.5 || 0.2 || RPD: 86	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012 subset	<0.1	96477-2	2.1 || 0.9 || RPD: 80	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012 subset	105	96477-2	101 || 100 || RPD: 1	LCS-3	96%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date digested	-			06/09/2013	96477-1	06/09/2013 || 06/09/2013	LCS-1	06/09/2013
Date analysed	-			06/09/2013	96477-1	06/09/2013 || 06/09/2013	LCS-1	06/09/2013
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	96477-1	5 || 5 || RPD: 0	LCS-1	82%
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	96477-1	<0.4 || <0.4	LCS-1	95%
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	96477-1	35 || 18 || RPD: 64	LCS-1	85%
Copper	mg/kg	1	Metals-020 ICP-AES	<1	96477-1	25 || 48 || RPD: 63	LCS-1	83%
Lead	mg/kg	1	Metals-020 ICP-AES	<1	96477-1	15 || 15 || RPD: 0	LCS-1	85%
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	96477-1	0.2 || 0.1 || RPD: 67	LCS-1	94%
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	96477-1	17 || 17 || RPD: 0	LCS-1	87%
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	96477-1	140 || 140 || RPD: 0	LCS-1	85%

QUALITY CONTROL Moisture	UNITS	PQL	METHOD	Blank
Date prepared	-			[NT]
Date analysed	-			[NT]
Moisture	%	0.1	Inorg-008	[NT]

QUALITY CONTROL Miscellaneous Inorg - soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			31/08/2013	96477-1	31/08/2013 || 31/08/2013	LCS-1	31/08/2013
Date analysed	-			31/08/2013	96477-1	31/08/2013 || 31/08/2013	LCS-1	31/08/2013
Fluoride (1:5 soil:water)	mg/kg	0.5	Inorg-026	<0.5	96477-1	110 || 120 || RPD: 9	LCS-1	98%
Total Cyanide	mg/kg	0.5	Inorg-013	<0.5	[NT]	[NT]	LCS-1	98%

QUALITY CONTROL Asbestos ID - materials	UNITS	PQL	METHOD	Blank
Date analysed	-			[NT]

QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date digested	-	[NT]	[NT]	96477-2	06/09/2013
Date analysed	-	[NT]	[NT]	96477-2	06/09/2013
Arsenic	mg/kg	[NT]	[NT]	96477-2	80%
Cadmium	mg/kg	[NT]	[NT]	96477-2	87%
Chromium	mg/kg	[NT]	[NT]	96477-2	77%
Copper	mg/kg	[NT]	[NT]	96477-2	88%
Lead	mg/kg	[NT]	[NT]	96477-2	83%
Mercury	mg/kg	[NT]	[NT]	96477-2	99%
Nickel	mg/kg	[NT]	[NT]	96477-2	81%
Zinc	mg/kg	[NT]	[NT]	96477-2	126%

QUALITY CONTROL Miscellaneous Inorg - soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	[NT]	[NT]	96477-2	02/09/2013
Date analysed	-	[NT]	[NT]	96477-2	02/09/2013
Fluoride (1:5 soil:water)	mg/kg	[NT]	[NT]	96477-2	92%
Total Cyanide	mg/kg	[NT]	[NT]	[NR]	[NR]

Report Comments:

PAHs in Soil:
The RPD for duplicate results is accepted due to the non homogenous nature of the sample/s.

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteriae has been exceeded for 96477-1 for Cu, Cr. Therefore a triplicate result has been issued as laboratory sample number 96477-12.

Asbestos ID was analysed by Approved Identifier:	Alex Tam
Asbestos ID was authorised by Approved Signatory:	Matt Mansfield

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NA: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and speciated phenols is acceptable.

RAMBOLL ENVIRON

AECOM
17 Warabrook Boulevard
Warabrook
NSW 2310

RESPONSE TO AUDITOR COMMENTS, RESIDENTIAL PARCEL 1

Date 27/06/2016

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Ref AS130328

Dear Ross

Ramboll Environ, as the environmental consultant for Hydro Aluminium Kurri Kurri, provided two environmental reports for your review as part of your audit of Residential Parcel 1 including a Phase 2 ESA report prepared by Ramboll Environ and a Remediation and Validation Report prepared by DLA. In return, you have provided comments via letters, as follows:

- 'Residential Parcel 1_reporting_guidelines_Validation 5May2016' dated 25 May 2016.
- 'Residential Parcel 1 Audit_reporting_guidelines DSI 19May2016' dated 19 May 2016.

Ramboll Environ has addressed the comments in the column *Consultants Reply/ Section Amended*. Where comments require additional supporting information or figures further discussion is included below.

Auditor's Review of the Residential Parcel 1 Phase 2 Environmental Site Assessment

Auditor comments have been addressed in the attached letter 'Residential Parcel 1_reporting_guidelines DSI 19May2016_RE responses'.

Auditor's Review of the Remediation and Validation Report

Auditor Comment: It is unclear if there are to be restrictions on parts of the parcel (e.g. mine subsidence areas, former railway, buffer to current railway etc) where residential development will not be allowed. Such details need to be included and clarified for the purpose of the SAR/SAS.

Ramboll Environ Australia Pty Ltd
ACN 095 437 442
ABN 49 095 437 442

Ramboll Environ Response: There are to be restrictions on residential development on the following areas of the site and these areas are to be zoned as follows:

- Active railway line: SP2 Special Purposes Infrastructure.
- Buffer around active railway line: RE1 Public Recreation.
- Mine subsidence areas: RU2 Rural Landscape and E2 Environmental Conservation.

A plan showing the location of these areas and proposed zonings is provided in **Figure 1**.

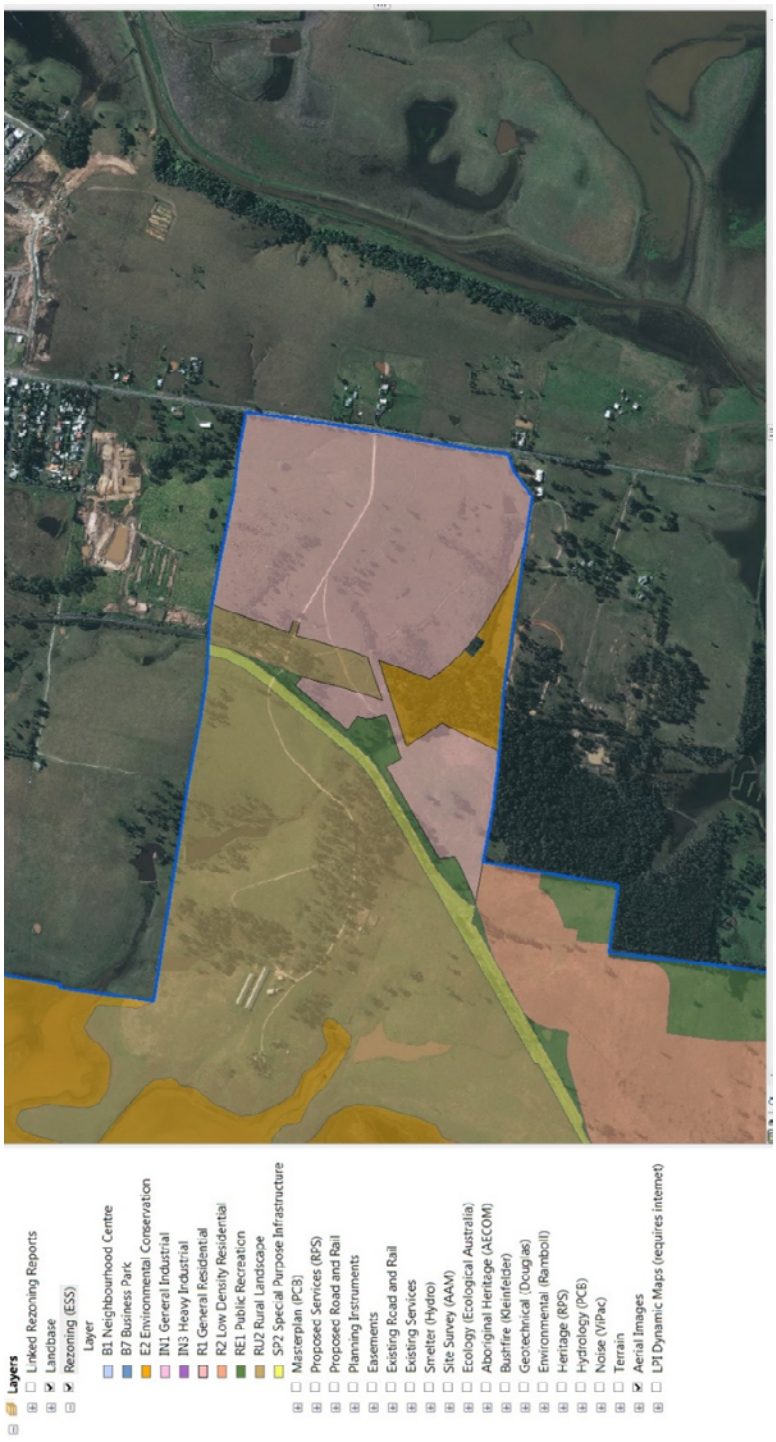

Figure 1: Zoning Plan for Residential Parcel 1.

Auditor Comment: In Section 3.1, the Consultant stated that no remediation of groundwater and surface water was considered needed. This needs to be justified further.
Ramboll Environ Response: Surface water sampling was completed as part of the Phase 2 ESA and included collection of surface water samples representative of dry and wet conditions from within the mine void water storage dam, two downstream farm dams and Wentworth Swamp to assess the quality of water discharging from the mine workings and any down gradient impacts. Water at the upstream dam formed within the mine void is known to contain water of a low pH (acidic). Surface water was assessed against the criteria for protection of aquatic ecosystems, irrigation, stock watering and recreational use. Field parameters identified surface water in dams onsite, immediately down gradient and the nearly swamp can be described as fresh to slightly brackish with an acidic to neutral pH and a high amount of dissolved oxygen. Surface water sampling on Residential Parcel 1 found concentrations for all analytes to be below the relevant guidelines for stock watering. Concentrations of TRH, BTEX and PAHs were all below the trigger levels for ecological protection. Concentrations of metals cobalt, chromium (total) and manganese were identified above ecological protection criteria in the dry monitoring period but not the wet monitoring event. Due to an absence of on-site sources of these compounds as demonstrated during soil sampling, the observed concentrations are likely to be related to background concentrations, rather than attributable to activities at Residential Parcel 1. The results of surface water monitoring demonstrate that the conditions at Residential Parcel 1 were not significantly impacting on the surface water receptors and do not represent an unacceptable human or ecological health risk.
Groundwater from within the former mine void was suspected to discharge to the surface water bodies and thus, assessment of surface water quality was sufficient for the Phase 2 ESA. As no unacceptable human or ecological health risks were identified, remediation of surface water or groundwater was not required.

Auditor Comment: A discussion needs to be included relating to on-going monitoring and/or a plan to deal with potential contamination during development.
Ramboll Environ Response: The bulk of Residential Parcel 1 will be developed for residential landuse, with other uses including environmental conservation, public recreation and rural landscape. Remedial works at Residential Parcel 1 were completed in two areas where filling of mine voids with Smelter wastes and historical illegal dumping of household wastes by others had occurred. Residential Parcel 1 is a fenced property, accessed by a locked gate. As no evidence of illegal dumping was identified at other areas of the site and access is restricted, Ramboll Environ consider that the likelihood of illegal dumping by others prior to or during development is low.

Auditor Comment: In the Conclusion (Section 9) the Consultant stated that the tipping areas were validated. It needs to be made very clear in this section (and throughout the report) that the Site is larger than the two tipping areas, and that when the Consultant states that the Site is suitable for its intended landuse (residential), it is for the entire Residential Parcel 1.
Ramboll Environ Response: Ramboll Environ note that DLA, the Consultant who undertook supervision of the remedial works, were contracted by the Client, Hydro Aluminium Kurri Kurri Pty Ltd, to complete these specific works in accordance with the ENVIRON (2014) Remedial Action Work Plan, Residential Parcel 1, Kurri Kurri, NSW. Ramboll Environ completed the Phase 1 Environmental Site Assessment (ESA) and Remedial Action Work Plan (RAWP) and were the Client's Environmental Representative during the remedial works. The Phase 2 ESA identified two areas of the site that were not considered suitable for the future

landuse and the RAWP outlined the remediation required. As the Client's Environmental Representative, Ramboll Environ attended weekly meetings during the completion of the remedial works. Following the completion of the remedial works, Ramboll Environ consider that Residential Parcel 1 is suitable for the proposed residential landuse and other uses including environmental conservation, public recreation and rural landscape.

We trust that the information provided in our responses has is sufficient for you to complete the audit. Please let us know if you require any further information.
Yours sincerely

Kirsty Greenfield
Senior Environmental Consultant

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M +61 4 07149176
kgreenfield@ramboll.com

Appendix C

Relevant Correspondence

Appendix C Relevant Correspondence

From:
Sent: Monday, 26 September 2016 10:36 AM
To:
Cc:
Subject: RE: Hydro Audit: DRAFT SAR for Residential Parcel 1

Hi Ross and Erla,

As per Anna's request below, this is to confirm that the site boundaries as outlined in DLA's Figure 2 are correct.

Yours sincerely
Kirsty Greenfield

Senior Environmental Consultant
Certified Practitioner: Site Assessment and Management

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Ramboll Environ Australia Pty Ltd
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ABN 49 095 437 442

From:
Sent: Saturday, 24 September 2016 9:53 PM
To:
Cc:
Subject: RE: Hydro Audit: DRAFT SAR for Residential Parcel 1

Thanks again Kirsty,

Since the Validation Report states 78 ha, could you confirm if DLAs figure 2 (which we used for the purpose of the SAR) is correct? If not, could you send the correct Site boundaries please?

Send to Erla and Ross, but cc me in too.

Cheers,

Anna Lundmark
Principal Environmental Scientist

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From:
Sent: Thursday, 22 September 2016 3:23 PM
To:
Cc:
Subject: RE: Hydro Audit: DRAFT SAR for Residential Parcel 1

Hi Anna,

I have completed a factual review on Hydro's behalf and there are two changes, as follows:

- Four of the lots are part lots, so Lot 3, Lot 4, Lot 7 and Lot 9 in DP 456946 should be described as Part 2. Part 1 of these lots are on the western side of the railway line.
- The size of the site is 67 Ha, not 78 Ha. We had both sizes in our RAWP, however 78 Ha includes the total area of the four part lots when only the area on the eastern side of the railway line should be included. This reduces the total size to 67 Ha.

Thanks,

Yours sincerely
Kirsty Greenfield

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From:
Sent: Thursday, 1 September 2016 7:19 PM
To:
Subject: Fwd: Hydro Audit: DRAFT SAR for Residential Parcel 1

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---------- Forwarded message ----------
From:
Date: Thu, Sep 1, 2016 at 6:31 PM +1000
Subject: Hydro Audit: DRAFT SAR for Residential Parcel 1
To:
Cc:
<erla.hafsteinsdottir@aecom.com>

Hi Richard,

Please find the draft SAR for Residential Parcel 1 for your review (please only review from a factual perspective to ensure we have included all the right information, no need to review the Auditor's comments etc).

Once you have looked through the report, we can finalise the Audit for this parcel.

Regards,

Anna Lundmark
Principal Environmental Scientist

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From:
Sent: Thursday, 20 November 2014 5:18 PM
To: Stephen Challinor
Cc:
Subject: EILs for heavy metals

Hi Stephen.

At Res Parcel 1 on Tuesday, Steve mentioned there were some EIL exceedences for heavy metals in the validation samples for the Western Fill Area. The EILs in Table 6.1 of the RAWP are the most conservative values possible.

Subsequent to the RAWP, Environ completed soil pH and cation exchange capacity testing on four samples from Tranche 1, Tranche 4, Tranche 7 and Tranche 10 and used these results and the calculated ambient background concentration (ABC) for aged soils to derive site-specific EIL criteria for copper and zinc as per NEPM (2013). The site-specific EILs are 220mg/kg for copper and 630mg/kg for zinc. We will add an addenda to the RAWP to outline how the site-specific EIL criteria were derived and then these criterion can be used for validation purposes.

Regards,

ENVIRON

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ENVIRON Australia Pty Ltd
Eastpoint Complex | Suite 19B, Level 2
50 Glebe Road | The Junction, NSW 2291

From:
Sent: Tuesday, 30 August 2016 1:37 PM
To: Lundmark, Anna
Cc:
Subject: RE: Hydro Audit: Parcel 1 past zoning

Hi Anna,

As far as we are aware, there have been no past zonings that are different to the current zoning. This is the same for all buffer zone parcels.

Yours sincerely
Kirsty Greenfield

Senior Environmental Consultant
Certified Practitioner: Site Assessment and Management

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From: Lundmark, Anna [
Sent: Tuesday, 30 August 2016 1:28 PM
To:
Cc:
Subject: Hydro Audit: Parcel 1 past zoning

Hi Fiona and Kirsty,

We are currently finalising the Parcel 1 SAR and will deliver it tomorrow. For completion, would you be able to give me the past zoning of the land within this Site?

Cheers,

Anna Lundmark
Principal Environmental Scientist

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Manson, Angela

From:
Sent: Monday, 1 December 2014 4:58 PM
To: Lundmark, Anna
Cc:
Subject: RE: Hydro Kurri Kurri - Comments on EILs for Validation of Res Parcel 1

Hi Anna,

Thanks for the comments. I've provided a response below in bold.

1. Could you please include a description of the materials sampled? Were all samples from the same profile or various ones? **The materials sampled comprised the soil matrix within the two filled areas (Western Fill Area and South Western Fill Area). The soil matrix is topsoil from the site, not imported fill material.**
2. It is unclear why Site specific values were not derived for Ni, and if the clay contents were measured or assumed for deriving a value for CrIII? **There were no exceedences of the most conservative criteria for Ni or CrIII in the analytical results during the Phase 2 ESA. The current validation results indicate there are no exceedences for Ni or CrIII either.**
3. The CrIII EIL should be separated from CrVI to avoid confusion. **Noted.**
4. Was OC analysed for the purpose of deriving a Cu EIL? Although it is noted that OC does not have a huge effect on the values, it does vary if the concentrations are extremely low. **No, OC was not analysed for, so a value of 1% was used in the EIL Calculation Spreadsheet.**
5. It should be noted that EILs only apply to the top 2 m of soil (i.e. anticipated extent of the root zone). **Noted**.
6. Since the derived values are for a specific landuse, it should be clear in the table what landuse they are for. **The derived values are specific to Urban Residential and Open Public Space Landuse. We will communicate this to DLA so it is clear in their Remediation and Validation Report.**

If you have any further questions, please let me know.

Regards,

ENVIRON

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From:
Sent: Tuesday, 25 November 2014 5:31 PM
To:
Cc:
Subject: Hydro Kurri Kurri - Comments on EILs for Validation of Res Parcel 1

Hi Kirsty,

The calculations used to derive the EILS appear to be generally appropriate and accurate. However, we have the following comments and questions on the amended EIL table provided:

1. Could you please include a description of the materials sampled? Were all samples from the same profile or various ones?
2. It is unclear why Site specific values were not derived for Ni, and if the clay contents were measured or assumed for deriving a value for CrIII?
3. The CrIII EIL should be separated from CrVI to avoid confusion.
4. Was OC analysed for the purpose of deriving a Cu EIL? Although it is noted that OC does not have a huge effect on the values, it does vary if the concentrations are extremely low.
5. It should be noted that EILs only apply to the top 2 m of soil (i.e. anticipated extent of the root zone).
6. Since the derived values are for a specific landuse, it should be clear in the table what landuse they are for.

Cheers,

Anna Lundmark
Senior Professional Environmental Scientist

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From:
Sent: Thursday, 20 November 2014 11:18 AM
To:
Cc:
Subject: RE: Hydro Update
Attachments: Western Fill Area, mid excavation.JPG; Western Fill Area, north end of excavation.JPG; Western Fill Area, northern end.JPG; Western Fill Area, southern end.JPG; Asbestos from South Western Fill Area.jpg

Hi Anna,

1. Could you please take photos of the final surface of the excavation at the western fill area? See attached photos
2. Could you clarify if all validation samples from the western fill area are analysed for asbestos? My understanding is that DLA added asbestos analysis for the southern end of the excavation up to the pillar separating the southern end from the northern end, as asbestos was identified in the final load only. Checking of the sorted soil stockpiles has confirmed that there is no asbestos in the material excavated from the northern portion of the excavation.
3. Could you ensure that the results from the validation samples are obtained and reviewed prior to filling the excavation? We have requested this information from DLA. With regard to fluoride, DLA has analysed for total fluoride and we have indicated to them that Environ's Site-Specific Soil Assessment Criteria is based on soluble fluoride. DLA will email you for clarification of this.
4. It would be good to have volumes of ACM that were collected during the surface pick, so we could assess the "removal to the extent practical" in subsequent hand picks, if required. We can explain this methodology further if needed. A photo of the two bags of ACM are attached. I will request a record of the quantity from Enviropacific.

Please let me know if you need any further information or photos.

Regards,

ENVIRON

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From:
Sent:
To:
Cc:
Subject: RE: Hydro Update

Hi Kirsty,

Thanks for your update and photos.

A couple of questions and comments:

5. Could you please take photos of the final surface of the excavation at the western fill area?
6. Could you clarify if all validation samples from the western fill area are analysed for asbestos?
7. Could you ensure that the results from the validation samples are obtained and reviewed prior to filling the excavation?
8. It would be good to have volumes of ACM that were collected during the surface pick, so we could assess the "removal to the extent practical" in subsequent hand picks, if required. We can explain this methodology further if needed.

Cheers,

Anna Lundmark
Senior Professional Environmental Scientist

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From:
Sent: Wednesday, 19 November 2014 2:25 PM
To:
Subject: RE: Tomorrow

Hi Anna,

It's no problem that you can't come out tomorrow as the work has not progressed enough at this stage to see much. Here are some dot points of where the work is at:

- Excavation of all wastes from the Western Fill Area was completed Monday morning. Some suspected ACM fragments were identified in the final load. Based on this, all soil stockpiles have been checked for ACM and identification testing has been completed at the lab. Some lab results have come back negative. Where stockpiles have no ACM or the laboratory confirmed negative results, these soil stockpiles will be transported to the Smelter Site as per the RAWP. Where ACM has been visually identified or confirmed by lab testing, these stockpiles will be transported under Enviropacific's WorkCover licence as per WorkCover requirements and for separate stockpiling at the Smelter Site.
- Validation sampling has been completed for the Western Fill Area. Asbestos was added to the analysis suite at the southern end of the excavation where the final load was removed from.
- Backfilling of this excavation with VENM from Daracon's Martins Creek Quarry will occur later, probably next week.
- ACM fragments were hand-picked from the surface of the South Western Fill Area last week. Some fragments were found to be beneath leaf litter and topsoil that has accumulated over time. The bank at the south end, which we looked at during your site visit, was scraped back today and 30m3 of ACM impacted soil was excavated and stockpiled separately. I've attached some photos of this work.
- Enviropacific are starting to sort the material on the surface of the South Western Fill Area today and this will continue for the rest of the week.

I understand you had some correspondence with DLA on Friday regarding the validation sampling (1/ linear meter that was in your previous email) – can you forward your correspondence (if it was via email) or just confirm what the discussion with DLA was?

I'll keep you up to date on the works and see how we're looking for a site visit next Thursday.

Thanks,

ENVIRON

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ENVIRON Australia Pty Ltd
Eastpoint Complex | Suite 19B, Level 2
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From:
Sent: Wednesday, 19 November 2014 12:25 PM
To:
Subject: Tomorrow

Hi Kirsty,

Not sure if we decided that we would go to Site tomorrow or not, but I will unfortunately not be able to make it.

How are they going out there?

Cheers,

Anna Lundmark
Senior Professional Environmental Scientist

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From:
Sent: Wednesday, 10 April 2019 8:11 AM
To:
Cc:
Subject: Letter re: change to Res Parcel 1 boundary
Attachments: 318000240_Residential Parcel 1 Addendum 2018.pdf

Hi Ross and Mark,

Please find attached an Addenda letter to the Phase 2 Environmental Site Assessment for Residential Parcel 1, which updates the western boundary of Res Parcel 1 where four lots are divided by South Maitland Railway Line. The western portion of these lots, originally included in Parcel 2, are now part of Res Parcel 1 so that the SAS for Res Parcel 1 covers whole lots and no part lots.

Please include this for the Res Parcel 1 SAR and SAS.

Thanks,

Kind regards
Kirsty Greenfield

Managing Consultant
3182675 - Hunter

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From:
Sent: Tuesday, 2 December 2014 4:05 PM
To:
Cc:
Subject: Res Parcel 1 - further visits
Attachments: South Western Fill Area complete.JPG; Western Fill Area backfilled.JPG

Hi Anna,

Just an update on the work at Residential Parcel 1 – the Western Fill Area excavation has been backfilled with VENM from Martins Creek Quarry and the South Western Fill Area excavation is complete (see attached photos). The sorting is on-going and it is anticipated this work will be completed before Christmas.

Let me know if you would like to complete any more site visits as the sorting and relocation of the stockpiles progresses.

Regards,

ENVIRON

Kirsty Greenfield | Environmental Consultant
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From:
Sent: Friday, 3 May 2019 1:58 PM
To: Tiedeman, Mark
Cc: McFarland, Ross
Subject: RE: Res Parcel 1 SAR/SAS

Hi Mark,

Hydro did acquire former Crown land and therefore, we do need to add a part lot to Res Parcel 1:
Part Lot 1 in DP 1206034 as shown below.

As discussed, this narrow portion of land is not fenced off and was assessed as part of the environmental investigations undertaken.


https://maps.six.nsw.gov.au/
Convert
Select
BST Enterprise
ENVIRON Box
ENVIRON SharePoint
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Search for a location
Search
DP 456946
DP 1206034
DP 975994
DP 976895
DP 976896
DP 62332

Kind regards
Kirsty Greenfield
Managing Consultant

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ABN 49 095 437 442

From:
Sent: Friday, 3 May 2019 1:17 PM
To:
Cc:
Subject: Res Parcel 1 SAR/SAS

Hi Mark,

I have reviewed the factual information and have one change – please remove Lot 6 from the site description as Lot 6 is part of Parcel 2.

Thanks,

Kind regards
Kirsty Greenfield

Managing Consultant
3182675 - Hunter

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From:
Sent: Monday, 24 November 2014 9:37 AM
To:
Subject: Res Parcel 1 site visit
Attachments: Completed excavation, north end of South Western Fill Area.JPG; Concrete at top of South Western Fill Area.JPG; Facing north, South Western Fill Area.JPG

Hi Anna,

I was out at Res Parcel 1 this morning and it looks like the excavation works at the South Western Fill Area will be completed this week. It would be great if you could come out on Thursday. I can pick you up like last time but if we could make if half an hour earlier to fit in with smoko (9am on site), that'd would be great.

I've attached some photos of the South Western Fill Area excavation for you.

Regards,

Kirsty Greenfield | Environmental Consultant
ENVIRON Australia Pty Ltd
Eastpoint Complex | Suite 19B, Level 2
50 Glebe Road | The Junction, NSW 2291

From:
Sent: Thursday, 20 November 2014 12:53 PM
To:
Cc:

Subject: RE: Review of current data

Hi Stephen,

Re-analysing the samples that exceeded the criterion for soluble fluoride as per Kirsty's suggestion is a suitable approach since the derived criterion is based on soluble concentrations.

Thanks,

Anna Lundmark
Senior Professional Environmental Scientist

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From:
Sent: Thursday, 20 November 2014 11:16 AM
To:
Cc:
Subject: RE: Review of current data

Hi Kirsty,

As just discussed on phone re soluble and total fluoride, I am seeking clarification from Anna as to what they are going to be looking for in the Validation Report for Fluoride, as the RAWP stands 440mg/kg is stated and generally interpreted as Total Fluoride not soluble, as soluble would be the leachable component to the environment.

As for the other analytes Anna may be able to shed some more light on this issue. The site auditor will be signing off on the Site Audit Statement they will want to be able to say that the site meets Residential Criteria. A general suite of analytes is included within this process including Chemicals/Analytes of Concern. Typically Volatile Hydrocarbons, Semi Volatile Hydrocarbons, PAHs, Eight Heavy Metals as recommended by NSW EPA, and in this case some samples analysed for OC OP PCBs due to the surrounding farming activities.

Kind Regards,

Stephen Challinor
Manager – Hunter Valley

DLA environmental

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Hornsby NSW 2077

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Fax: 9476 1557
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Maitland
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Maitland NSW 2320
PO Box 137,
Branxton NSW 2335
Phone: 49330001

Email: Hunter@dlaenvironmental.com.au

From:
Sent: Thursday, 20 November 2014 10:52 AM
To:
Cc:
Subject: RE: Review of current data

Hi Stephen,

Thanks for the update. Environ considers that validation samples should be analysed for PAHs only, as per Section 10.1 of the RAWP. Now that analysis of total fluoride has been completed, we recommend re-analysis of the failed samples for soluble fluoride which is what Environ's Site-Specific Soil Assessment Criteria is based on. It is unlikely that soluble fluoride results will exceed the criteria based on our experience and additional excavation works are unlikely to be required.

Thanks,

ENVIRON

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ENVIRON Australia Pty Ltd
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From:
Sent: Thursday, 20 November 2014 10:31 AM
To:

Cc:
Subject: Review of current data

Hi all,

Following a review of the current data we have for the Western Area. There is an exceedance of fluoride (1800mg/kg) in the base sample of the most northern excavation. We propose a scrape of the base of this area to remove residual soils.

There was an exceedance within the Western wall sample of total fluoride(640mg/kg) in the northern section , this was taken out of the rock face. A 95% UCL on all of the data from the remediation area will show it complies with the fluoride criteria set by Environ (440mg/kg).

The stockpiles in the western side of the staging area have all come back as no detection of friable asbestos.

The failures of the samples so far have been in the residual soils.

Online results so far have shown Section 3 of the excavation meeting criteria for PAHs and the pink lithology does not have PAHs.

Kind Regards,

Stephen Challinor
Manager – Hunter Valley

DLA environmental

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Email: Hunter@dlaenvironmental.com.au

Appendix D

Addendum: Change to Site Boundaries

Appendix D Addendum: Change to Site Boundaries

RAMBOLL

ENVIRONMENT
& HEALTH

Hydro Aluminium Kurri Kurri Pty Ltd
Hart Road
Loxford NSW 2326

Addendum to Phase 2 Environmental Site Assessment, Residential Parcel 1: Change to Site Boundary

Date 10/04/2019

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Ref 318000240

Ramboll Australia Pty Ltd (Ramboll), as the environmental consultant for Hydro Aluminium Kurri Kurri Pty Ltd (Hydro), completed a Phase 2 Environmental Site Assessment (ESA) at Residential Parcel 1, located in the north east portion of the Buffer Zone. The report reference:

- 'Phase 2 Environmental Site Assessment, Residential Parcel 1' dated November 2013 by ENVIRON Australia Pty Ltd.

This addendum has been prepared as the western boundary of the Residential Parcel 1 site has expanded to include the western portion of four part lots that are separated by the South Maitland Railway Line. This will allow for the Site Audit Report and Site Audit Statement for Residential Parcel 1 to refer to whole lots.

The four affected lots are Lot 3, Lot 4, Lot 7 and Lot 9 in DP 456946. The former boundaries of Residential Parcel 1 and the adjacent Parcel 2 are shown in **Figure 1**, with the new boundaries shown in **Figure 2**.

The change in the boundary means that surface soil samples collected for soluble fluoride analysis within Lots 3, 4, 7 and 9 (formerly reported in Phase 2 Environmental Site Assessment, Parcel 2) now form part of the data set for Residential Parcel 1.

Five surface soil samples (SF5, SF11, SF12, SF13 and SF14, with the prefix Res2) were collected from within the affected lots for analysis in November 2013. Laboratory analytical results have been compared against the following criteria:

- Site-specific health screening level of 440 mg/kg for residential landuse.
- Tier 1 Ecological Screening Criterion of 4.3 mg/kg.

Ramboll Australia Pty Ltd
ACN 095 437 442
ABN 49 095 437 442

The maximum soluble fluoride concentration was 1 mg/kg, well below the site criteria. The location of fluoride soil samples are shown on **Figure 2**. A summary of the laboratory results are in **Table 1** and the laboratory report ES1324135 is attached.

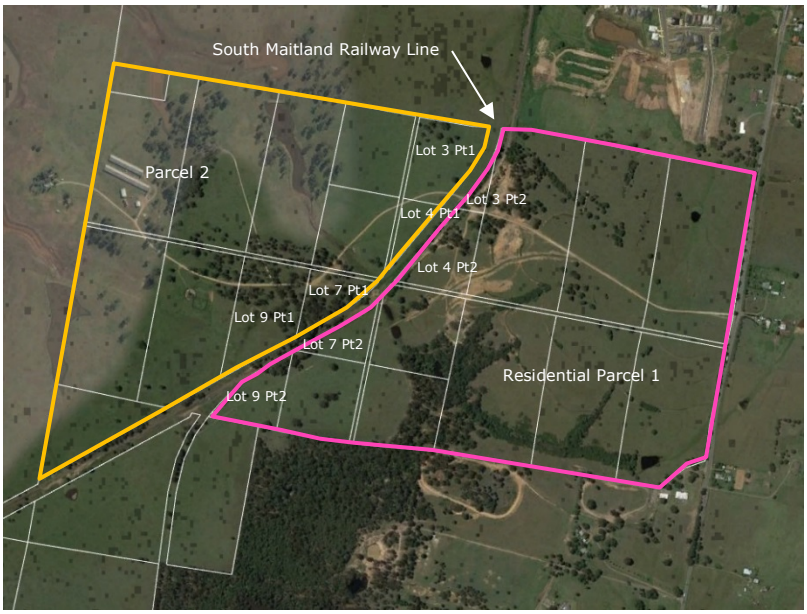

Figure 1: Former Boundaries of Residential Parcel 1 and Parcel 2

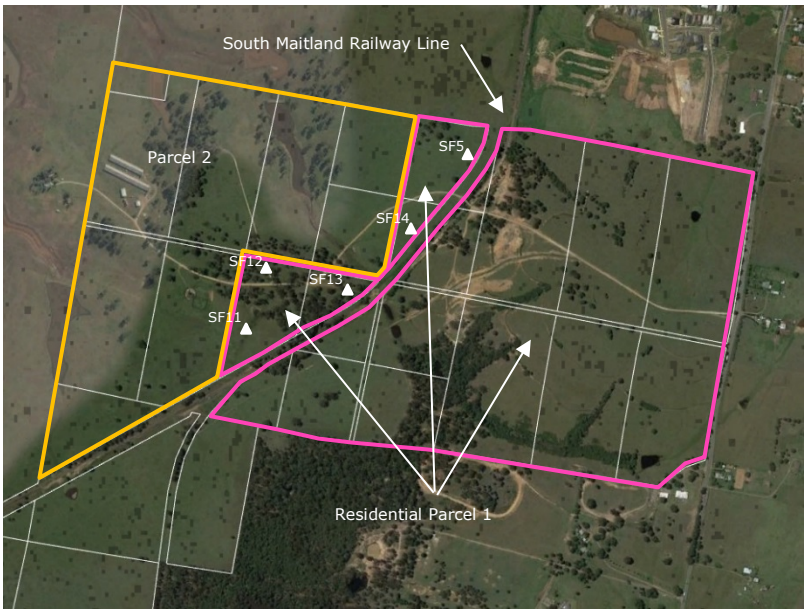

Figure 2: New Boundaries of Residential Parcel 1 and Parcel 2

Table 1: Summary of Laboratory Results – mg/kg

Sample ID within Affected Lots	Soluble Fluoride Result
RES2 - SF5	<1
RES2 - SF11	1
RES2 - SF12	<1
RES2 - SF13	<1
RES2 - SF14	1

The laboratory results indicate that the portion of Residential Parcel 1 that was formerly part of Parcel 2 has not been impacted by the aerial deposition of fluoride associated with the operation of the former aluminium smelter.

In addition, a site walkover of the portion of Residential Parcel 1 that was formerly part of Parcel 2 was completed on 7 November 2013. At this time, fill material and asbestos debris were not observed at the site. A copy of the Site Walkover Checklist is attached.

Based on the information provided, the portion of Residential Parcel 1 that comprises the western portion of Lots 3, 4,7 and 9 in DP 456946 is considered to be suitable for the future R1 General Residential, RU2 Rural Landscape and E2 Environmental Conservation land uses.

Yours sincerely

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Enc: Laboratory Report ES1324135
Site Walkover Checklist

CERTIFICATE OF ANALYSIS

Work Order	: **ES1324135**	Page	: 1 of 7
Client	: **ENVIRON AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR STEVE CADMAN	Contact	: Client Services
Address	: PO BOX 560 NORTH SYDNEY NSW, AUSTRALIA 2060	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: scadman@environcorp.com	E-mail	: sydney@alsglobal.com
Telephone	: +61 02 99548114	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: HYDRO BUFFER SONE 2291	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: AS130348		
C-O-C number	: 155070	Date Samples Received	: 08-NOV-2013
Sampler	: MM	Issue Date	: 18-NOV-2013
Site	: ----		
		No. of samples received	: 23
Quote number	: SY/285/10	No. of samples analysed	: 23

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Hoa Nguyen	Senior Inorganic Chemist	Sydney Inorganics

General Comments

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

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

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

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

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

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

- **EK040S: FLUORIDE LOR for samples(ID 4135#23)raised due to insufficient.**
- **EK040S: FLUORIDE LOR for samples(ID 4135#4)raised due to insufficient.**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	ECO1-SF1	ECO1-SF2	ECO1-SF3	ECO1-SF4	ECO1-SF5
			Client sampling date / time	07-NOV-2013 15:00	07-NOV-2013 15:00	07-NOV-2013 15:00	07-NOV-2013 15:00	07-NOV-2013 15:00
Compound	CAS Number	LOR	Unit	ES1324135-001	ES1324135-002	ES1324135-003	ES1324135-004	ES1324135-005
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	**9.4**	**4.6**	**39.2**	**24.5**	**3.5**
EK040: Fluoride								
Fluoride	16984-48-8	1	mg/kg	**1**	**1**	**9**	<2	**2**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	ECO1-SF6	ECO1-SF7	RES2-SF1	RES2-SF2	RES2-SF3
			Client sampling date / time	07-NOV-2013 15:00	07-NOV-2013 15:00	07-NOV-2013 15:00	07-NOV-2013 15:00	07-NOV-2013 15:00
Compound	CAS Number	LOR	Unit	ES1324135-006	ES1324135-007	ES1324135-008	ES1324135-009	ES1324135-010
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	**4.8**	**6.5**	**4.0**	**4.1**	**2.8**
EK040: Fluoride								
Fluoride	16984-48-8	1	mg/kg	**4**	**1**	**1**	<1	<1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	RES2-SF4	RES2-SF5	RES2-SF6	RES2-SF7	RES2-SF8
			Client sampling date / time	07-NOV-2013 15:00	07-NOV-2013 15:00	07-NOV-2013 15:00	07-NOV-2013 15:00	07-NOV-2013 15:00
Compound	CAS Number	LOR	Unit	ES1324135-011	ES1324135-012	ES1324135-013	ES1324135-014	ES1324135-015
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	**3.8**	**3.0**	**5.8**	**5.6**	**5.9**
EK040: Fluoride								
Fluoride	16984-48-8	1	mg/kg	**1**	<1	**1**	**1**	**1**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	RES2-SF9	RES2-SF10	RES2-SF11	RES2-SF12	RES2-SF13
			Client sampling date / time	07-NOV-2013 15:00	07-NOV-2013 15:00	07-NOV-2013 15:00	07-NOV-2013 15:00	07-NOV-2013 15:00
Compound	CAS Number	LOR	Unit	ES1324135-016	ES1324135-017	ES1324135-018	ES1324135-019	ES1324135-020
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	**4.9**	**5.7**	**8.0**	**11.2**	**4.8**
EK040: Fluoride								
Fluoride	16984-48-8	1	mg/kg	**1**	<1	**1**	<1	<1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	RES2-SF14	RES2-DUP1	ECO1-DUP1	----	----
			Client sampling date / time	07-NOV-2013 15:00	07-NOV-2013 15:00	07-NOV-2013 15:00	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1324135-021**	**ES1324135-022**	**ES1324135-023**	**----**	**----**
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	**6.5**	**8.3**	**15.2**	----	----
EK040: Fluoride								
Fluoride	16984-48-8	1	mg/kg	**1**	**1**	**1**	----	----

QUALITY CONTROL REPORT

Work Order	: **ES1324135**	Page	: 1 of 4
Client	: **ENVIRON AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR STEVE CADMAN	Contact	: Client Services
Address	: PO BOX 560 NORTH SYDNEY NSW, AUSTRALIA 2060	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: scadman@environcorp.com	E-mail	: sydney@alsglobal.com
Telephone	: +61 02 99548114	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: HYDRO BUFFER SONE 2291	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: 155070	Date Samples Received	: 08-NOV-2013
Sampler	: MM	Issue Date	: 18-NOV-2013
Order number	: AS130348		
		No. of samples received	: 23
Quote number	: SY/285/10	No. of samples analysed	: 23

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out ir compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Hoa Nguyen	Senior Inorganic Chemist	Sydney Inorganics

General Comments

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

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

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

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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR:- No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:- 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (QC Lot: 3154221)									
ES1324114-004	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	22.1	22.4	1.4	0% - 20%
ES1324128-003	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	23.5	23.9	1.8	0% - 20%
EA055: Moisture Content (QC Lot: 3154222)									
ES1324135-005	ECO1-SF5	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	3.5	2.8	23.4	No Limit
ES1324135-016	RES2-SF9	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	4.9	4.3	13.3	No Limit
EA055: Moisture Content (QC Lot: 3154223)									
ES1324139-002	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	17.0	16.8	1.1	0% - 50%
ES1324140-011	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	11.0	11.0	0.0	0% - 50%
EK040S: Fluoride Soluble (QC Lot: 3157675)									
ES1324135-001	ECO1-SF1	EK040S: Fluoride	16984-48-8	1	mg/kg	1	<1	0.0	No Limit
ES1324135-010	RES2-SF3	EK040S: Fluoride	16984-48-8	1	mg/kg	<1	<1	0.0	No Limit
EK040S: Fluoride Soluble (QC Lot: 3157676)									
ES1324135-021	RES2-SF14	EK040S: Fluoride	16984-48-8	1	mg/kg	1	<1	0.0	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EK040S: Fluoride Soluble (QCLot: 3157675)								
EK040S: Fluoride	16984-48-8	1.0	mg/kg	<1	25.0 mg/kg	92.2	69	117
EK040S: Fluoride Soluble (QCLot: 3157676)								
EK040S: Fluoride	16984-48-8	1.0	mg/kg	<1	25.0 mg/kg	91.0	69	117

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK040S: Fluoride Soluble (QCLot: 3157675)							
ES1324135-001	ECO1-SF1	EK040S: Fluoride	16984-48-8	25.0 mg/kg	102	70	130
EK040S: Fluoride Soluble (QCLot: 3157676)							
ES1324135-021	RES2-SF14	EK040S: Fluoride	16984-48-8	25.0 mg/kg	99.2	70	130

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

The quality control term Matrix Spike (MS) and Matrix Spike Duplicate (MSD) refers to intralaboratory split samples spiked with a representative set of target analytes. The purpose of these QC parameters are to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	MSD	Low	High	Value	Control Limit
EK040S: Fluoride Soluble (QCLot: 3157675)										
ES1324135-001	ECO1-SF1	EK040S: Fluoride	16984-48-8	25.0 mg/kg	102	----	70	130	----	----
EK040S: Fluoride Soluble (QCLot: 3157676)										
ES1324135-021	RES2-SF14	EK040S: Fluoride	16984-48-8	25.0 mg/kg	99.2	----	70	130	----	----

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **ES1324135**	Page	: 1 of 5
Client	: ENVIRON AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MR STEVE CADMAN	Contact	: Client Services
Address	: PO BOX 560 NORTH SYDNEY NSW, AUSTRALIA 2060	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: scadman@environcorp.com	E-mail	: sydney@alsglobal.com
Telephone	: +61 02 99548114	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: HYDRO BUFFER SONE 2291	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: 155070	Date Samples Received	: 08-NOV-2013
Sampler	: MM	Issue Date	: 18-NOV-2013
Order number	: AS130348		
		No. of samples received	: 23
Quote number	: SY/285/10	No. of samples analysed	: 23

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with recommended holding times (USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content							
Soil Glass Jar - Unpreserved (EA055-103)							
ECO1-SF1, ECO1-SF2, ECO1-SF3, ECO1-SF4, ECO1-SF5, ECO1-SF6, ECO1-SF7, RES2-SF1, RES2-SF2, RES2-SF3, RES2-SF4, RES2-SF5, RES2-SF6, RES2-SF7, RES2-SF8, RES2-SF9, RES2-SF10, RES2-SF11, RES2-SF12, RES2-SF13, RES2-SF14, RES2-DUP1, ECO1-DUP1	**07-NOV-2013**	**----**	----	----	**12-NOV-2013**	21-NOV-2013	✓
EK040: Fluoride							
Soil Glass Jar - Unpreserved (EK040S)							
ECO1-SF1, ECO1-SF2, ECO1-SF3, ECO1-SF4, ECO1-SF5, ECO1-SF6, ECO1-SF7, RES2-SF1, RES2-SF2, RES2-SF3, RES2-SF4, RES2-SF5, RES2-SF6, RES2-SF7, RES2-SF8, RES2-SF9, RES2-SF10, RES2-SF11, RES2-SF12, RES2-SF13, RES2-SF14, RES2-DUP1, ECO1-DUP1	**07-NOV-2013**	**14-NOV-2013**	14-NOV-2013	✓	**15-NOV-2013**	12-DEC-2013	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Fluoride - Soluble	EK040S	3	23	**13.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Moisture Content	EA055-103	6	59	**10.2**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Fluoride - Soluble	EK040S	2	23	**8.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Fluoride - Soluble	EK040S	2	23	**8.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Fluoride - Soluble	EK040S	2	23	**8.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055-103	SOIL	A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Fluoride - Soluble	EK040S	SOIL	APHA 21st ed., 4500 F--C Soluble Fluoride is determined after a 1:5 soil/water extract using an ion selective electrode.

Preparation Methods	Method	Matrix	Method Descriptions
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of distilled water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW 846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

- **For all matrices, no Method Blank value outliers occur.**
- **For all matrices, no Duplicate outliers occur.**
- **For all matrices, no Laboratory Control outliers occur.**
- **For all matrices, no Matrix Spike outliers occur.**

Regular Sample Surrogates

- **For all regular sample matrices, no surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

- **No Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- **No Quality Control Sample Frequency Outliers exist.**

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ Sydney: 277 Woodpark Rd, Smithfield NSW 2164 Ph 02 8784 8555 E: samples.sydney@alsenviro.com
☐ Newcastle: 5 Rosegum Rd, Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsenviro.com
☐ Brisbane: 32 Shand St, Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsenviro.com
☐ Townsville: 14-15 Desma Cl, Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsenviro.com
☐ Melbourne: 2-4 Westall Rd, Springvale, VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsenviro.com
☐ Adelaide: 2/1 Burma Rd, Pooraka SA 5095 Ph:08 8359 0890 E: adelaide@alsenviro.com
☐ Perth: 10 Hod Way, Malaga, WA 6090 Ph: 08 9209 7655 E: samples.perth@alsenviro.com
☐ Launceston: 27 Wellington St, Launceston, TAS 7250 Ph: 03 6331 2158 E: launceston@alsenviro.com

CLIENT: ENVIRON Australia P/L
OFFICE: 19B 50 Glebe Rd The Junction 2291
PROJECT: Hydro buffer zone
PURCHASE ORDER NUMBER: AS130348
PROJECT MANAGER: Steve Cadman — CONTACT PH: 49625444
SAMPLER: Michelle Manditch — SAMPLER MOBILE: 0447677711
COC emailed to ALS? (YES / NO) — NO circled — EDD FORMAT (or default):
Email Reports to (will default to PM if no other addresses are listed): S. Cadman
Email Invoice to (will default to PM if no other addresses are listed): S. Cadman

TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)
☒ Standard TAT (List due date):
☐ Non Standard or urgent TAT (List due date):

ALS QUOTE NO.: —

COC SEQUENCE NUMBER (Circle)
COC: (1) 2 3 4 5 6 7
OF: 1 (2) 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No (N/A)
Free ice / frozen ice bricks present upon receipt? Yes No (N/A)
Random Sample Temperature on Receipt: °C
Other comment: Ambient

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
M. Manditch	[signature]	[signature] NONE	Steve
DATE/TIME: 8/11/13 0950	DATE/TIME: 8/11/13 10:05	DATE/TIME: 8/11/13 1700	DATE/TIME: 11/11/13 7:00

COMMENTS/ SPECIAL HANDLING/STORAGE OR DISPOSAL: scadman@environcorp.com

ALS USE	SAMPLE DETAILS MATRIX - SOLID (S), WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).	Additional Information
LAB ID	SAMPLE ID (number one)	DATE/ TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	Soluble fluoride	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	EC01 - SF1	7/11/13	S	Unpreserved glass	1	↓	
2	EC01 - SF2	↓		↓	1	↓	
3	EC01 - SF3	↓		↓	↓	↓	
4	EC01 - SF4	↓		↓	↓	↓	
5	EC01 - SF5	↓		↓	↓	↓	
6	EC01 - SF6	↓		↓	↓	↓	
7	EC01 - SF7	↓		↓	↓	↓	
8	RES2 - SF1	↓		↓	↓	↓	
9	RES2 - SF2	↓		↓	↓	↓	
10	RES2 - SF3	↓		↓	↓	↓	
11	RES2 - SF4	↓		↓	↓	↓	
12	RES2 - SF5	↓		↓	↓	↓	
				TOTAL	12	12	

Environmental Division
Sydney
Work Order
ES1324135
Telephone : +61-2-8784 8555

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic;
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic;
F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag.

155070

Site Walkover Checklist

Project No.:	AS130348	**Date and Time:**	7/11/13 13:00 – 16:30
Land Parcel:	RES2 Lot1, Lot3, 7	**Weather:**	Fine 28°C
Lot and DP:	Lot 9, 10, 58 Lot 6 D. DP975994	**Environ Personnel:**	M. Manditch

Site Description	
Topography	Gentle slope to Wentworth Swamp in the west.
Surface Geology	Pasturelands. Dry, compacted soil
Fill evident?	No
Hummocky ground?	Yes. Near dam and one soil pile
Structures on site?	Chicken sheds, galvanised tanks. house
Location of structures	-32.770003° 151.509819° and surrounds
Building materials used in structures	Galvanised sheeting, steel, brick
Asbestos debris on site?	None found during walkover.
Location of asbestos debris?	N/A
Volume of asbestos debris?	N/A

GPS Locations of Interest		
Point of Interest	Easting	Northing
Dam hummocky ground – wall of dam	-32.770129	151.514321
Pile of soil	-32.773838	151.512986
Chicken shed manure stockpile	-32.769767	151.511009

Description of Photographs Taken

- Soil sampling sites 1688 → 1691, 694 → 702, 704 → 707
- Soil pile 1703
- Hummocky ground at dam wall – 1693, 1692
- General scenery and topography – 1708.

Miscellaneous Field Comments

- Sampled 14 soil sites for fluoride analysis.
- Spoke to tenant (Greencross vet) during visit.
- 10 x 10 m site walkover -32.769463 151.516616°
- Hazardous materials audit performed separately.

M. Manditch

ENVIRON

PROJECT SAMPLE REGISTER ECO1 and RES2.

Project No AS130348	Project Name Hydro buffer zone	Date commenced 7/11/13
Location Kurri Kurri	Refer to Daily log for weather details	Date completed 7/11/13

#	Sample Name	Sampled by	Easting	Northing	Depth mm	Description (soil type, moisture, colour, foreign content, signs of contamination) or 'refer to log'	Quality Assurance	Comments (eg lab analyse)
1	ECO1 - SF1	MM	32. 76524	151. 50245	10	Dry, brown soil. Pasture area with cattle. No trees		
2	- SF2		32. 758105	151. 501740	10	As per SF1. Grass coverage more dense i.e. soil less exposed.		
3	- SF3		32. 76415	151. 50353	10	~~Dry~~ Empty course. Brown soil Soil damp, some vegetation shooting.		
4	- SF4		32. 76759	151. 49245	15	Pasture area with low grass density. Dry grass present	DUP 1 Loose soil	Drainage line
5	- SF5		32.77 242	151. 48705		Pasture. Heavy grass coverage.	MM 7/11/13	
6	- SF5		32. 77266	151. 49277	10	Pasture. No trees. Dry Heavy grass coverage.		
7	- SF6		32. 77106	151. 49642	5	as per SF5. Compacted soil		
8	- SF7		32. 77130	151. 50652	10	Pasture. No trees. Dry Moderate grass coverage		
9	RES2 - SF1		32. 76945	151. 51034	10	as per SF8. ECO1-		
10	- SF2		32. 76813	151. 51306	10	as per SF6. ECO1-		

Signed MH

Date 7/11/13

#	Sample Name	Sampled by	Easting	Northing	Depth	Description (soil type, moisture, colour, foreign content, signs of contamination) or 'refer to log'	Quality Assurance	Comments (eg lab analyse)
	RES2 -SF3	MM	32. 76850	151. 51479	10	as per ECO1 - SF6 Drainage line into dam.	-32.770013 151.514261	mounds of soil along bank adj. dam
	-SF4		32. 76929	151. 51653	10	as per ECO1 - SF6.		
	-SF5		32. 76951	151. 51913	10	as per ECO1 - SF6 Sampled on exposed area of soil		
	-SF6		32. 77185	151. 50953	10	Heavily grassed pasture. No trees. Drainage line.		
	-SF7		32. 77474	151. 50895	10	Heavy density grass coverage. No exposed soil. No trees. Downhill slope towards dam		
	-SF8		32. 77610	151. 50852	10	as per RES2 - SF7	RES2-Dup1	
	-SF9		32. 77532	151. 51039	10	as per RES2 - SF7 level ground		
	-SF10		32. 77324	151. 51209	10	Near stockyards level ground. Mod grass coverage		
	-SF11		32. 77371	151. 51296	10	Mod Heavy density of grass coverage. Dam Compacted soil Reedy grass. Low lying land. Pile soil nearby.		
	-SF12		32. 77184	151. 51342	10	Eucalypt trees. Level land. Dry soil. Heavy density pasture grass coverage.		
	-SF13		32. 77245	151. 51588	10	Eucalypt trees. Sloping land. Mod coverage pastvie grass. Leaf litter.		
	-SF14		32. 77135	151. 51739	10	No trees Level land Heavy grass coverage.		

Signed _____

Date 7/11/13.

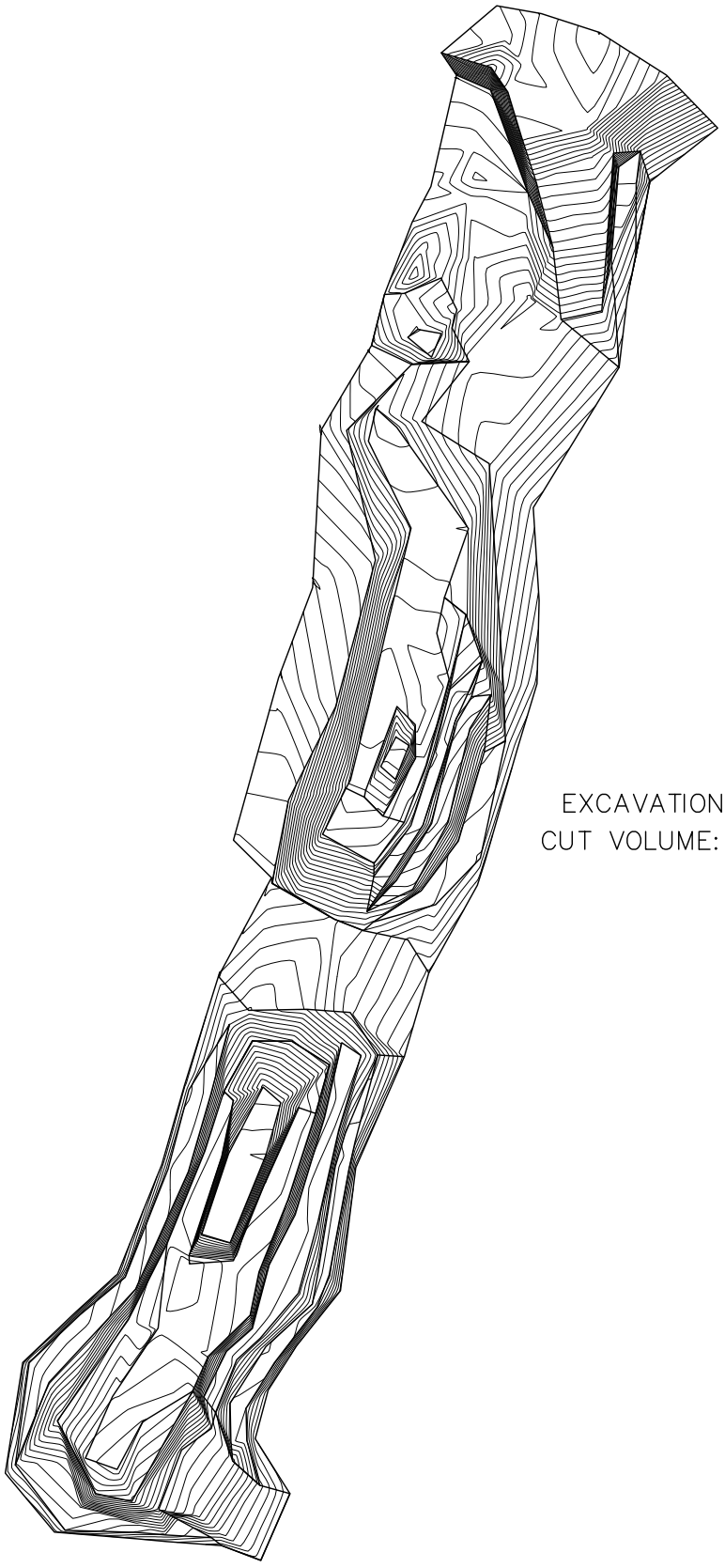
Appendix E

Survey of Excavations from the Validation Report

Appendix E Survey of Excavations from the Validation Report

Appendix I

Surveys of Excavations



EXCAVATION SITE 1
CUT VOLUME: 2970m^3

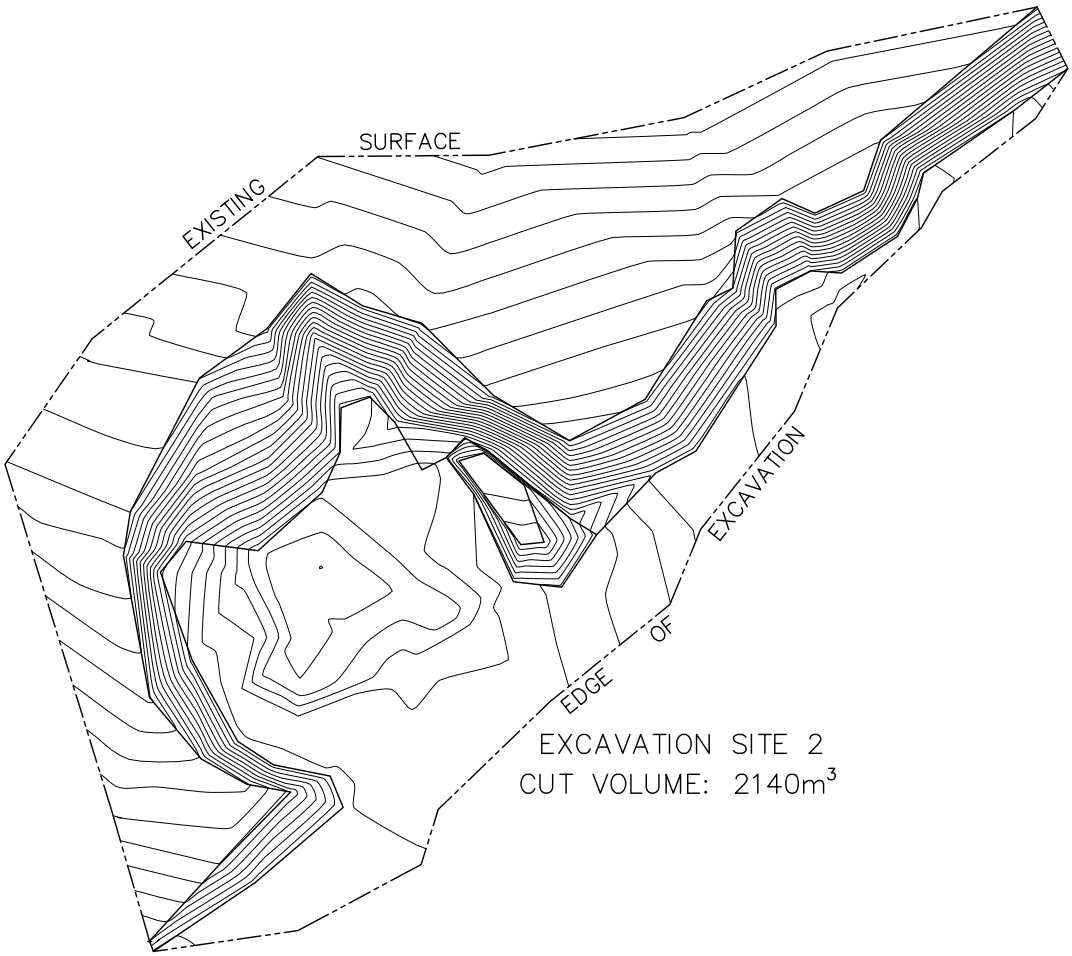
DRAWING NOT TO SCALE

RENNIE GOLLEDGE PTY. LTD.
SURVEYORS & PLANNERS
P.O. BOX 132
36 St ANDREWS ST
MAITLAND NSW 2320
ABN: 55 002 622 317
PH (02) 49334977
FAX (02) 49338579
mail@renniegolledge.com.au

HYDRO ALUMINIUM
EXCAVATION SITE 1
KURRI KURRI

ENVIROPACIFIC

DATE: NOVEMBER 2014 REF: 309.14



DRAWING NOT TO SCALE

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MAITLAND NSW 2320
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FAX (02) 49338579
mail@renniegolledge.com.au

HYDRO ALUMINIUM
EXCAVATION SITE 2
KURRI KURRI

ENVIROPACIFIC

DATE: 3/12/14

REF: 309.14

Appendix F

Photographic Log

Appendix F Photographic Log

Print 1
Northern End of Western Fill Zone during excavation

Print 2
Excavation of Western Fill Zone.

Print 3
Excavation progress of the northern end of the Western Fill Zone.

Print 4
Excavated material from Western Fill Zone.

Print 5
Main Staging area with material from western fill zone.

Print 6
Excavation of Western Fill Zone.

Print 7
The northern end of the Western Fill Zone.

Print 8
Middle excavation section of Western Fill Zone.

Print 9
Southern End of Western Fill Zone following benching.

Print 10
Southern end of WFZ looking north following benching.

Print 11
Excavation start of South-Western Fill Zone.

Print 12
Excavation face of the South-Western Fill Zone.

Print 5
Main Staging area with material from western fill zone.

Print 6
Excavation of Western Fill Zone.

Print 5
Main Staging area with material from western fill zone.

Print 6
Excavation of Western Fill Zone.

Print 7
The northern end of the Western Fill Zone.

Print 8
Middle excavation section of Western Fill Zone.

Print 9
SWFZ fill zone northern end.

Appendix G

Results Tables from the Validation Report

Appendix G Results Tables from the Validation Report

DLH1152 Hydro - Wangara Res Parcel 1 - Validation Data

Metals and Inorganics

NEPM (1999) Amended 2013 Residential A - Residential Land Use Criteria (as per RAP); mg/Kg					Asbestos	(0-4m+) - **0.5** ESL - **65**	(0-0.5m) - 160 (1-1m) - 220 (2-2m) - 310 (4m+) - 540 ESL - 105	(0-0.5m) - 55 (1-4m+) - NL ESL - 125	(0-0.5m) - 40 (1-1m) - 60 (2-2m) - 95 (4m+) - 170 ESL - 45	(0-0.5m) - 3 (1-1m) - NL (2-2m) - NL (4m+) - NL	F1 (C6-C10) (0-0.5m) - 45 (1-1m) - 70 (2m2) - 110 (4m+) - 200 ESL - 180, ML - 800	F2 (>C10-C16<Napthalene) (0-0.5m) - 110 (1-1m) - 240 (2m2) - 440 (4m+) - NL ESL - 120 ML - 1000	F3 (>C16-C34) **NL** ESL - **1300** ML - **3500**	F4 (>C34-C40) **NL** ESL - **5600** ML - **10000**	**3**	**300**	**DDT+DDD+DDE -240**	**Aldrin+Dieldrin - 6**	**Chlordane - 50**	**Endosulfan - 270**	**Endrin - 10**	**Heptachlor - 6**	**HCB - 10**	**Methoxychlor - 300**			**100**	**20**	**100**	**6,000**	**300**	**40**	**400**	**7,400**	**250**	**440 mg/kg (RAP)**	
Sample ID	**Date**	**Chemical Report**	**Asbestos Report**	**Soil Desciption**		**BTEX**				**TRH Sand**					**PAH**		**Pesticides**										**Heavy Metals**								**Cyanide**	**Fluoride**	
						Benz	**Toluene**	**EthylBenzene**	**Xylene**	**Naphthalene**	**F1**	**F2**	**F3**	**F4**	**BaP TEQ**	**Total**	**OC**								**OP**	**PCB**	**As**	**Cd**	**Cr VI**	**Cu**	**Pb**	**Hg**	**Ni**	**Zn**			
Western Fill Zone																																					
WFZ_Surface_5	18/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	94.00	550	340	<0.5	0.06	-	-	-	-	-	-	-	-	-	-	4	<0.4	9	6	16	<0.1	6	25	<0.5	1.865*	
WFZ_Surface_4	18/11/14	119577				<0.2	<0.5	1	<2	<1	<25	180.00	830	360	<0.5	0.79	-	-	-	-	-	-	-	-	-	-	2	<0.4	4	8	14	<0.1	4	32	0.7	1.67	
WFZ_N_B_1	11/11/14	119151	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	2.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	<0.4	12	10	7	<0.1	4	27	0.7	30*	1800
WFZ_N_S_1	11/11/14	119151	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2	<0.4	6	9	7	<0.1	0.5	0.5	<0.5	410	
WFZ_N_E_1	11/11/14	119151	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2	<0.4	7	5	7	<0.1	0.5	4	<0.5	220	
WFZ_N_W_1	11/11/14	119151	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	4	<0.4	9	5	6	<0.1	2	5	<0.5	640	
WFZ_S1-1_WWall_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	<0.4	8	7	6	<0.1	2	6	<0.5	53	
WFZ_S1-1_EWall-2	17/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	-	-	-	-	-	-	-	-	-	-	2	<0.4	6	3	4	<0.1	0.5	2	-	-	
WFZ_S1-2_WWall-2	17/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	-	-	-	-	-	-	-	-	-	-	2	<0.4	5	20	5	<0.1	0.5	2	-	-	
WFZ_S1-2_EWall-2	17/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	1.5	8.1	-	-	-	-	-	-	-	-	-	-	8	<0.4	11	11	9	<0.1	7	32	-	-	
WFZ_S1-2_Base_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	440	240	1.9	10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	7	<0.4	21	9	14	<0.1	8	45	<0.5	280	
WFZ_S1-3_WWall_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.06	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	11	<0.4	19	6	17	<0.1	5	23	<0.5	190	
WFZ_S1-3_EWall-2	17/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	-	-	-	-	-	-	-	-	-	-	14	<0.4	20	4	9	<0.1	7	19	-	-	
WFZ_S3-3_Ewall 2.0	18/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	10	<0.4	21	8	8	<0.1	2	35	<0.5	0.25	
WFZ_S1-3_Base_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2	<0.4	3	4	3	<0.1	2	7	<0.5	85	
WFZ_S2-1_WWall_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	<0.4	8	10	7	<0.1	22	61	<0.5	340	
WFZ_S2-1_EWall_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	15	<0.4	22	4	11	<0.1	8	33	<0.5	180	
WFZ_S2-1_Base_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	10	<0.4	11	11	6	<0.1	8	38	<0.5	240	
WFZ_S2-2_Ewall_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	10	<0.4	15	3	10	<0.1	5	17	<0.5	130	
WFZ_S2-2_Swall_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.68	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	<0.4	6	10	4	<0.1	13	40	<0.5	320	
WFZ_VENM_S3-2_1	12/11/14	119306	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	16	<0.4	26	2	15	<0.1	8	23	<0.5	87	
WFZ_VENM_S3-2_1A	12/11/14	119306	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	16	<0.4	24	2	15	<0.1	6	19	<0.5	170	
WFZ_S2-2_WWall-2	17/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	-	-	-	-	-	-	-	-	-	-	4	<0.4	7	6	4	<0.1	10	22	-	-	
WFZ_S2-3_Ewall_1	12/11/14	119306	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	0.6	4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	9	<0.4	17	6	22	<0.1	12	84	<0.5	1800	
WFZ_S2-3_Wwall_1	12/11/14	119306	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.82	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	6	<0.4	10	14	9	<0.1	66	85	<0.5	370	
WFZ_S2-3_Base_1	12/11/14	119306	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.38	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	6	<0.4	10	12	9	<0.1	67	82	<0.5	410	
WFZ-S3-1-Wwall 1.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	4	<0.4	9	6	5	<0.1	2	8	<0.5	25	
WFZ-S3-1-Wwall 2.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	-	-	-	-	-	-	-	-	-	-	2	<0.4	9	11	6	<0.1	110	80	<0.5	25	
WFZ-S3-1-Wwall 3.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.31	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	<0.4	15	18	13	<0.1	19	66	<0.5	170	
WFZ-S3-1-Wwall 5.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	-	-	-	-	-	-	-	-	-	-	8	<0.4	6	5	5	<0.1	49	29	<0.5	230	
WFZ-S3-1-Ewall 1.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	7	<0.4	10	4	7	<0.1	9	26	<0.5	150	
WFZ-S3-1-Ewall 3.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	160	<100	1.8	7.9	-	-	-	-	-	-	-	-	-	-	10	<0.4	21	10	13	<0.1	11	55	<0.5	200	
WFZ-S3-1-Ewall 5.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	-	-	-	-	-	-	-	-	-	-	9	<0.4	8	11	6	<0.1	45	26	<0.5	25	
WFZ-S3-1-Base	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	11	<0.4	7	8	6	<0.1	40	23	<0.5	460	
WFZ-S3-2-WWall1.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	6	<0.4	12	4	8	<0.1	25	29	<0.5	25	
WFZ-S3-2-Wwall 3.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	9	<0.4	10	3	13	0.2	6	44	<0.5	89	
WFZ-S3-2-Wwall 5.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	-	-	-	-	-	-	-	-	-	-	10	<0.4	9	12	6	<0.1	69	58	<0.5	25	
WFZ-S3-2-Ewall 1.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	-	-	-	-	-	-	-	-	-	-	15	<0.4	19	3	14	<0.1	8	15	<0.5	25	
WFZ-S3-2-Ewall 4.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	7	<0.4	6	5	6	0.2	39	41	<0.5	67	
WFZ-S3-2-Ewall 5.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	-	-	-	-	-	-	-	-	-	-	17	<0.4	9	6	6	<0.1	26	35	<0.5	110	
WFZ-S3-3-Wwall 1..0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	7	0.4	20	7	10	<0.1	2	16	<0.5	25	
WFZ_S3-3_Swall_1	18/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	9	<0.4	9	13	6	<0.1	0.5	11	<0.5	0.25	
WFZ_S3-3_Wwall 3.0	18/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.025	-	-	-	-	-	-	-	-	-	-	2	<0.4	4	3	4	<0.1	0.5	3	<0.5	0.25	
WFZ_S3-3_Base	18/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	<50	150	<100	<0.5	0.06	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	10	<0.4	14	8	23	<0.1	3	96	<0.5	4.31	
WFZ_OS_1	18/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	<50	290	220	<0.5	0.025	-	-	-	-	-	-	-	-	-	-	2	<0.4	4	4	12	<0.1	2	19	<0.5	1.765*	
WFZ_OS_2	18/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	<50	270	170	<0.5	0.025	-	-	-	-	-	-	-	-	-	-	2	<0.4	3	4	14	<0.1	3	25	0.6	2.06*	
WFZ_OS_3	18/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	66	620	360	<0.5	0.32	-	-	-	-	-	-	-	-	-	-	2	0.4	4	7	36	0.2	5	32	<0.5	1.765*	
WFZ_OS_4	18/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	66	450	370	<0.5	0.025	-	-	-	-	-	-	-	-	-	-	2	<0.4	5	4	9	<0.1	4	19	0.6	1.94*	
WFZ_OS_5	18/11/14	119577				<0.2	<0.5	1	<2	<1	<25	54	550	430	<0.5	0.025	-	-	-	-	-	-	-	-	-	-	5	<0.4	5	7	20	<0.1	9	38	0.7	2.57	
WFZ_VENM_N_1	11/11/14	119151	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	10	<0.4	10	6	6	<0.1	1	5	<0.5	370	
WFZ_VENM_N_2	11/11/14	119151	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	19	<0.4	24	3	11	<0.1	2	11	<0.5	53	
WFZ_VENM_N_3	11/11/14	119151	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	6	<0.4	7	4	4	<0.1	<1	4	<0.5	<50	
SouthWestern Fill Zone																																					
SWFZ_2F_NWall_1_Orange	24/11/14	119854				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	7	<0.4	11	0.5	8	<0.1	2	7	<0.5	0.25	
SWFZ_2F_NWall_1_Grey	24/11/14	119854				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	4	<0.4	8	4	10	<0.1	3	26	<0.5	0.5	
SWFZ_2F_Scrape_1	24/11/14	119854				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	2	<0.4	6	0.5	7	<0.1	2	2	<0.5	0.25	
SWFZ_2C_NWall_1	24/11/14	119854				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	5	<0.4	12	3	9	<0.1	2	9	<0.5	0.6	
SWFZ_2C_Base_1	24/11/14	119854				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	7	<0.4	10	1	11	<0.1	2	12	<0.5	1.1	
SWFZ_2B_NWall_1	24/11/14	119854				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	2	<0.4	7	0.5	6	<0.1	2	5	<0.5	1.2	
SWFZ_2B_Base_1	24/11/14	119854				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	6	<0.4	10	1	11	<0.1	3	17	<0.5	2.9	
SWFZ_1A_Swall_1	28/11/14	120155				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	7	<0.4	11	0.5	10	<0.1	2	9	<0.5	0.91	
SWFZ_2A_Nwall_1	28/11/14	120155				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	7	<0.4	16	0.5	9	<0.1	2	7	<0.5	0.99	
SWFZ_1D_Base_1	28/11/14	120155				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	5	<0.4	7	3	10	<0.1	5	13	<0.5	41	
SWFZ_2E_Base_1	28/11/14	120155				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	8	<0.4	14	2	10	<0.1	3	17	<0.5	0.7	
SWFZ_2D_Base_1	28/11/14	120155				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	5	<0.4	8	2	7	<0.1	2	11	<0.5	25	
SWFZ_1F_Base_1	28/11/14	120155				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	5	<0.4	7	2	9	<0.1	2	34	<0.5	7.7	
SWFZ_3C_Ewall_1	28/11/14	120155				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	2	<0.4	10	5	8	<0.1	8	47	<0.5	24	
SWFZ_3D_Wall_1	28/11/14	120155				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	2	<0.4	10	0.5	7	<0.1	2	5	<0.5	4.8	
SWFZ_3E_Base_1	28/11/14	120155				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	5	<0.4	11	0.5	8	<0.1	1	4	<0.5	0.25	
SWFZ_4E_NWall_1	28/11/14	120155				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	4	<0.4	10	1	7	<0.1	2	7	<0.5	8.6	
SWFZ_3F_WWall_1	28/11/14	120155				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	2	<0.4	5	0.5	5	<0.1	2	3	<0.5	1.6	
SWFZ_2E_WWall_1	28/11/14	120155				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	6	<0.4	8	1	6	<0.1	2	8	<0.5	3.2	
Imported Material																																					
Sample -1	4/11/14	118835				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	2	<0.4	2	3	4	<0.1	1	11	-	-	
Sample -2	4/11/14	118835				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	2	<0.4	5	4	7	<0.1	2	20	-	-	
Sample - 3	4/11/14	118835				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	2	<0.4	4	4	7	<0.1	2	18	-	-	
SP_VENM_1	27/11/14	120038				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	5	<0.4	6	9	10	<0.1	4	25	<0.5	2	
SP_VENM_2	27/11/14	120038				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	2	<0.4	5	7	7	<0.1	3	20	<0.5	2.3	
SP_VENM_3	27/11/14	120038				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	4	<0.4	6	7	8	<0.1	4	21	<0.5	2.3	
SP_VENM_4	27/11/14	120038				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	5	<0.4	6	8	10	<0.1	3	24	<0.5	2.1	
SP_VENM_5	27/11/14	120038				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	4	<0.4	6	8	8	<0.1	4	24	<0.5	2.6	
VENM_6	2/12/14	120306	-		-	<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE											4	<0.4	4	7	7	<0.1	3	22	<0.5	0.91	
VENM_7	2/12/14	120306	-		-	<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE											6	<0.4	5	8	9	<0.1	3	23	<0.5	0.8	
Staging Areas																																					
WFZ_V_2A	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
WFZ_V_1A	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
WFZ_V_2B	16/01/15	122322				-	-	-	-	-	-	-	-	-	0.8	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
WFZ_V_3B	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
WFZ_V_1C	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
WFZ_V_2C_1	4/02/15	122998													<0.5	NIL (+)VE																					
WFZ_V_3C	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	0.69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
WFZ_V_4C	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
WFZ_V_1D	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	0.025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
WFZ_V_2D	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	1.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
WFZ_V_3D	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
WFZ_V_4D	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
WFZ_V_2E	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
WFZ_V_3E	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
WFZ_V_4E	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SWFZ_V_2B	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SWFZ_V_2B-A	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SWFZ_V_2C	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SWFZ_V_2C-A	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SWFZ_V_2E	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SWFZ_V_2D	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SWFZ_V_2D-A	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SWFZ_V_3B	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SWFZ_V_3C	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SWFZ_V_3D	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	0.28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SWFZ_V_3D-A	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	0.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SWFZ_V_3E	16/01/15	122322				-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						-	-	-	-	-	-	-	-	-																							

DLH1152 Hydro - Wangara Res Parcel 1- All Data

Metals and Inorganics

NEPM 2013 Residential A - Residential Land Use Criteria (as per RAP); mg/Kg					Asbestos	(0-4m+) - 0.5 ESL - 65	(0-<1m) - 160 (1-<2m) - 220 (2-<4m) - 310 (4m+) - 540 ESL - 105	(0-<1m) - 55 (1-4m+) - NL ESL - 125	(0-<1m) - 40 (1-<2m) - 60 (2-<4m) - 95 (4m+) - 170 ESL - 45	(0-<1m) - 3 (1-<2m) - NL (2-<4m) - NL (4m+) - NL	F1 (C6-C10) (0-<1m) - 45 (1-<2m) - 70 (2m<4) - 110 (4m+) - 200 ESL - 180, ML - 800	F2 (>C10-C16<Napthalene) (0-<1m) - 110 (1-<2m) - 240 (2m<4) - 440 (4m+) - NL ESL - 120 ML - 1000	F3 (>C16-C34) NL ESL - 1300 ML - 3500	F4 (>C34-C40) NL ESL - 5600 ML - 10000	3	300	DDT+DDD+DDE -240	Aldrin+Dieldrin - 6	Chlordane - 50	Endosulfan - 270	Endrin - 10	Heptachlor - 6	HCB - 10	Methoxychlor - 300			100	20	100	6,000	300	40	400	7,400	250	440 mg/kg (RAP)
Sample ID	Date	Chemical Report	Asbestos Report	Soil Desciption		BTEX				TRH Sand					PAH		Pesticides										Heavy Metals								Cyanide	Fluoride
						Benz	Toluene	EthylBenzene	Xylene	Naphthalene	F1	F2	F3	F4	BaP TEQ	Total	OC								OP	PCB	As	Cd	Cr VI	Cu	Pb	Hg	Ni	Zn		
WFZ_Surface_1	3/11/14	118748	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	1.67	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	10	<0.4	17	3	10	<0.1	4	16	-	-
WFZ_Surface_2	3/11/14	118748	-			<0.2	<0.5	<1	<2	<1	<25	<50	536	247	14.5	72.55	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	0.6	34	33	31	0.1	31	280	-	-
WFZ_Surface_3	3/11/14	118748	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	0.91	4.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	4	<0.4	12	6	13	<0.1	8	100	-	-
WFZ_Surface_4	18/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	180.00	830	360	<0.5	0.79	-	-	-	-	-	-	-	-	-	-	10	<0.4	14	8	23	<0.1	3	96	<0.5	1.865*
WFZ_Surface_5	18/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	94.00	550	340	<0.5	0.06	-	-	-	-	-	-	-	-	-	-	<4	<0.4	4	8	14	<0.1	4	32	0.7	1.67
WFZ_N_B_1	11/11/14	119151	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	2.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	<0.4	12	10	7	<0.1	4	27	0.7	1800
WFZ_N_S_1	11/11/14	119151	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<0.4	6	9	7	<0.1	<1	<1	<0.5	410
WFZ_N_E_1	11/11/14	119151	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<0.4	7	5	7	<0.1	<1	4	<0.5	220
WFZ_N_W_1	11/11/14	119151	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	4	<0.4	9	5	6	<0.1	2	5	<0.5	640
WFZ_S1-1_WWall_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	<0.4	8	7	6	<0.1	2	6	<0.5	53
WFZ_S1-1_EWall_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	160	<100	5.9	35	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	9	<0.4	15	23	8	<0.1	16	44	<0.5	820
WFZ_S1-1_EWall-2	17/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	<4	<0.4	6	3	4	<0.1	<1	2	-	-
WFZ_S1-2_WWall_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	130	<100	3.9	21	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	7	<0.4	18	13	11	0.1	9	49	<0.5	1400
WFZ_S1-2_WWall-2	17/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	<4	<0.4	5	20	5	<0.1	<1	2	-	-
WFZ_S1-2_EWall_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	1.8	11	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	12	<0.4	22	17	16	<0.1	7	130	<0.5	1500
WFZ_S1-2_EWall-2	17/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	1.5	8.1	-	-	-	-	-	-	-	-	-	-	8	<0.4	11	11	9	<0.1	7	32	-	-
WFZ_S1-2_Base_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	440	240	1.9	10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	7	<0.4	21	9	14	<0.1	8	45	<0.5	280
WFZ_S1-3_WWall_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.06	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	11	<0.4	19	6	17	<0.1	5	23	<0.5	190
WFZ_S1-3_EWall_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	4	<0.4	7	21	7	<0.1	50	120	<0.5	260
WFZ_S1-3_EWall-2	17/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	14	<0.4	20	4	9	<0.1	7	19	-	-
WFZ_S3-3_Ewall 2.0	18/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	10	<0.4	21	8	8	<0.1	2	35	<0.5	<0.5
WFZ_S1-3_Base_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<0.4	3	4	3	<0.1	2	7	<0.5	85
WFZ_S2-1_WWall_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	<0.4	8	10	7	<0.1	22	61	<0.5	340
WFZ_S2-1_EWall_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	15	<0.4	22	4	11	<0.1	8	33	<0.5	180
WFZ_S2-1_EWall_1A	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	15	<0.4	20	4	11	<0.1	7	29	<0.5	610
WFZ_S2-1_Base_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	10	<0.4	11	11	6	<0.1	8	38	<0.5	240
WFZ_S2-2_Wwall_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.26	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	<0.4	11	13	16	<0.1	89	90	<0.5	230
WFZ_S2-2_Ewall_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	10	<0.4	15	3	10	<0.1	5	17	<0.5	130
WFZ_S2-2_Swall_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.68	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	<0.4	6	10	4	<0.1	13	40	<0.5	320
WFZ_VENM_S3-2_1	12/11/14	119306	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	16	<0.4	26	2	15	<0.1	8	23	<0.5	87
WFZ_VENM_S3-2_1A	12/11/14	119306	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	16	<0.4	24	2	15	<0.1	6	19	<0.5	170
WFZ_S2-2_WWall-2	17/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	4	<0.4	7	6	4	<0.1	10	22	-	-
WFZ_S2-3_Ewall_1	12/11/14	119306	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	0.6	4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	9	<0.4	17	6	22	<0.1	12	84	<0.5	780
WFZ_S2-3_Wwall_1	12/11/14	119306	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.82	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	6	<0.4	10	14	9	<0.1	66	85	<0.5	1800
WFZ_S2-3_Base_1	12/11/14	119306	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.38	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	6	<0.4	10	12	9	<0.1	67	82	<0.5	370
WFZ_Ramp_Base1	12/11/14	119306	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	9	<0.4	14	7	11	<0.1	17	37	<0.5	5300
WFZ-S3-1-Wwall_1.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	4	<0.4	9	6	5	<0.1	2	8	<0.5	<50
WFZ-S3-1-Wwall_2.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	<4	<0.4	9	11	6	<0.1	110	80	<0.5	<50
WFZ-S3-1-Wwall_3.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	0.31	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	<0.4	15	18	13	<0.1	19	66	<0.5	170
WFZ-S3-1-Wwall_5.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	8	<0.4	6	5	5	<0.1	49	29	<0.5	230
WFZ-S3-1-Ewall_1.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	7	<0.4	10	4	7	<0.1	9	26	<0.5	150
WFZ-S3-1-Ewall_3.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	160	<100	1.8	7.9	-	-	-	-	-	-	-	-	-	-	10	<0.4	21	10	13	<0.1	11	55	<0.5	200
WFZ-S3-1-Ewall_5.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	9	<0.4	8	11	6	<0.1	45	26	<0.5	<50
WFZ-S3-1-Base	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	11	<0.4	7	8	6	<0.1	40	23	<0.5	460
WFZ-S3-2-WWall1.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	6	<0.4	12	4	8	<0.1	25	29	<0.5	<50
WFZ-S3-2-WWall-1.0a	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	5	<0.4	11	4	7	<0.1	21	44	<0.5	<50
WFZ-S3-2-Wwall_3.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	9	<0.4	10	3	13	0.2	6	44	<0.5	89
WFZ-S3-2-Wwall_5.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	10	<0.4	9	12	6	<0.1	69	58	<0.5	<50
WFZ-S3-2-Ewall_1.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	15	<0.4	19	3	14	<0.1	8	15	<0.5	<50
WFZ-S3-2-Ewall_4.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	7	<0.4	6	5	6	0.2	39	41	<0.5	67
WFZ-S3-2-Ewall_5.0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	17	<0.4	9	6	6	<0.1	26	35	<0.5	110
WFZ-S3-2-EWall-5.0a	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	10	<0.4	9	7	6	<0.1	37	76	<0.5	110
WFZ-S3-3-Wwall_1..0	14/11/14	119473				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	7	0.4	20	7	10	<0.1	2	16	<0.5	<50
WFZ_S3-3_Swall_1	18/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	9	<0.4	9	13	6	<0.1	<1	11	<0.5	<0.5
WFZ_S3-3_Wwall 3.0	18/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	<4	<0.4	4	3	4	<0.1	<1	3	<0.5	<0.5
WFZ_S3-3_Base	18/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	<50	150	<100	<0.5	0.06	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	10	<0.4	14	8	23	<0.1	3	96	<0.5	4.31
WFZ_OS_1	18/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	<50	290	220	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	4	<0.4	9	6	16	<0.1	6	25	<0.5	1.765*
WFZ_OS_2	18/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	<50	270	170	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	<4	<0.4	4	4	12	<0.1	2	19	<0.5	2.06*
WFZ_OS_3	18/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	66	620	360	<0.5	0.32	-	-	-	-	-	-	-	-	-	-	<4	<0.4	3	4	14	<0.1	3	25	0.6	1.765*
WFZ_OS_4	18/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	66	450	370	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	<4	0.4	4	7	36	0.2	5	32	<0.5	1.94*
WFZ_OS_5	18/11/14	119577	-			<0.2	<0.5	<1	<2	<1	<25	54	550	430	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	<4	<0.4	5	4	9	<0.1	4	19	0.6	2.57
WFZ_S3-3_Base	24/11/14	120038				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	0.06	-	-	-	-	-	-	-	-	-	-	4	<0.4	6	5	6	<0.1	2	14	<0.5	1.1
SW-ASB-1	25/09/14	118154				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	<4	<0.4	12	3	5	<0.1	2	7	-	-
SW-ASB-2	25/09/14	118154				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	4	<0.4	8	3	10	<0.1	2	21	-	-
SW-ASB-3	25/09/14	118154				<0.2	<0.5	<1	<2	<1	<25	<50	110	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	6	<0.4	9	4	10	<0.1	3	24	-	-
SWFZ_2F_NWall_1_Orange	24/11/14	119854				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	7	<0.4	11	<1	8	<0.1	2	7	<0.5	<0.5
SWFZ_2F_NWall_1_Grey	24/11/14	119854				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	4	<0.4	8	4	10	<0.1	3	26	<0.5	0.5
SWFZ_2F_Scrape_1	24/11/14	119854				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	<4	<0.4	6	<1	7	<0.1	2	2	<0.5	<0.5
SWFZ_2C_NWall_1	24/11/14	119854				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	5	<0.4	12	3	9	<0.1	2	9	<0.5	0.6
SWFZ_2C_Base_1	24/11/14	119854				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	7	<0.4	10	1	11	<0.1	2	12	<0.5	1.1
SWFZ_2B_NWall_1	24/11/14	119854				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	<4	<0.4	7	<1	6	<0.1	2	5	<0.5	1.2
SWFZ_2B_Base_1	24/11/14	119854				<0.2	<0.5	<1	<3	<1	<25	<50	210	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	6	<0.4	10	1	11	<0.1	3	17	<0.5	2.9
SWFZ_1A_Swall_1	28/11/14	120155				<0.2	<0.5	<1	<3	<1	<25	<50	160	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	7	<0.4	11	<1	10	<0.1	2	9	<0.5	0.91
SWFZ_2A_Nwall_1	28/11/14	120155				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	7	<0.4	16	<1	9	<0.1	2	7	<0.5	0.99
SWFZ_1D_Base_1	28/11/14	120155				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	5	<0.4	7	3	10	<0.1	5	13	<0.5	41
SWFZ_2E_Base_1	28/11/14	120155				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	8	<0.4	14	2	10	<0.1	3	17	<0.5	0.7
SWFZ_2D_Base_1	28/11/14	120155				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	5	<0.4	8	2	7	<0.1	2	11	<0.5	25
SWFZ_1F_Base_1	28/11/14	120155				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	5	<0.4	7	2	9	<0.1	2	34	<0.5	7.7
SWFZ_3C_Ewall_1	28/11/14	120155				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	<4	<0.4	10	5	8	<0.1	8	47	<0.5	24
SWFZ_3D_Wall_1	28/11/14	120155				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	<4	<0.4	10	<1	7	<0.1	2	5	<0.5	4.8
SWFZ_3E_Base_1	28/11/14	120155				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	5	<0.4	11	<1	8	<0.1	1	4	<0.5	<0.5
SWFZ_4E_NWall_1	28/11/14	120155				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	4	<0.4	10	1	7	<0.1	2	7	<0.5	8.6
SWFZ_3F_WWall_1	28/11/14	120155				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	<4	<0.4	5	<1	5	<0.1	2	3	<0.5	1.6
SWFZ_2E_WWall_1	28/11/14	120155				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	6	<0.4	8	1	6	<0.1	2	8	<0.5	3.2
SWFZ_2E_WWall_1A	28/11/14	120155				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	4	<0.4	8	1	6	<0.1	2	6	<0.5	3
Pitch_WFZ_1	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	490	1200	<0.5	0.06	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<0.4	<1	<1	3	<0.1	<1	8	<0.5	150
WFZ_VENM_N_1	11/11/14	119151	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	10	<0.4	10	6	6	<0.1	1	5	<0.5	370
WFZ_VENM_N_2	11/11/14	119151	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	19	<0.4	24	3	11	<0.1	2	11	<0.5	53
WFZ_VENM_N_3	11/11/14	119151	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	6	<0.4	7	4	4	<0.1	<1	4	<0.5	<50
SPC_WFZ_1	12/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	210	170	2.7	14	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	7	<0.4	22	37	17	<0.1	13	120	<0.5	5500
SPC_WFZ_2	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	280	190	6.8	37	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	7	<0.4	89	28	19	<0.1	24	220	<0.5	4400
SPC_WFZ_3	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	140	<100	4.6	25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	9	<0.4	24	20	32	<0.1	21	450	<0.5	2500
SPC_WFZ_4	14/11/14	119231	-			<0.2	<0.5	<1	<2	<1	<25	<50	340	230	5	27	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	6	<0.4	19	15	24	<0.1	16	320	0.6	4000
SPO_WFZ_1	12/11/14	119306	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	16	<0.4	24	2	15	<0.1	6	19	<0.5	170
SPO_WFZ_2	12/11/14	119306	-			<0.2	<0.5	<1	<2	<1	<25	<50	160	<100	3	16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	13	<0.4	35	190	41	<0.1	18	500	<0.5	2500
SPI_WFZ_1	12/11/14	119306	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	1.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	<0.4	14	14	15	<0.1	22	93	<0.5	360
SPI_WFZ_2	12/11/14	119306	-			<0.2	<0.5	<1	<2	<1	<25	<50	240	100	5	28	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	7	<0.4	28	48	18	<0.1	20	120	<0.5	3200
SPI_WFZ_3	12/11/14	119306	-			<0.2	<0.5	<1	<2	<1	<25	<50	220	110	3.5	22	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	7	<0.4	23	68	52	<0.1	17	210	<0.5	4100
SPA_WFZ_1	12/11/14	119306	-			<0.2	<0.5	<1	<2	<1	<25	<50	390	140	17	95	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	7	<0.4	24	51	20	<0.1	20	160	<0.5	2100
SPA_WFZ_2	12/11/14	119306	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	2.1	12	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<0.4	9	7	7	<0.1	21	60	<0.5	2800
SPM_WFZ_1	12/11/14	119306	-			<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	1.9	11	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<4	<0.4	11	12	12	<0.1	18	83	<0.5	1300
SPM_WFZ_2	12/11/14	119306	-			<0.2	<0.5	<1	<2	<1	<25	<50	320	460	4.4	22	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	5	<0.4	17	21	26	<0.1	13	220	<0.5	950
Sample -1	4/11/14	118835				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	<4	<0.4	2	3	4	<0.1	1	11	-	-
Sample -2	4/11/14	118835				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	<4	<0.4	5	4	7	<0.1	2	20	-	-
Sample - 3	4/11/14	118835				<0.2	<0.5	<1	<2	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	<4	<0.4	4	4	7	<0.1	2	18	-	-
SP_VENM_1	27/11/14	120038				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	5	<0.4	6	9	10	<0.1	4	25	<0.5	2
SP_VENM_2	27/11/14	120038				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	<4	<0.4	5	7	7	<0.1	3	20	<0.5	2.3
SP_VENM_3	27/11/14	120038				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	4	<0.4	6	7	8	<0.1	4	21	<0.5	2.3
SP_VENM_4	27/11/14	120038				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	5	<0.4	6	8	10	<0.1	3	24	<0.5	2.1
SP_VENM_5	27/11/14	120038				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	4	<0.4	6	8	8	<0.1	4	24	<0.5	2.6
SP_VENM_5A	27/11/14	120038				<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	<4	<0.4	4	7	8	<0.1	2	18	<0.5	3
VENM_6	2/12/14	120306	-		-	<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE											4	<0.4	4	7	7	<0.1	3	22	<0.5	0.91
VENM_7	2/12/14	120306	-		-	<0.2	<0.5	<1	<3	<1	<25	<50	<100	<100	<0.5	NIL (+)VE											6	<0.4	5	8	9	<0.1	3	23	<0.5	0.8
SPI-NEPM-1	17/11/14	-	119472		<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPI-NEPM-2	17/11/14	-	119472		<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPI-NEPM-3	17/11/14	-	119472		<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPI-NEPM-4	17/11/14	-	119472		<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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SPO-NEPM-2	17/11/14	-	119472		<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPO-NEPM-3	17/11/14	-	119472		<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPO-NEPM-4	17/11/14	-	119472		<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPO-NEPM-5	17/11/14	-	119472		<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPO-NEPM-6	17/11/14	-	119472		<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPN-NEPM-1	17/11/14	-	119472		<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPN-NEPM-2	17/11/14	-	119472		<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SPC-NEPM-1	18/11/14	-	119577		<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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SPR-NEPM-1	18/11/14	-	119577		<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Northern bulk sample 1	19/11/14		119629		<0.1																																			
Southern bulk sample 1	19/11/14		119629		<0.1																																			
WFZ_S3_BULK_WWall	24/11/14	-	119854		<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
WFZ_S3_BULK_EWall	24/11/14	-	119854		<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SWFZ_4G	2/12/14	-	120306		<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SWFZ_3C	2/12/14	-	120306		<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SWFZ_2D	2/12/14	-	120306		<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SWFZ_2A	2/12/14	-	120306		<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SWFZ_2F	2/12/14	-	120306		<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SWFZ_2E	2/12/14	-	120306		<0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
WFZ_V_2A	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
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WFZ_V_2B	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	0.8	5.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
WFZ_V_3B	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
WFZ_V_1C	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
WFZ_V_2C	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	**6.1**	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
WFZ_V_2C_1	4/02/15	122998														<0.5	NIL (+)VE																								
WFZ_V_3C	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	0.69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
WFZ_V_4C	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
WFZ_V_1D	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
WFZ_V_2D	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	1.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
WFZ_V_3D	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
WFZ_V_4D	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
WFZ_V_2E	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
WFZ_V_3E	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
WFZ_V_4E	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SWFZ_V_2B	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SWFZ_V_2B-A	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SWFZ_V_2C	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SWFZ_V_2C-A	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SWFZ_V_2E	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SWFZ_V_2D	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SWFZ_V_2D-A	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SWFZ_V_3B	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SWFZ_V_3C	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SWFZ_V_3D	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	0.28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SWFZ_V_3D-A	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	0.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
SWFZ_V_3E	16/01/15	122322				-	-	-	-	-	-	-	-	-	-	<0.5	NIL (+)VE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Appendix H

Addendum to Landuses

Appendix H Addendum to Landuses

RAMBOLL

ENVIRONMENT
& HEALTH

Hydro Aluminium Kurri Kurri Pty Ltd
Hart Road
Loxford
NSW 2326

Att: Mr Richard Brown

Dear Richard,

Date 03/04/2020

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Suitability of Residential Parcel 1 and Residential Central for other land uses

Hydro Aluminium Kurri Kurri Pty Ltd engaged Ramboll and others to complete site investigation, remediation and validation activities at the site known as Residential Parcel 1 and comprising Lots 1, 2, 3, 4, 5, 7, 8 and 9 in DP456946, Lots 54, 55, 69, 70 & 71 in DP975994, and Part Lot 1 in DP 1206034 and the site known as Residential Central and comprising Lot 1 in DP 71130, Lot 1 and Lot 2 in DP 62332 and Lot 1 in DP 998540. Residential Parcel 1 is located in the Maitland City Council local government area and comprises 80.32 Ha. Residential Central is located in the Cessnock Council local government area and comprises 141.87 Ha.

Investigation works for Residential Parcel 1 were reported in a number of supporting documents which were reviewed in preparation of the Site Audit Statement 2015/02 which was prepared by Mr Ross McFarland and issued 3 May 2019. The Site Audit Statement states that the land is suitable for:

- Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry
- Park, recreational open space, playing field
- RU2 Rural Landscape and E2 Environmental Conservation

This finding is consistent with the evidence and statements provided in Ramboll Environ 'Addenda to Phase 2 Environmental Site Assessment Report and Validation Report, Residential Parcel 1: Environmental Conservation and Rural Landscape Zoning, October 2017'.

Ramboll Australia Pty Ltd.
ACN 095 437 442
ABN 49 095 437 442

Similarly, Site Audit Statement 2015/03 was prepared by Mr Ross McFarland for Residential Central, which was issued on 21 May 2019. This Site Audit Statement states that the land is suitable for:

- Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry
- Park, recreational open space, playing field
- E2 Environmental Conservation and B1 Neighbourhood Centre

This finding is consistent with the evidence and statements provided in Ramboll Environ 'Phase 2 Environmental Site Assessment, Parcel 3, December 2016' and Ramboll Environ 'Hydro Aluminium Kurri Kurri: Validation of Asbestos Containing Material Absence in Parcel 3, December 2016'.

Whilst not specifically assessed, Ramboll consider both Residential Parcel 1 and Residential Central to also be suitable for the following land uses:

- Day care centre, preschool, primary school
- Residential with minimal opportunity for soil access, including units
- Secondary school
- Commercial/industrial

Both sites, without further investigation, are considered suitable for these land uses on the basis that both sites are suitable for 'Residential with accessible soil'. The soil, water and vapour investigation and screening criteria relevant to this site use are consistent with those required for day care and primary school, and lower (i.e. more sensitive) than the criteria for secondary schools and commercial/ industrial sites for all contaminants assessed.

On this basis, Ramboll considers Residential Parcel 1 and Residential Central suitable for the following land uses:

- Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry
- Park, recreational open space, playing field
- RU2 Rural Landscape and E2 Environmental Conservation
- Day care centre, preschool, primary school
- Residential with minimal opportunity for soil access, including units
- Secondary school
- Commercial/industrial

Yours sincerely

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RAMBOLL

ENVIRONMENT
& HEALTH

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Dear Richard,

Date 21/07/2020

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Australia

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Suitability of Residential Parcel 1 for land uses

Hydro Aluminium Kurri Kurri Pty Ltd engaged Ramboll to complete site investigation, remediation and validation activities at the site known as Residential Parcel 1 and comprising Lots 1, 2, 3, 4, 5, 7, 8 and 9 in DP 456946, Part Lot 1, DP 1206034, Lots 53, 54, 69, 70 and 71 in DP 975994 and comprising 82.32 Ha. The site is situated in Maitland Council Local Government Area.

Investigation and remediation works for Residential Parcel 1 were reported in a number of documents which were reviewed in preparation of the Site Audit Statement 2015/02 issued by Mr Ross McFarland on 7 May 2019. This Site Audit Statement states that the land is suitable for:

- Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry
- Park, recreational open space, playing field
- E2 Environmental Conservation and RU2 Environmental Conservation

A Rezoning Masterplan has been developed by Hydro that identifies Residential Parcel 1 to comprise land proposed for general residential (R1), rural landscape (RU2) and public recreation (RE1). The land is currently zoned rural landscape (RU2). Land uses under the Maitland Local Environment Plan 2011 for these zonings are:

General Residential R1

2 Permitted without consent

Home occupations

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ABN 49 095 437 442

3 Permitted with consent
Attached dwellings; Bed and breakfast accommodation; Boarding houses; Building identification signs; Business identification signs; Centre-based child care facilities; Community facilities; Dwelling houses; Group homes; Home-based child care; Home industries; Hostels; Hotel or motel accommodation; Multi dwelling housing; Neighbourhood shops; Oyster aquaculture; Places of public worship; Pond-based aquaculture; Residential flat buildings; Respite day care centres; Roads; Semi-detached dwellings; Seniors housing; Serviced apartments; Shop top housing; Tank-based aquaculture; Any other development not specified in item 2 or 4

Rural Landscape RU2

2 Permitted without consent
Extensive agriculture; Home occupations; Intensive plant agriculture
3 Permitted with consent
Agriculture; Airstrips; Animal boarding or training establishments; Aquaculture; Bed and breakfast accommodation; Boat launching ramps; Boat sheds; Camping grounds; Caravan parks; Cellar door premises; Cemeteries; Community facilities; Crematoria; Dual occupancies; Dwelling houses; Eco-tourist facilities; Educational establishments; Environmental facilities; Environmental protection works; Farm buildings; Farm stay accommodation; Flood mitigation works; Forestry; Helipads; Home-based child care; Home businesses; Home industries; Information and education facilities; Jetties; Landscaping material supplies; Markets; Open cut mining; Places of public worship; Plant nurseries; Recreation areas; Recreation facilities (outdoor); Roads; Roadside stalls; Rural industries; Rural supplies; Signage; Turf farming; Veterinary hospitals; Water supply systems

Rural Landscape RE2

2 Permitted without consent
Environmental facilities; Environmental protection works
3 Permitted with consent
Aquaculture; Boat launching ramps; Boat sheds; Camping grounds; Car parks; Caravan parks; Centre-based child care facilities; Charter and tourism boating facilities; Community facilities; Information and education facilities; Jetties; Kiosks; Markets; Public administration buildings; Recreation areas; Recreation facilities (indoor); Recreation facilities (major); Recreation facilities (outdoor); Respite day care centres; Roads; Signage; Water recreation structures; Water supply systems

Whilst not specifically assessed the above uses under the zonings are broadly consistent with the following land uses defined in the NEPM (2013) National Environment Protection (Assessment of Site Contamination) Measure 1999:

- Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry
- Day care centre, preschool, primary school
- Residential with minimal opportunity for soil access, including units
- Secondary school
- Park, recreational open space, playing field
- Commercial/industrial land uses
- Rural landscape

- Environmental conservation.

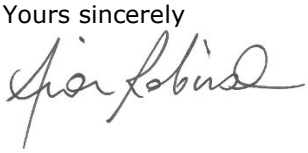
Ramboll consider Residential Parcel 1, without further investigation, to be suitable for these land uses on the basis that the site is suitable for 'Residential with accessible soil'. The soil, water and vapour investigation and screening criteria relevant to this site use are consistent with those required for day care and primary school, and lower (i.e. more sensitive) than the criteria for secondary schools and commercial/ industrial sites for all contaminants assessed.

As described in the Ramboll Environ 'Addenda to Phase 2 Environmental Site Assessment Report and Validation Report, Residential Parcel 1: Environmental Conservation and Rural Landscape Zoning, October 2017', Residential Parcel 1 was assessed for rural land use and environmental conservation and found to be suitable.

On this basis Ramboll consider Residential Parcel 1 suitable for the following land uses:

- Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry
- Park, recreational open space, playing field
- Day care centre, preschool, primary school
- Residential with minimal opportunity for soil access, including units
- Secondary school
- Commercial/industrial
- Rural Landscape and
- Environmental Conservation

Yours sincerely



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References:
NEPM (2013) National Environment Protection (Assessment of Site Contamination) Measure 1999. Federal Register of Legislative Instruments F2013C00288.