Phase 2 Environmental Site Assessment, Parcel 12

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Hydro Aluminium Kurri Kurri Pty Ltd

On behalf of:

Prepared by:
ENVIRON Australia Pty Ltd

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Acronyms and Abbreviations

ACM	Asbestos Containing Materials
AHD	Australian Height Datum
ALS	Australian Laboratory Services
ANZECC	Australian and New Zealand Environment and Conservation Council
B(a)P	Benzo(a)pyrene
BGL	Below Ground Level
BTEX	Benzene, Toluene, Ethylbenzene & Xylenes (Monocyclic aromatic Hydrocarbons)
CT	Certificate of Title
DEC	NSW Department of Environment and Conservation, now EPA
DP	Deposited Plan
DQI	Data Quality Indicator
DQO	Data Quality Objective
EIL	Ecological Investigation Level
EPA	NSW Environment Protection Authority
ESA	Environmental Site Assessment
F	Fluoride
GMU	Groundwater Management Unit
GPS	Global Positioning System
Ha	Hectare
HIL	Health Investigation Level
HSL	Health Screening Level
HRA	Health Risk Assessment
km	Kilometres
LOR	Limit of Reporting
m	Metres
Mercury	Inorganic mercury unless noted otherwise
Metals	As: Arsenic, Cd: Cadmium, Cr: Chromium, Cu: Copper, Fe: Iron, Ni: Nickel, Pb: Lead, Zn: Zinc, Hg: Mercury, Se: Selenium
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Litre
m AHD	Metres relative to the Australian Height Datum
m BGL	Metres below ground level
m TOC	Metres below top of casing
ML	Megalitre, one million litres
mg/L	Micrograms per Litre
NATA	National Association of Testing Authorities
NC	Not Calculated
ND	Not Detected
NEHF	National Environmental Health Forum
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
NSW	New South Wales
n	Number of Samples
OH&S	Occupational Health & Safety
PAH	Polycyclic Aromatic Hydrocarbons
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RPD	Relative Percent Difference
TRH	Total Recoverable Hydrocarbons
UCL	Upper Confidence Limit
US EPA	United States Environment Protection Authority
µg/L	Micrograms per Litre
VENM	virgin excavated natural material
-	On tables is "not calculated", "no criteria" or "not applicable"

Executive Summary

This report presents the findings of a Phase 2 Environmental Site Assessment undertaken on part of the Hydro Aluminium Kurri Kurri (Hydro) owned land known as Parcel 12. Parcel 12 is a rural property comprising approximately 4.3ha and is accessed from McLeod Road, Loxford and located within the buffer zone and to the south east of the Hydro Aluminium Kurri Kurri Smelter. Parcel 12 comprises three residential properties, with cleared open grassland at the rear of each property.

The objectives of this assessment were to assess the potential for contamination at Parcel 12 based on historical and current landuse and to assess the suitability of Parcel 12 for the purposes of low rural residential (R2) and rural landscape (RU2) land use.

A Phase 1 Environmental Site Assessment has previously been completed for the Hydro owned lands including Parcel 12 (ENVIRON (22 October 2013) Phase 1 ESA, Hydro Kurri Kurri Aluminium Smelter). The Phase 1 identified that contamination of Parcel 12 may have occurred from dust deposition due to the proximity of the Hydro smelter and from construction or demolition of dwellings constructed with asbestos containing materials and activities of the tenants on these properties.

To assess potential contaminants of concern on Parcel 12, a site walkover was completed and surface soil samples were collected from across the parcel.

The site walkover identified a dwelling and several sheds on each of the three lots located near the northern boundary, street frontage to McLeods Road. The remainder of each lot comprised open grassland with a stand of mature trees present along the south western and part of the south eastern boundaries. Each Lot was fenced. A fenced-off AbiGroup depot was located in the south western portion of Lot 10, comprising three demountable sheds and surface gravels. This depot is associated with the construction of the Hunter Expressway, for which AbiGroup were the contractor. A fenced-off grass plot was also located at the rear of the dwelling on Lot 10.

Surface soil samples from across Parcel 12 were collected and analysed for soluble fluoride. Fluoride results were below the preliminary screening level for residential landuse, which is considered applicable for the proposed rural residential landuse.

The site walkover identified hummocky (uneven and disturbed in appearance) ground at the rear of the three properties where poultry sheds may have been previously constructed. Excavation of this hummocky ground identified a small volume of fill material comprising ash or slag with minor glass and crushed brick. No asbestos containing materials (ACM) were identified within the fill material excavated and no soil contamination associated with heavy metals, or hydrocarbons was identified.

Three small ACM fragments were collected for analysis from hummocky ground on Lot 10 during the site walkover. These fragments were confirmed by the laboratory to contain chrysotile and crocidolite asbestos. No further ACM fragments were identified on the surface of Parcel 12.

The dwellings and associated sheds were assessed separately in a Hazardous Materials Audit, which identified asbestos containing building materials in the dwellings on Lot 10, 11 and 12.

Parcel 12 is suitable for the purposes of low rural residential (R2) and rural landscape (RU2) land use.

Hydro has separately engaged a NSW EPA-accredited Site Auditor to issue a Site Audit Statement certifying that the site is suitable for the proposed use.

ENVIRON makes the following recommendations:

- In the event that further ACM fragments are identified on the surface of Parcel 12, these fragments should be collected by Hydro personnel in a suitable plastic bag for collection and appropriate disposal;
- An Unexpected Finds protocol should be implemented during future development works to deal with potential buried wastes that may exist on Lot 12.

1 Introduction

1.1 Background

This report presents the findings of a Phase 2 Environmental Site Assessment undertaken on part of the Hydro Aluminium Kurri Kurri Pty Limited (Hydro) owned land known as Parcel 12. Parcel 12 is located off McLeod Road, Loxford, New South Wales (2326). The location of Parcel 12 is shown in **Figure 1**.

The work has been performed at the request of Hydro Aluminium Kurri Kurri Pty Limited (the "Client").

Hydro is currently evaluating options for the divestment of land parcels for a range of proposed uses following the closure of the smelter in May 2014. A Rezoning Masterplan has been developed that identifies Parcel 12 to comprise land suitable for low rural residential (R2) and rural landscape (RU2) land use.

A Phase 1 Environmental Site Assessment has previously been prepared for all Hydro owned lands and evaluated the potential for contamination. The Phase 1 identified that contamination of Parcel 12 may have occurred from dust deposition due to the proximity of the Hydro smelter and from construction/ demolition of dwellings constructed with asbestos containing materials.

It is noted that at the time of the fieldwork, this land parcel was named Employment Land Subarea 12 and as such the soil samples reference this name. The parcel was renamed Parcel 12 during the Rezoning Masterplan process.

The location of Parcel 12 in the context of the Rezoning Masterplan is shown in **Figure 2**.

1.2 Objectives and Scope of Work

The objectives of the assessment were to assess the potential for contamination at Parcel 12 based on historical and current land use and to assess the suitability of Parcel 12 for the purposes of low rural residential (R2) and rural landscape (RU2) land use.

The scope of work performed to meet the objectives comprised:

- A review of available information relating to land use to assess the potential for soil, groundwater or surface water contamination arising from historic and current activities;
- A review of published geological, hydrogeological and hydrological data to establish the environmental setting and sensitivity;
- Field work comprising:
  - Collection of surface soil samples to provide a coarse grid assessment to assess the potential for dust deposition from the smelter operations;
  - A site walkover to evaluate other potential locations of buried waste or illegal dumping.
- Data interpretation including comparison against relevant guidelines and a discussion of the findings in terms of human health and environment risk under the current and future land use scenarios.

- Review of options available for remediation or management to render Parcel 12 suitable for the proposed land use.

2 Site Description

2.1 Site Location

Parcel 12 is owned by Hydro Aluminium Kurri Kurri Pty Limited and is located approximately 35km north west of the city of Newcastle and 150km north of Sydney, in New South Wales, Australia. The address of Parcel 12 is McLeod Road, Loxford, New South Wales, Australia. The location of Parcel 12 is shown in **Figure 1**.

Parcel 12 is located within the Buffer Zone of the Hydro Aluminium Kurri Kurri Smelter, south east of the smelter. The Buffer Zone is an area of land surrounding the smelter that provides a buffer between the smelter and surrounding communities. The site comprises three residential properties, each with a dwelling and associated sheds. The rear of each property is cleared open grassland. Parcel 12 drains to Swamp Creek, located approximately 100m west of the site.

Parcel 12 is located within the Cessnock Local Government Area and is zoned RU2 – Rural Landscape under the Cessnock Local Environment Plan.

Parcel 12 is approximately 4.3 hectares (ha) and comprises the lot numbers and deposited plans (DP) listed in **Table 1**:

Table 1: Lot and Deposited Plans for Parcel 12.

Subarea	Lot/ DP	Area (ha)	Total Area (ha)
Parcel 12	Lot 10 DP1082569 Lot 11 DP1082569 Lot 12 DP1082569	2.1 1.1 1.1	4.3

Land uses surrounding Parcel 12 are as follows:

- North: Rural residential properties;
- South: The Hunter Expressway and sewerage treatment works surrounded by bushland;
- East: Bushland;
- West: Rural residential properties and bushland.

Parcel 12 is located approximately 850m to the south east of the smelter site boundary.

2.2 Site Setting

2.2.1 Topography

Parcel 12 is located in a low lying area of the Buffer Zone at approximately 12 mAHD. The main entrance off McLeod Road to Parcel 12 extends along its north eastern boundary and is the highest point on the site. The natural topography slopes to the south west towards Swamp Creek, located approximately 100m west of the site boundary.

2.2.2 Regional Geology

According to the review of the regional geology described on the Sydney Basin Geological Sheet, Parcel 12 is underlain by siltstone, marl and minor sandstone from the Permian aged Rutherford Formation (Dalwood Group) in the Sydney Basin.

Undifferentiated Quaternary alluvium occurs on the surface of Parcel 12 associated with surface water bodies. Quaternary sediments which are associated with Swamp Creek (located approximately 100m west of the site) and the Hunter River consist of gravel, sand, silt and clay.

2.2.3 Site Hydrology

Surface water from Parcel 12 discharges primarily via infiltration and overland flow to Swamp Creek, located approximately 100m west of the site. Swamp Creek discharges into Wentworth Swamp, which in turn discharges to the Hunter River approximately 11km northeast of Parcel 12 near Maitland.

The Wentworth Swamp system is within the Fishery Creek Catchment, where declining stream water quality and a reduction in diversity of native plants and animals has occurred due to population growth and development pressures in the last ten years (Hunter-Central Rivers Catchment Management Authority).

2.2.4 Regional Hydrogeology

Regional groundwater is expected to follow topography and flow northeast towards the surface water bodies that discharge to the Hunter River. Locally, groundwater beneath Parcel 12 is expected to flow west to Swamp Creek located approximately 100m west of the site.

According to the NSW Office of Environment and Heritage (Natural Resource Atlas), there are 21 licensed groundwater abstractions (bores) located within 2km of Parcel 12. The majority of the groundwater bores are located within the aluminium smelter and buffer zone.

Information for 11 bores located in a 1km radius from Parcel 12 has been included in Appendix A. The bores are used for monitoring purposes. No further information, such as depth to water or logging information was provided.

The Hunter River Alluvium Groundwater Management Unit (GMU) is an important groundwater resource to the region. Groundwater extraction for irrigation, urban supply, drought supply, stock, domestic and commercial/ industrial use occurs, with volumes in excess of 10,000ML per annum extracted from the Hunter River Alluvium GMU. Aquifer storage and recovery is also an important use of this GMU. It is noted that the Hunter River GMU is not the primary drinking water supply in the region, although the protection of

drinking water is a water quality objective for the Hunter River (NSW Water Quality and River Flow Objectives) (www.environment.nsw.gov.au/ieo/Hunter/index.htm).

2.3 Site Sensitivity

The sensitivity of Parcel 12 with respect to surface water and groundwater is considered to be moderate based on the following:

- Surface water and groundwater discharge into Swamp Creek, located approximately 100m west of the site, which discharges to the Hunter River via Wentworth Swamp within the Fishery Creek Catchment, approximately 11km northeast of Parcel 12 near Maitland.

- Declining stream water quality and a reduction in diversity of native plants and animals has occurred within the Fishery Creek Catchment and water quality down gradient of Parcel 12 has been impacted by historical coal mining;

- The Hunter River GMU is used for irrigation, urban supply, drought supply, stock, domestic and commercial/ industrial use but it is not the main drinking water supply in the region.

3 Site History

Site history investigations included in the Phase 1 ESA for the Hydro Aluminium Kurri Kurri Smelter, dated 22 October 2013 provided the following historical information about Parcel 12:

- Earliest records (aerial photograph in 1951) shows that Parcel 12 comprised unknown developments on Lots 10, 11 and 12. The photograph indicates that the extent of the development on each lot is greater than the present day extent.
- Aerial photographs indicate that the three lots were re-developed for residential landuse with a dwelling constructed on each lot in the early 1970s. The dwellings are located close to the north eastern boundary adjacent to McLeod Road.
- Historical aerial photographs indicate the dwellings remain on site to the present day. The remainder of each lot comprises vacant cleared land.
- Parcel 12 is located approximately 700m south east of the smelter boundary and may be impacted from smelter dust deposition.

The locations of the current dwellings are included in **Figure 3**. Photos are presented in **Appendix B**.

4 Sampling and Analytical Quality Plan

4.1 Potential Areas and Contaminants of Concern

Based on Parcel 12 historical information as discussed in **Section 3**, the following areas of concern were identified:

- Unknown developments on Lots 10, 11 and 12 that were demolished;
- Smelter dust deposition.
- Illegal dumping.

Contaminants of concern associated with the range of previous site activities are:

- Asbestos;
- Fluoride.

4.2 Data Quality Objectives and Data Quality Indicators

Data quality objectives (DQOs) and Data Quality Indicators (DQIs) were developed by ENVIRON using the US EPA seven-step DQO process. Completing the seven-step process helps to define the purpose of the assessment and the type, quality and quantity of data needed to inform decisions relating to the assessment of site contamination.

The seven-step DQO process and DQIs are included in **Appendix F**.

4.3 Sampling Design

The sampling design was optimised following the development of DQOs and DQIs. The sampling design is outlined below. ENVIRON notes that the historical site activities indicate potential contamination to surface soils only. Where fill was identified during the site walkover, a second round of field investigations was completed to assess subsurface soils. No potential contamination sources to surface water or groundwater have been identified.

4.3.1 Fluoride

To assess the potential for fluoride in soil from dust deposition from the Hydro Aluminium Kurri Kurri Smelter, surface soil samples were collected at a rate of one sample per 5ha.

The sample density is lower than that suggested in Table A of NSW EPA (1995) Contaminated Sites: Sampling Design Guidelines. The density is considered adequate for the purposes of this investigation for the following reasons:

- aerial dust deposition is likely to be relatively consistent over the surface of the parcel and therefore sampling on a low density will allow for identification of whether or not dust deposition is an issue; and
- in the event that elevated or variable fluoride concentrations are identified, additional sampling will be completed.

Samples were collected by trowel from surface soils on an approximate grid across open areas of Parcel 12. Sample locations were logged by GPS.

Soil samples were placed into laboratory-supplied paper bags and stored in an ice-filled cooler for transportation to the laboratory. Soil samples were transported to the laboratory under chain of custody conditions. Intra-laboratory duplicate soil samples were collected at a rate of 10%.

Soil samples were analysed for soluble fluoride, as this is the portion of total fluoride that is available for uptake in receptors including biota, flora, fauna and humans. The laboratory was NATA accredited for the analysis.

4.3.2 Asbestos

To assess the potential for asbestos and other illegally dumped wastes to be present at Parcel 12, a site walkover of accessible areas was completed.

The location and type of dumped wastes were detailed on Field Information Sheets and logged by GPS. Where asbestos was confidently identified by the field personnel, no sampling was completed. If not, a sample of potential asbestos containing material (ACM) was collected for laboratory analysis. ACM fragments were collected into a zip-lock bag using dedicated disposable gloves.

ACM fragments were analysed for asbestos identification by a laboratory NATA accredited for the analysis.

4.3.1 Potential Fill

The site walkover identified the potential for fill material at Parcel 12. As such, a second round of fieldwork was completed to assess the potential fill material and its potential for contamination. ENVIRON note that intrusive investigations could not be completed on Lot 12 due to access issues with the tenant.

A back hoe was used to excavate 14 test pits into areas of potential fill identified at Parcel 12. The test pits were logged by an ENVIRON environmental scientist and soil samples were collected for analysis.

Soil samples were collected into laboratory-supplied acid-rinsed glass jars using dedicated disposable gloves. The soil samples were stored in an ice-filled cooler for transportation to the laboratory. Soil samples were transported to the laboratory under chain of custody conditions. Intra-laboratory duplicate soil samples were collected at a rate of 10%.

Soil samples were analysed for a range of potential contaminants, including heavy metals, total recoverable hydrocarbons (TRH), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs), organophosphorous pesticides (OPPs) and asbestos. The laboratory was NATA accredited for the analysis.

5 Basis for Assessment Criteria

5.1 Soil

The criteria proposed for the assessment of soil contamination were sourced from the following references:

- NEPC (2013) National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) (NEPM).

The variation to the National Environmental Protection (Assessment of Site Contamination) Measure (NEPM 2013) was approved on 19 June 2013 by the NSWEPA under the *Contaminated Land Management Act 1997*. NEPM (2013) provide revised health-based soil investigation levels (HILs) and ecological-based investigation levels (EILs) for various land uses, as follows:

- HIL A - residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake, (no poultry), also includes children day care centres, preschools and primary schools

- HIL B - residential with minimal opportunities for soil access includes dwellings with fully and permanently paved yard space such as high-rise buildings and flats

- HIL C - public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. It does not include undeveloped public open space (such as urban bushland and reserves) which should be subject to a site-specific assessment where appropriate

- HIL D - commercial/industrial such as shops, offices, factories and industrial sites.

The NEPM 2013 also introduces health-based and ecological screening levels and management limits for petroleum hydrocarbons (HSLs and ESLs). The levels have been derived from recent assessments that more accurately define the exposure mechanisms and risks from sites contaminated with petroleum hydrocarbons.

The objective of the Phase 2 ESA is to assess soil contamination at Parcel 12 in relation to risks posed to human health and the environment under the proposed future land use of rural residential. As such, soil investigation results will be compared against the HIL/HSL Residential A (low density residential), management limits and EILs/ESLs for urban residential/public open space.

- The HILs are applicable for assessing human health risk via all relevant pathways of exposure. The HILs are generic to all soil types and apply generally to a depth of 3 m below the surface for residential use.
- HSLs for soil vapour intrusion from petroleum hydrocarbons - guidelines that prevent accumulation of vapours at concentrations that may represent a health risk. The HSLs are derived for various depths and are for the same generic land uses as for the HILs. The guidelines are relevant were soils are beneath building or structures such as confined spaces.

- EILs for urban residential/ public open space, applicable for assessing risk to terrestrial ecosystems. EILs depend on specific soil physicochemical properties and generally apply to the top 2 m of soil.
- ESLs for urban residential/ public open space, developed for selected petroleum hydrocarbon compounds and fractions and are applicable for assessing risk to terrestrial ecosystems. These are also generally applicable to the top 2m of soil.
- Management Limits where concentrations above these limits may indicate poor aesthetics, high odour and potentially explosive vapour. Management limits are to be applied after consideration of relevant ESLs and HSLs.

The applicable assessment criteria for heavy metals and PAHs in soil are presented in Table 2:

Table 2: Soil Assessment Criteria (mg/kg) – Health and Ecological Investigation Levels

	HIL A	EIL
Arsenic	100	100
Cadmium	20	-
Chromium (VI)	100	190 (Cr III, 1% Clay)
Copper	6000	60
Lead	300	1100
Nickel	400	30
Zinc	7,400	70
Mercury (inorganic)	40	-
Fluoride	Ref Table 5	-
Carcinogenic PAHs (as BaP TEQ)	3	-
Total PAHs	300	-

1 EILs represent the most conservative value possible as the lowest value for added contaminant limit (ACL) was used and the ambient background concentration (ABC) was not added, with the exception of zinc and copper, where the EIL was calculated by adding the ACL with the estimated ABC using the NEPM (2013) EIL Calculation Spreadsheet as shown in Appendix B.

The applicable assessment criteria for petroleum hydrocarbons in soil are presented in Table 3 and Table 4:

Table 3: Soil Assessment Criteria for Vapour Intrusion - HSL A & HSL B (mg/kg) - Sand

	0 to <1m	1m to <2m	2m to <4m	4m+
Toluene	160	220	310	540
Ethylbenzene	55	NL	NL	NL
Xylenes	40	60	95	170
Naphthalene	3	NL	NL	NL
Benzene	0.5	0.5	0.5	0.5
F1(4)	45	70	110	200
F2(5)	110	240	440	NL

1 Land use settings are equivalent to those described in Section 5.1 (above). HSLs for vapour intrusion for high density residential assume residential occupation of the ground floor. If communal car parks or commercial properties occupy the ground floor, HSL D should be used.

2 The soil saturation concentration (Csat) is defined as the soil concentration at which the porewater phase cannot dissolve any more of an individual chemical. The soil vapour that is in equilibrium with the porewater will be at its maximum. If the derived soil HSL exceeds Csat, a soil vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'.

3 (For soil texture classification undertaken in accord with AS 1726, the classifications of sand, silt and clay may be applied as coarse, fine with liquid limit <50% and fine with liquid limit>50% respectively, as the underlying properties to develop the HSLs may reasonably be selected to be similar. Where there is uncertainty, either a conservative approach may be adopted or laboratory analysis should be carried out.

4 To obtain F1 subtract the sum of BTEX concentrations from the C6-C10 fraction.

5 To obtain F2 subtract naphthalene from the >C10-C16 fraction.

Table 4: ESLs and Management Limits for Petroleum Hydrocarbons in Soil

TPH fraction	Soil texture	ESLs (mg/kg dry soil)	Management Limits[1] (mg/kg dry soil)
		Urban residential and public open space	Residential, parkland and public open space
F1 C6- C10	Fine	180*	800
F2 >C10-C16	Fine	120*	1000
F3 >C16-C34	Fine	1300	3500
F4 >C34-C40	Fine	5600	10000
Benzene	Fine	65	-
Toluene	Fine	105	-
Ethylbenzene	Fine	125	-
Xylenes	Fine	45	-
Benzo(a)pyrene	Fine	0.7	-

[1] Management limits are applied after consideration of relevant ESLs and HSLs.

[2] Separate management limits for BTEX and naphthalene are not available hence these should not be subtracted from the relevant fractions to obtain F1 and F2.

[3] ESLs are of low reliability except where indicated by * which indicates that the ESL is of moderate reliability.

[4] To obtain F1, subtract the sum of BTEX from C6-C10 fraction and subtract naphthalene from >C10-C16 to obtain F2.

The HSLs for asbestos are applicable for assessing human health risk via the exposure pathway of inhalation of airborne asbestos and are presented in **Table 5**. The HSLs are generic to all soil types.

Table 5. Health screening levels for asbestos contamination in soil Health Screening Level (w/w)

Form of asbestos	Residential A[1]	Residential B[2]	Recreational C[3]	Commercial/ Industrial D[4]
Bonded ACM	0.01%	0.04%	0.02%	0.05%
FA and AF[1] (friable asbestos)	0.001%			
All forms of asbestos	No visible asbestos for surface soil			

1. The screening level of 0.001% w/w asbestos in soil for FA and AF (i.e. non-bonded/friable asbestos) only applies where the FA and AF are able to be quantified by gravimetric procedures. This screening level is not applicable to free fibres.

NEPM (2013) do not provide criteria for fluoride in soils in Australia. Therefore, ENVIRON (2013) conducted a preliminary level Human Health Risk Assessment (HRA) specific to fluoride in order to derive a specific preliminary screening level for fluoride for the Hydro Aluminium Kurri Kurri Smelter . The screening levels are protective of the range of human receptors and are provided in **Table 6**:

Table 6: Site Specific Soil Assessment Criteria (mg/kg) for Fluoride	
Preliminary screening levels	
Land Use	**Preliminary screening level**
Residential landuse	F 440mg/kg
Recreational landuse	F 1200mg/kg
Commercial/ industrial landuse	F 17000mg/kg

Soil investigation results for the samples taken from a grid formation across Parcel 12 have been compared against the residential land use screening level. The fluoride 'residential land use' screening level is considered to be suitably protective of both 'residential' and 'rural residential' land use because the exposure pathways (including vegetable ingestion) and behavioural assumptions (e.g. soil ingestion rate) for the child are considered to be identical under residential and rural residential land use scenarios.

There is a possibility that the rural plots may contain a low density of domestic livestock such as poultry and goats, however there is limited evidence of fluoride accumulation in milk and edible tissues of animals fed high levels of fluorides (ATSDR, 2003; NAS, 1971). Rather, fluoride accumulates primarily (up to approximately 99%) in the skeletal tissues of terrestrial animals that consume fluoride-containing foliage (WHO, 1997; ATSDR, 2003). This assumption is supported by site-specific data collected during the 29th annual cattle survey conducted in March 2012 on cattle located within the site's buffer zone, and surrounding areas (AECOM, 2013). The results of this survey concluded that cattle has had little or no exposure to excess environmental fluoride; skeletal fluoride levels decreased compared to 2011 levels, with all fluoride measurements below the toxic threshold; and all cattle examined were in good health and body condition. Consequently, the residential screening level is considered to be suitably protective of rural residential land use that may contain a low density of domestic livestock.

Consistent with the guidance provided in the NEPM, the data was assessed against the above adopted site guidelines by:

- Comparing individual concentrations against the relevant guidelines and if discrete samples are in excess of the relevant guideline then;
- Comparing the 95% upper confidence limit (UCL) of mean against the relevant guideline also ensuring that:
    - the standard deviation of the results is less than 50% of the relevant investigation or screening level, and
    - no single value exceed 250% of the relevant investigation or screening level.

6 Results

6.1 Site Walkover

A site walkover was completed to identify areas of environmental concern, such as illegally dumped wastes and fill at Parcel 12. The entrance to Parcel 12 is from McLeod Road, which borders the northern boundary. The site comprises three rural residential lots, Lots 10, 11 and 12, with a dwelling and several sheds on each lot located near the northern site boundary. The remainder of each lot comprised open grassland and a section of mature trees along the south western boundary. Each lot slopes gently towards the south western site boundary. A fenced-off AbiGroup depot was located in the south western portion of Lot 10, comprising three demountable sheds and surface gravels. This depot is associated with the construction of the Hunter Expressway. A fenced-off grass plot was also located at the rear of the dwelling on Lot 10.

The dwellings and associated sheds were assessed separately in a Hazardous Materials Audit, a copy of which is included in **Appendix G**.

The site walkover identified hummocky ground on the western portion of each lot in the cleared grassed land at the rear of each dwelling. The hummocky ground was identified as elevated areas of land suspected to be the location of former poultry sheds. One ACM fragment and metal scrap on the land surface was observed at two of these locations.

The tenant from Lot 12 reported in the 1980s, sheds at the rear of the property were demolished and demolition waste was buried in the area. During rain events following this, scrap metal and other waste would rise to the land surface. The tenant indicated that concrete has been used to seal the area of ground filled with demolition waste in the paddock immediately adjacent to the dwelling. This paddock now comprises a shed to house goats and grassed land. The use of concrete to bury demolition waste was not evident from the land surface.

The locations of hummocky ground identified during the field investigations are shown in **Figure 3**. Photographs are included in **Appendix B**. Field Information Sheets are included in **Appendix C**.

6.2 Soil Investigations

6.2.1 Fluoride and Asbestos

Three surface soil samples were collected from across Parcel 12 as per the sampling design to assess the potential for fluoride in soil from dust deposition from the Hydro Aluminium Kurri Kurri Smelter as shown in **Figure 3**. A generalised lithology of the surface soils encountered at Parcel 12 is as follows:

- Topsoil: Sandy silt, brown, slightly moist.

One fragment of asbestos containing material (ACM) was identified in an area of hummocky ground suspected to be the location of a former poultry shed on Lot 10. This fragment was collected into a zip-lock plastic bag using dedicated disposable gloves for asbestos analysis.

As potential asbestos was identified, a 10m by 10m grid was set up over this area and a walkover screening survey conducted comprising two passes with a 90º directional change between them, as per NEPM (2013). The walkover identified two small ACM fragments within the 10m by 10m grid, which were collected and sent for asbestos analysis with the initial fragment.

6.2.1 Potential Fill

Fourteen test pits were excavated in areas of potential fill on Lots 10 and 11, as shown in **Figure 3**. ENVIRON note that access to Lot 12 was not available at the time of the investigation. In general, the test pits identified minor fill material comprising ash or slag with some crushed brick and glass to a maximum depth of 0.6m bgs. The fill material was underlain by silty sand.

Five representative soil samples were collected from the test pits for analysis. Three samples were analysed for asbestos, two samples were analysed for TPH/BTEX and one sample was analysed for heavy metals.

6.3 Soil Results

A summary of the soil results is presented in **Table 7**. Soil analytical results are presented in **Appendix D** and laboratory reports are included in **Appendix E**.

Table 7: Summary of Soil Results

Analyte	No. of Samples	Maximum Concentration (mg/kg)	No. exceeding Site Criteria	Criteria Exceeded (mg/kg)
Fluoride	3	5	0	-
Arsenic	1	<5	0	-
Cadmium	1	<1	0	-
Chromium	1	7	0	-
Copper	1	16	0	-
Lead	1	<5	0	-
Nickel	1	4	0	-
Zinc	1	31	0	-
Mercury	1	0.2	0	-
BaP TEQ	2	<0.5	0	-
Total PAHs	2	10.6	0	-
Benzene	2	<0.2	0	-
Toluene	2	<0.5	0	-
Ethyl benzene	2	<0.5	0	-
Xylene	2	<0.5	0	-
TRH C6-C10	2	<10	0	-
TRH >C10-C16	2	<50	0	-
TRH >C16-C34	2	<100	0	-
TRH >C34-C40	2	<100	0	-
Asbestos	4	1 – Chrysotile and crocidolite	1	Presence

The results of surface soil sampling for fluoride demonstrate that the conditions at Parcel 12 were not impacted by stack particulate fallout from the Hydro Aluminium Smelter.

The results of the fill sampling indicate that the fill material is not impacted by contamination associated with heavy metals, TRH/ BTEX or PAHs.

Chrysotile and crocidolite asbestos was identified in the ACM fragment collected during the site walkover. No asbestos was detected in samples of fill material.

6.4 Quality Assurance/ Quality Control

A quality assurance assessment for this report is presented in **Appendix F**. An assessment was made of data completeness, comparability, representativeness, precision and accuracy based on field and laboratory considerations, as outlined in NSW DEC (2006) and NSW EPA (2007) guidelines. Overall it is considered that the completed investigation works and the data are of suitable quality to meet the project objectives.

7 Site Characterisation

7.1 Conceptual Site Model

Parcel 12 consists of three residential properties with dwellings and associated sheds located close to the north eastern boundary. Parcel 12 is bounded by McLeod Road to the north, bushland to the east and the new Hunter Expressway to the south and west. The site is located in the south east of the Buffer Zone of the Hydro Aluminium Kurri Kurri Smelter.

Parcel 12 was developed for residential use in the early 1970s, with three residential properties on the parcel. This use remains to the present day. Historical aerial photographs indicate that the parcel was developed prior to the 1970s, with photographs from the 1950s showing an unknown development. The site walkover identified hummocky ground suspected to be the location of former poultry sheds on the western portion of each lot. It is likely that the previous 1950s development was for poultry farming. It is understood from the current tenant that sheds (likely poultry sheds) were demolished on Lot 12 in the 1980s and demolition waste was buried in the area. This waste was then covered with concrete and grassed over. As the location of the buried material is currently beneath a shed and access was not available to Lot 12 during the intrusive investigations, the extent and types of demolition waste was not investigated.

The dwellings and associated sheds were assessed separately in a Hazardous Materials Audit, which identified asbestos containing building materials in the dwellings on Lot 10, 11 and 12.

The hummocky ground suspected to be the location of former poultry sheds was assessed via test pitting. Limited fill material was identified to a maximum depth of 0.6m bgs and comprising ash or slag with minor glass and crushed brick. Representative soil samples from the fill material were analysed and no contamination associated with heavy metals, TRH/ BTEX or PAHs was identified.

Three small ACM fragments were identified in an area of hummocky ground suspected to be the location of a former poultry shed on Lot 10. The fragments were collected for laboratory analysis, with chrysotile and crocidolite asbestos identified. No further ACM fragments were identified on the surface of the 10m by 10m grid set up in this area. No buried ACM was identified during the excavation of test pits in this area. Asbestos at Parcel 12 is considered to be limited to minor scattered ACM fragments on the surface of the parcel.

Parcel 12 has not been affected by dust deposition of fluoride from the Hydro Aluminium Kurri Kurri Smelter, with fluoride concentrations in surface soil below the preliminary screening level for residential landuse. It is noted that there is currently no source of aerial fluoride emissions, as the smelter is in a care and maintenance mode.

8 Conclusions and Recommendations

This report presents the findings of a Phase 2 Environmental Site Assessment undertaken on part of the Hydro Aluminium Kurri Kurri (Hydro) owned land known as Parcel 12. Parcel 12 is a rural property comprising approximately 4.3ha and is accessed from McLeod Road, Loxford and located within the buffer zone and to the south east of the Hydro Aluminium Kurri Kurri Smelter. Parcel 12 comprises three residential properties, with cleared open grassland at the rear of each property.

The objectives of this assessment were to assess the potential for contamination at Parcel 12 based on historical and current landuse and to assess the suitability of Parcel 12 for the purposes of low rural residential (R2) and rural landscape (RU2) land use.

A Phase 1 Environmental Site Assessment has previously been completed for the Hydro owned lands including Parcel 12 (ENVIRON (22 October 2013) Phase 1 ESA, Hydro Kurri Kurri Aluminium Smelter). The Phase 1 identified that contamination of Parcel 12 may have occurred from dust deposition due to the proximity of the Hydro smelter and from construction or demolition of dwellings constructed with asbestos containing materials and activities of the tenants on these properties.

To assess potential contaminants of concern on Parcel 12, a site walkover was completed and surface soil samples were collected from across the parcel.

The site walkover identified a dwelling and several sheds on each of the three lots located near the northern boundary, street frontage to McLeods Road. The remainder of each lot comprised open grassland with a stand of mature trees present along the south western and part of the south eastern boundaries. Each Lot was fenced. A fenced-off AbiGroup depot was located in the south western portion of Lot 10, comprising three demountable sheds and surface gravels. This depot is associated with the construction of the Hunter Expressway, for which AbiGroup were the contractor. A fenced-off grass plot was also located at the rear of the dwelling on Lot 10.

Surface soil samples from across Parcel 12 were collected and analysed for soluble fluoride. Fluoride results were below the preliminary screening level for residential landuse, which is considered applicable for the proposed rural residential landuse.

The site walkover identified hummocky (uneven and disturbed in appearance) ground at the rear of the three properties where poultry sheds may have been previously constructed. Excavation of this hummocky ground identified a small volume of fill material comprising ash or slag with minor glass and crushed brick. No asbestos containing materials (ACM) were identified within the fill material excavated and no soil contamination associated with heavy metals, or hydrocarbons was identified.

Three small ACM fragments were collected for analysis from hummocky ground on Lot 10 during the site walkover. These fragments were confirmed by the laboratory to contain chrysotile and crocidolite asbestos. No further ACM fragments were identified on the surface of Parcel 12.

The dwellings and associated sheds were assessed separately in a Hazardous Materials Audit, which identified asbestos containing building materials in the dwellings on Lot 10, 11 and 12.

Parcel 12 is suitable for the purposes of low rural residential (R2) and rural landscape (RU2) land use.

Hydro has separately engaged a NSW EPA-accredited Site Auditor to issue a Site Audit Statement certifying that the site is suitable for the proposed use.

ENVIRON makes the following recommendations:

- In the event that further ACM fragments are identified on the surface of Parcel 12, these fragments should be collected by Hydro personnel in a suitable plastic bag for collection and appropriate disposal;
- An Unexpected Finds protocol should be implemented during future development works to deal with potential buried wastes that may exist on Lot 12.

9 References

AECOM. 2013. Hydro Aluminum – 2012 Annual Environmental Management Review. 2 June 2013;

ANZECC & NHMRC (1992) Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites;

ENVIRON (2013) Preliminary Screening Level, Health Risk Assessment for Fluoride and Aluminium, Part of the Kurri Kurri Aluminium Smelter, Hart Road, Loxford;

ENVIRON (2013) Phase 1 ESA, Hydro Kurri Kurri Aluminium Smelter;

Hunter Catchment Management Trust (2000) Wallis and Fishery Creeks Total Catchment Management Strategy;

National Academy of Sciences. 1971a. Biologic effects of atmospheric pollutants: Fluorides. Washington, DC: National Academy of Sciences, National Research Council, Committee on Biologic Effects of Atmospheric Pollutants, 239;

National Environment Protection Council (2013) National Environmental Protection (Assessment of Site Contamination) Amendment Measure (NEPM);

NSW DEC (2006) Guidelines for the NSW Site Auditor Scheme (Second Edition);

NSW DEC (2007) Guidelines for the Assessment and Management of Groundwater Contamination;

NSW DECC (2008) Waste Classification Guidelines;

World Health Organisation (1997) Environmental Health Criteria for Fluorides and Fluorosis. 2nd ed. Internal Technical Report, International Program on Safety, WHO, Geneva.

10 Limitations

ENVIRON Australia prepared this report in accordance with the scope of work as outlined in our proposal to Hydro Aluminium Kurri Kurri Pty Ltd dated 18 September 2013 and in accordance with our understanding and interpretation of current regulatory standards.

A representative program of sampling and laboratory analyses was undertaken as part of this investigation, based on past and present known uses of Parcel 12. While every care has been taken, concentrations of contaminants measured may not be representative of conditions between the locations sampled and investigated. We cannot therefore preclude the presence of materials that may be hazardous.

Site conditions may change over time. This report is based on conditions encountered at Parcel 12 at the time of the report and ENVIRON disclaims responsibility for any changes that may have occurred after this time.

The conclusions presented in this report represent ENVIRON's professional judgment based on information made available during the course of this assignment and are true and correct to the best of ENVIRON's knowledge as at the date of the assessment.

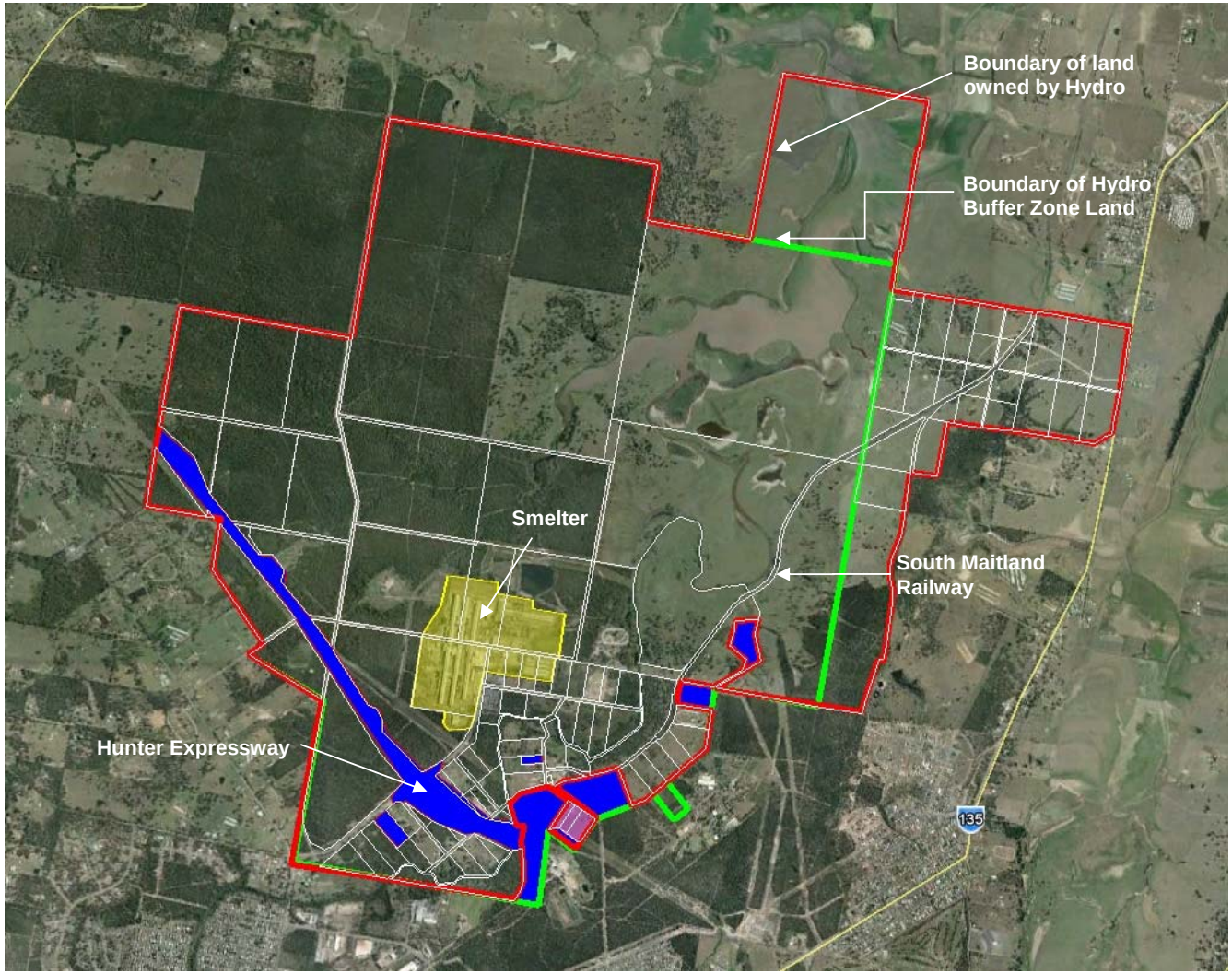
ENVIRON did not independently verify all of the written or oral information provided to ENVIRON during the course of this investigation. While ENVIRON has no reason to doubt the accuracy of the information provided to it, the report is complete and accurate only to the extent that the information provided to ENVIRON was itself complete and accurate.

This report does not purport to give legal advice. This advice can only be given by qualified legal advisors.

10.1 User Reliance

This report has been prepared exclusively for Hydro Aluminium Kurri Kurri Pty Ltd and may not be relied upon by any other person or entity without ENVIRON's express written permission.

Figures



Google Earth Pro

Approximate Location of land owned by Hydro

Approximate Location of Buffer Zone

Land not owned by Hydro

Parcel 12

N

Hydro Aluminium Kurri Kurri – Phase 2 Environmental Site Assessment

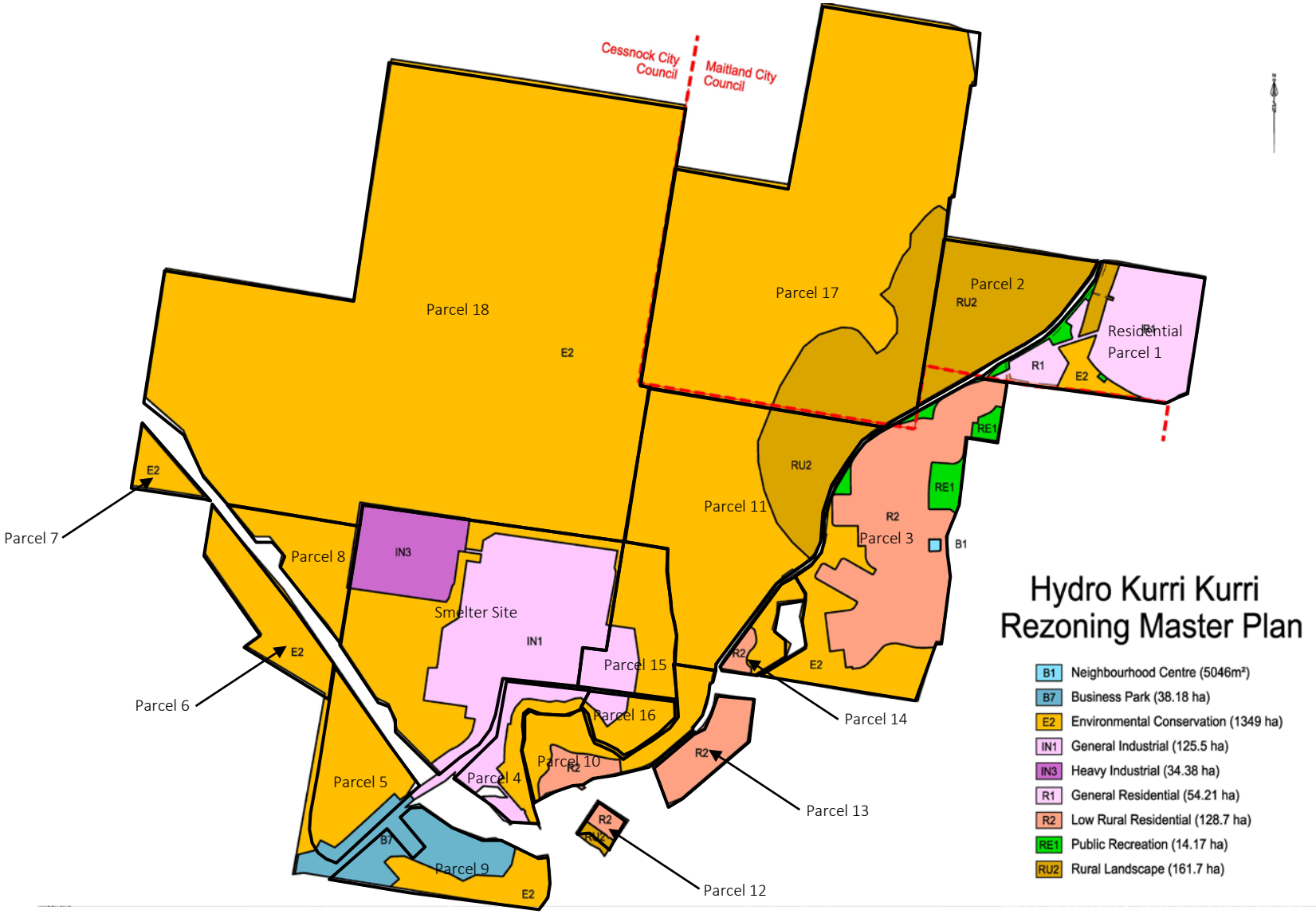
Parcel 12 - Site Location

ENVIRON

JOB NO: AS130348

DATE: May 2015

FIGURE 1



Proposed Land Zonings taken from
Hydro Kurri Kurri Preliminary Masterplan dated 26/3/15

Hydro Aluminium Kurri Kurri – Phase 2 Buffer Zone investigations

Land Parcels and Proposed Land Zoning

ENVIRON

JOB NO: AS 130348

DATE: March 2015

FIGURE 2

Google Earth Pro: Licenced til 5/2/15

KEY:

- Site Boundary
- SF — Soil Sample for Fluoride Analysis
- TP — Test Pit
- ACM — ACM Fragment
- Hummocky Ground

N

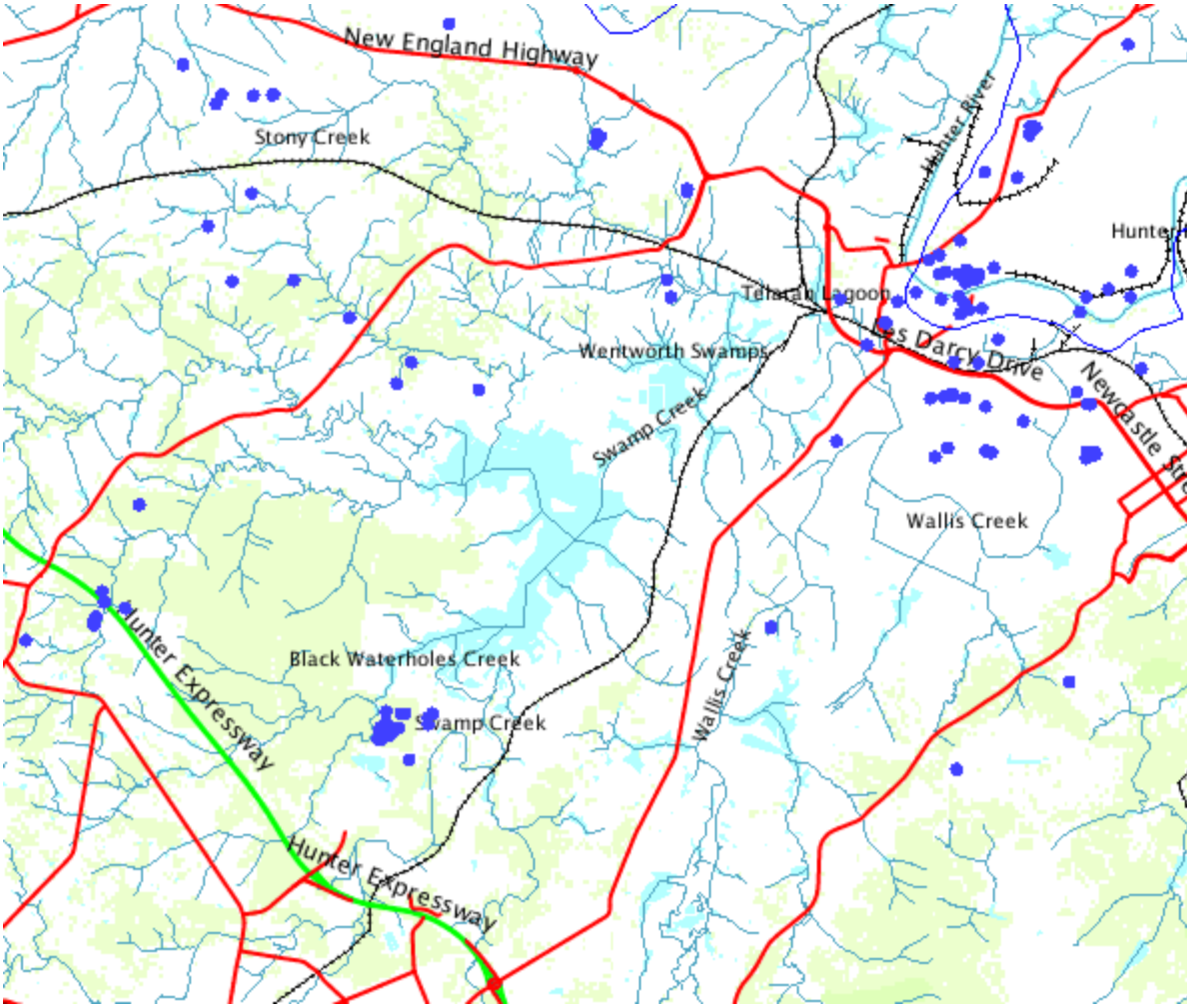
Hydro Aluminium Kurri Kurri – Phase 2 Environmental Site Assessment	Parcel 12 – Soil Sampling Locations
ENVIRON	JOB NO: AS130348 DATE: May 2015 FIGURE 3

Appendix A

Surrounding Groundwater Bores

Groundwater Wells near Employment Land Subarea 11

Map created with NSW Natural Resource Atlas - http://www.nratlas.nsw.gov.au
Wednesday, January 08, 2014



0 15 Km

Legend

Symbol	Layer	Custodian
	Cities and large towns renderImage: Cannot build image from features	
Cowra	Populated places renderImage: Cannot build image from features	
	Towns	
	Groundwater Bores	
	Catchment Management Authority boundaries	
	Major rivers	

Topographic base map

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Monday, January 6, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW079088

Works Details (top)

GROUNDWATER NUMBER	GW079088
LIC-NUM	
AUTHORISED-PURPOSES	
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	(Unknown)
COMMENCE-DATE	
COMPLETION-DATE	
FINAL-DEPTH (metres)	
DRILLED-DEPTH (metres)	
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	
GWMA	
GW-ZONE	
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	20 - HUNTER
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6371306.00
EASTING	358054.00
LATITUDE	32 47' 13"
LONGITUDE	151 29' 3"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Monday, January 6, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW079090

Works Details (top)

GROUNDWATER NUMBER	GW079090
LIC-NUM	
AUTHORISED-PURPOSES	
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	(Unknown)
COMMENCE-DATE	
COMPLETION-DATE	
FINAL-DEPTH (metres)	
DRILLED-DEPTH (metres)	
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	
GWMA	
GW-ZONE	
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	20 - HUNTER
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6371368.00
EASTING	358105.00
LATITUDE	32 47' 11"
LONGITUDE	151 29' 5"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Monday, January 6, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW079092

Works Details (top)

GROUNDWATER NUMBER	GW079092
LIC-NUM	
AUTHORISED-PURPOSES	
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	(Unknown)
COMMENCE-DATE	
COMPLETION-DATE	
FINAL-DEPTH (metres)	
DRILLED-DEPTH (metres)	
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	
GWMA	
GW-ZONE	
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	20 - HUNTER
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6371429.00
EASTING	358078.00
LATITUDE	32 47' 9"
LONGITUDE	151 29' 4"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Monday, January 6, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW079093

Works Details (top)

GROUNDWATER NUMBER	GW079093
LIC-NUM	
AUTHORISED-PURPOSES	
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	(Unknown)
COMMENCE-DATE	
COMPLETION-DATE	
FINAL-DEPTH (metres)	
DRILLED-DEPTH (metres)	
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	
GWMA	
GW-ZONE	
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	20 - HUNTER
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6371460.00
EASTING	358078.00
LATITUDE	32 47' 8"
LONGITUDE	151 29' 4"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Monday, January 6, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW079094

Works Details (top)

GROUNDWATER NUMBER	GW079094
LIC-NUM	
AUTHORISED-PURPOSES	
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	(Unknown)
COMMENCE-DATE	
COMPLETION-DATE	
FINAL-DEPTH (metres)	
DRILLED-DEPTH (metres)	
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	
GWMA	
GW-ZONE	
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	20 - HUNTER
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6371462.00
EASTING	358234.00
LATITUDE	32 47' 8"
LONGITUDE	151 29' 10"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Monday, January 6, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW079096

Works Details (top)

GROUNDWATER NUMBER	GW079096
LIC-NUM	
AUTHORISED-PURPOSES	
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	(Unknown)
COMMENCE-DATE	
COMPLETION-DATE	
FINAL-DEPTH (metres)	
DRILLED-DEPTH (metres)	
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	
GWMA	
GW-ZONE	
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	20 - HUNTER
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6371707.00
EASTING	358152.00
LATITUDE	32 47' 0"
LONGITUDE	151 29' 7"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Monday, January 6, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW079097

Works Details (top)

GROUNDWATER NUMBER	GW079097
LIC-NUM	
AUTHORISED-PURPOSES	
INTENDED-PURPOSES	MONITORING BORE
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	(Unknown)
COMMENCE-DATE	
COMPLETION-DATE	
FINAL-DEPTH (metres)	
DRILLED-DEPTH (metres)	
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	
GWMA	
GW-ZONE	
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	20 - HUNTER
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6371679.00
EASTING	358335.00
LATITUDE	32 47' 1"
LONGITUDE	151 29' 14"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Monday, January 6, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW079099

Works Details (top)

GROUNDWATER NUMBER	GW079099
LIC-NUM	
AUTHORISED-PURPOSES	
INTENDED-PURPOSES	
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	(Unknown)
COMMENCE-DATE	
COMPLETION-DATE	
FINAL-DEPTH (metres)	
DRILLED-DEPTH (metres)	
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	
GWMA	
GW-ZONE	
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	20 - HUNTER
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6371003.00
EASTING	358448.00
LATITUDE	32 47' 23"
LONGITUDE	151 29' 18"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Monday, January 6, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW079101

Works Details (top)

GROUNDWATER NUMBER	GW079101
LIC-NUM	
AUTHORISED-PURPOSES	
INTENDED-PURPOSES	
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	(Unknown)
COMMENCE-DATE	
COMPLETION-DATE	
FINAL-DEPTH (metres)	
DRILLED-DEPTH (metres)	
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	
GWMA	
GW-ZONE	
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	20 - HUNTER
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6371680.00
EASTING	358387.00
LATITUDE	32 47' 1"
LONGITUDE	151 29' 16"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Monday, January 6, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW079102

Works Details (top)

GROUNDWATER NUMBER	GW079102
LIC-NUM	
AUTHORISED-PURPOSES	
INTENDED-PURPOSES	
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	(Unknown)
COMMENCE-DATE	
COMPLETION-DATE	
FINAL-DEPTH (metres)	
DRILLED-DEPTH (metres)	
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	
GWMA	
GW-ZONE	
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	20 - HUNTER
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6371685.00
EASTING	358725.00
LATITUDE	32 47' 1"
LONGITUDE	151 29' 29"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

For information on the meaning of fields please see Glossary
Document Generated on Monday, January 6, 2014

Print Report

Works Details Site Details Form A Licensed Construction Water Bearing Zones Drillers Log

Work Requested -- GW079103

Works Details (top)

GROUNDWATER NUMBER	GW079103
LIC-NUM	
AUTHORISED-PURPOSES	
INTENDED-PURPOSES	
WORK-TYPE	Bore
WORK-STATUS	(Unknown)
CONSTRUCTION-METHOD	(Unknown)
OWNER-TYPE	(Unknown)
COMMENCE-DATE	
COMPLETION-DATE	
FINAL-DEPTH (metres)	
DRILLED-DEPTH (metres)	
CONTRACTOR-NAME	
DRILLER-NAME	
PROPERTY	
GWMA	
GW-ZONE	
STANDING-WATER-LEVEL	
SALINITY	
YIELD	

Site Details (top)

REGION	20 - HUNTER
RIVER-BASIN	
AREA-DISTRICT	
CMA-MAP	
GRID-ZONE	
SCALE	
ELEVATION	
ELEVATION-SOURCE	
NORTHING	6371530.00
EASTING	358675.00
LATITUDE	32 47' 6"
LONGITUDE	151 29' 27"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Appendix B

Site Photographs

Photo 1: Photograph showing the grassed area of Lot 12 with the dwelling in the background, facing north.

Photo 2: Photograph of mature trees on the south western boundary of the site.

Photo 3: Photograph of the AbiGroup depot on Lot 10. Note the demountables in the background of the photo and the surface gravels in the foreground.

Photo 4: Photograph of the fenced-off area on Lot 10.

Photo 5: Photograph of the grassed portion of the site, where hummocky ground appears to be the location of former poultry sheds.

Photo 6: Photograph of the grassed portion of Lot 10 with the dwelling in the background, facing north.

Appendix C

Field Information Sheets

Site Walkover Checklist

Project No.: AS180348	**Date and Time:** 30/10/13
Land Parcel: ELP #12	**Weather:** Partially Cloudy & Sunny
Lot and DP: No 5 McLeod Rd Lot 12	**Environ Personnel:** KW

Site Description

Topography	flat near road, slopes at treed area at rear towards rear fence & creek.
Surface Geology	
Fill evident?	yes - house lots / paddocks
Hummocky ground?	yes
Structures on site?	yes house at front & sheds & small animal paddocks
Location of structures	"
Building materials used in structures	
Asbestos debris on site?	No - not sighted
Location of asbestos debris?	-
Volume of asbestos debris?	-

Sandy, silt, topsoil brown → F sample (SF5) – 32.79938°S 151.48628°E

GPS Locations of Interest

Point of Interest	Easting	Northing S
old poultry shed locations x2 approx → very well grassed - surface metal visible in one paddock & hummocky ground → tenant confirmed fill is in back of house lot	151.48621 °E	32.79881°S

Description of Photographs Taken

Hummocky ground at rear of lot on cleared ground before treed area → 151.48566°E 32.79952°S & nearby very green (different) grass patches

Hummocky ground 2 – 32.79927°S 151.48658°E

Hummocky ground 3 → 32.79912°S 151.48702°E

* potential fill mound at front of lot 32.79886°S 151.48713°E

* this section belongs with Lot 11

Miscellaneous Field Comments

trees at rear of lot ~~land~~ are elevated on a little bit - fill?

F sample taken – ~~32.79927°S 151.48670°E~~

Sandy, silt, slightly moist topsoil 0.01m - 0.02m

~~(SF5)~~ // (SF4) see * lot 11 → for bearings

Site Walkover Checklist

Project No.: AS130348	**Date and Time:** 30/10/13
Land Parcel: ELP 12	**Weather:** Partially Cloudy, sunny
Lot and DP: No 3 McLeod Rd - Lot 11	**Environ Personnel:** KW

Site Description

Topography	flat at front near Rd, gentle slope to creek at rear
Surface Geology	
Fill evident?	hummocky ground,
Hummocky ground?	yes
Structures on site?	house & sheds & fill mound at rear of larger shed
Location of structures	front of lot near road
Building materials used in structures	
Asbestos debris on site?	
Location of asbestos debris?	
Volume of asbestos debris?	

GPS Locations of Interest

Point of Interest	Easting	~~Northing~~ S
hummocky ground 1	151.48601°E	32.79968°S

Description of Photographs Taken

Miscellaneous Field Comments

grass covered cleared field at rear with

F sample taken (SF4) - topsoil sandy silt, slightly moist 0.01m-0.02m
- 32.79927°S
151.48670°E

* add notes from lot 12 (mistakenly written)

mid point of 10x10m grid
32.79885°S
151.48710°E

Site Walkover Checklist

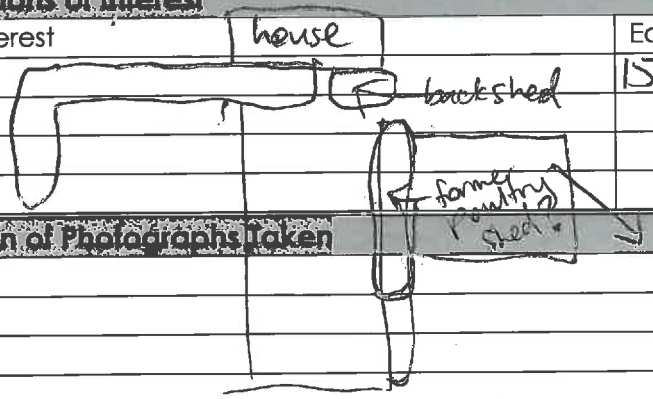
Project No.:	AS130348	**Date and Time:**	30/10/13
Land Parcel:	ELP 12	**Weather:**	Partially cloudy, sunny
Lot and DP:	Lot 10	**Environ Personnel:**	KW

Site Description	
Topography	
Surface Geology	
Fill evident?	
Hummocky ground?	
Structures on site?	house & 4 sheds & fenced off grass plot in back part of lot
Location of structures	front of property near road
Building materials used in structures	
Asbestos debris on site?	yes 1 piece sighted in potential fill area ①
Location of asbestos debris?	11
Volume of asbestos debris?	→ (SF6)

F- sample taken - 32.79912°S, 151.48726°E → topsoil sandy silt, dark brown 0.01-0.02m

GPS Locations of Interest

Point of Interest	Easting	Northing
fill ①	151.48715°E	32.79926°S



1 piece ACM found here

10x10 grid conducted here, 2 more small pieces found

Description of Photographs Taken

fenced off abbey group depot → clear site
3 demarcations & exposed gravel remains

hummocky ground - 32.80009°S 151.48695°E

fenced off plot - 32.79977°S, 151.48679°E

Miscellaneous Field Comments

suspected poultry sheds on land - on elevated strips of land that are apparent.

hummocky ground ② 32.80014°S 151.48641°E → 32.79966°S → 151.48745°E

hummocky ground ③ 32.80014°S 151.48709°E

hummocky ground ④ - 32.80012°S 151.48747°E

Appendix D

Results Tables

TABLE A: Soil Analytical Results - Grid Sampling

Sample Depth: 0.0m - 0.01m

Sampling Date: 30/10/13

Laboratory PQL: 0.5 mg/kg

Site Specific HIL - Fluoride: 440mg/kg

Sample Identification	Soluble Fluoride mg/kg (1:5 soil:water)
SF4	5
SF5	4
SF6	4

TABLE B: Soil Analytical Results - Infill Areas

Sample Identification	PQL	Guideline					TP45	TP50
Sample Depth (m)		HIL 'A' [A]	HSL 'A' Sand 0m to 1m	EIL Residential [B]	ESL Residential (Coarse Soil)	Mgt Limits Residential		
Date							2/04/2014	3/04/2014
Sample Profile							FILL	FILL
Sample collected by							KW	KW
Metals								
Arsenic	5	100		100			-	<5
Cadmium	1	20					-	<1
Chromium	2	100		190			-	7
Copper	5	6000		60			-	16
Nickel	5	400		30			-	<5
Lead	2	300		1100			-	4
Zinc	5	7400		70			-	31
Marcury	0.1	10					-	0.2
Polycyclic Aromatic Hydrocarbons (PAH)								
Naphthalene	0.1			170			<0.5	0.8
Acenaphthylene	0.1						<0.5	<0.5
Acenaphthene	0.1						<0.5	<0.5
Fluorene	0.1						<0.5	<0.5
Phenanthrene	0.1						<0.5	7
Anthracene	0.1						<0.5	0.6
Fluoranthene	0.1						<0.5	1.6
Pyrene	0.1						<0.5	0.6
Benz(a)anthracene	0.1						<0.5	<0.5
Chrysene	0.1						<0.5	<0.5
Benzo(b)&(k)fluoranthene	0.2						<0.5	<0.5
Benzo(a) pyrene	0.05				0.7		<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	0.1						<0.5	<0.5
Dibenz(a,h)anthracene	0.1						<0.5	<0.5
Benzo(g,h,i)perylene	0.1						<0.5	<0.5
Benzo(a)pyrene TEQ	0.5	3					<0.5	<0.5
Total +ve	--	300					<0.5	10.6
Total Recoverable Hydrocarbons (TRH) - NEPM (2013)								
TRH C6 - C10	25		45		180	700	<25	<25
vTPH C6 - C10 less BTEX	25		45		-	-	<25	<25
TRH >C10-C16	50		110		120	1000	<50	<50
TRH >C16-C34	100		NL		300	2500	<100	<100
TRH >C34-C40	100		NL		2800	10,000	<100	<100
BTEX								
Benzene	0.2		0.5		50		<0.2	<0.2
Toluene	0.5		160		85		<0.5	<0.5
Ethylbenzene	1		35		70		<1	<1
m+p-xylene	2		40		105		<2	<2
o-Xylene	1		40				<1	<1

All results are in mg/kg

[A] HIL A - Residential landuse

[D] EILs represent the most conservative value possible as the lowest value for added contaminant limit (ACL) was used, irrespective of soil properties and ambient background

Results shaded grey are in excess of the investigation criteria.

Benzo(a)pyrene TEQ is indicative of carcinogenic PAHs: the HIL is based on the 8 carcinogenic PAHs and their TEFs (potency relative to B(a)P) adopted by CCME 2008. The B(a)P TEQ is calculated by multiplying the concentration of each carcinogenic PAH in the sample by its B(a)P TEF and summing these products.

TABLE C: Soil Quality Assurance/ Quality Control Results

Sample Identification	TP50	QA1	RPD %
Sample Depth (m)	Fill soil matrix		
Duplicate Type	Intralaboratory		
Sample Profile	FILL		
Sample collected by	KW		
Metals			
Arsenic	<5	5	NC
Cadmium	<1	<1	NC
Chromium	7	13	60
Copper	16	23	36
Lead	<5	6	NC
Nickel	4	8	67
Zinc	31	32	3
Mercury	0.2	0.3	40
Polycyclic Aromatic Hydrocarbons (PAH)			
Naphthalene	<0.5	<0.5	NC
Acenaphthylene	<0.5	<0.5	NC
Acenaphthene	<0.5	<0.5	NC
Fluorene	<0.5	<0.5	NC
Phenanthrene	<0.5	<0.5	NC
Anthracene	<0.5	<0.5	NC
Fluoranthene	<0.5	<0.5	NC
Pyrene	<0.5	<0.5	NC
Benz(a)anthracene	<0.5	<0.5	NC
Chrysene	<0.5	<0.5	NC
Benzo(b)&(k)fluoranthene	<0.5	<0.5	NC
Benzo(a) pyrene	<0.5	<0.5	NC
Indeno(1,2,3-c,d)pyrene	<0.5	<0.5	NC
Dibenz(a,h)anthracene	<0.5	<0.5	NC
Benzo(g,h,i)perylene	<0.5	<0.5	NC
Benzo(a)pyrene TEQ	<0.5	<0.5	NC
Total +ve	<0.5	<0.5	NC
Total Recoverable Hydrocarbons (TRH) - NEPM (2013)			
TRH C6 - C10	<25	<25	NC
vTPH C6 - C10 less BTEX	<25	<25	NC
TRH >C10-C16	<50	<50	NC
TRH >C16-C34	<100	<100	NC
TRH >C34-C40	<100	<100	NC
BTEX			
Benzene	<0.2	<0.2	NC
Toluene	<0.5	<0.5	NC
Ethylbenzene	<1	<1	NC
m+p-xylene	<2	<2	NC
o-Xylene	<1	<1	NC

Note all units in mg/kg

BOLD identifies where RPD results

intralaboratory	interlaboratory	
>50	>60	where both sample results exceed ten x PQL
>75	>85	where both sample results are within 5 to 10 x PQL
>100	>100	where both sample results are within 2 to 5 x PQL
AD>2.5 * PQL		where one or both sample results are <2 x PQL

BOLD identified where blanks >0

Where results are within two of the above ranges the most conservative criteria have been used to assess duplicate performance

Appendix E

Laboratory Reports

CERTIFICATE OF ANALYSIS

Work Order	: **ES1323782**	Page	: 1 of 3
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	: AS130348	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 04-NOV-2013
Sampler	: KW	Issue Date	: 14-NOV-2013
Site	: ----		
		No. of samples received	: 4
Quote number	: SY/285/10	No. of samples analysed	: 4

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
- Descriptive 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*
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Christopher Owler	Team Leader - Asbestos	Newcastle - Asbestos
Nanthini Coilparampil	Laboratory Manager - Inorganics	Sydney Inorganics
Pabi Subba	Senior Organic 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

- **EA200 Legend**
- **EA200 'Am' Amosite (brown asbestos)**
- **EA200 'Ch' Chrysotile (white asbestos)**
- **EA200 'Cr' Crocidolite (blue asbestos)**
- **EA200 'Trace' - Asbestos fibres detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres**
- **EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.**
- **EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.**
- **EA200: Negative results for vinyl tiles should be confirmed by an independent analytical technique.**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	ELP12 LOT10 ACM1	ELP12 LOT11 SF4	ELP12 LOT12 SF5	ALP12 LOT10 SF6	----
				Client sampling date / time	30-OCT-2013 15:00	30-OCT-2013 15:00	30-OCT-2013 15:00	30-OCT-2013 15:00	----
Compound	CAS Number	LOR	Unit		ES1323782-001	ES1323782-002	ES1323782-003	ES1323782-004	----
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1.0	%		----	**5.0**	**2.6**	**4.9**	----
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples									
Asbestos Detected	1332-21-4	0.1	g/kg		**Yes**	----	----	----	----
Asbestos Type	1332-21-4	0.1	--		**Ch + Cr**	----	----	----	----
Sample weight (dry)	----	0.01	g		**3.62**	----	----	----	----
APPROVED IDENTIFIER:	----	-	--		**S.SPOONER**	----	----	----	----
EK040: Fluoride									
Fluoride	16984-48-8	1	mg/kg		----	**5**	**4**	**4**	----

Analytical Results

Descriptive Results

Sub-Matrix: **SOIL**

Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples		
EA200: Description	ELP12 LOT10 ACM1 - 30-OCT-2013 15:00	Two pieces of bonded asbestos cement sheeting approximately 25 x 25 x 5 mm.

QUALITY CONTROL REPORT

Work Order	: **ES1323782**	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	: AS130348	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 04-NOV-2013
Sampler	: KW	Issue Date	: 14-NOV-2013
Order number	: ----		
		No. of samples received	: 4
Quote number	: SY/285/10	No. of samples analysed	: 4

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*
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Christopher Owler	Team Leader - Asbestos	Newcastle - Asbestos
Nanthini Coilparampil	Laboratory Manager - Inorganics	Sydney Inorganics
Pabi Subba	Senior Organic 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: 3143719)									
ES1323782-002	ELP12 LOT11 SF4	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	5.0	6.1	20.0	No Limit
ES1323929-001	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	11.3	12.3	8.6	0% - 50%
EK040S: Fluoride Soluble (QC Lot: 3142827)									
ES1323624-001	Anonymous	EK040S: Fluoride	16984-48-8	1	mg/kg	2	2	0.0	No Limit
ES1323624-010	Anonymous	EK040S: Fluoride	16984-48-8	1	mg/kg	2	2	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: 3142827)								
EK040S: Fluoride	16984-48-8	1.0	mg/kg	<1	25.0 mg/kg	111	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: 3142827)							
ES1323624-001	Anonymous	EK040S: Fluoride	16984-48-8	25.0 mg/kg	115	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: 3142827)										
ES1323624-001	Anonymous	EK040S: Fluoride	16984-48-8	25.0 mg/kg	115	----	70	130	----	----

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **ES1323782**	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	: AS130348	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 04-NOV-2013
Sampler	: KW	Issue Date	: 14-NOV-2013
Order number	: ----		
		No. of samples received	: 4
Quote number	: SY/285/10	No. of samples analysed	: 4

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							
Pulp Bag (EA055-103) ELP12 LOT12 SF5, ALP12 LOT10 SF6	**30-OCT-2013**	**----**	----	----	**06-NOV-2013**	13-NOV-2013	✓
Soil Glass Jar - Unpreserved (EA055-103) ELP12 LOT11 SF4	**30-OCT-2013**	**----**	----	----	**06-NOV-2013**	13-NOV-2013	✓
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples							
Snap Lock Bag (EA200) ELP12 LOT10 ACM1	**30-OCT-2013**	**---**	28-APR-2014	----	**12-NOV-2013**	11-MAY-2014	✓
EK040: Fluoride							
Pulp Bag (EK040S) ELP12 LOT12 SF5, ALP12 LOT10 SF6	**30-OCT-2013**	**06-NOV-2013**	06-NOV-2013	✓	**06-NOV-2013**	04-DEC-2013	✓
Soil Glass Jar - Unpreserved (EK040S) ELP12 LOT11 SF4	**30-OCT-2013**	**06-NOV-2013**	06-NOV-2013	✓	**06-NOV-2013**	04-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	2	20	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Moisture Content	EA055-103	2	20	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Fluoride - Soluble	EK040S	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Fluoride - Soluble	EK040S	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Fluoride - Soluble	EK040S	1	20	**5.0**	**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).
Asbestos Identification in bulk solids	EA200	SOIL	AS 4964 - 2004 Method for the qualitative identification of asbestos in bulk samples
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.**

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☐MUDGEE 1/29 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4958 9433 E: samples.newcastle@alsglobal.com
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☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: Environ Australia Pty Ltd	TURNAROUND REQUIREMENTS : (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)	☑ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: 19B, 50 Glebe Road, The Junction, NSW 2291		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT: Hydro Buffer Zone Investigation PROJECT NO AS130348	ALS QUOTE NO.:	COC SEQUENCE NUMBER (Circle) COC: (1) 2 3 4 5 6 7	Free Ice / frozen Ice bricks present upon receipt? Yes No N/A
ORDER NUMBER:: AS130348 PURCHASE ORDER NO.:	COUNTRY OF ORIGIN:	OF: 1 2 3 (4) 5 6 7	Random Sample Temperature on Receipt °C
PROJECT MANAGER: Steve Cadman	CONTACT PH: 49625444		Other comment:
SAMPLER: Kate Woods/Steve Cadman	SAMPLER MOBILE: 0423583538		
COC Emailed to ALS? (YES / NO) Yes	EDD FORMAT (or default):		
Email Reports to (will default to PM if no other addresses are listed): ~~scadman@environcorp.com~~ kwoods@environcorp.com			
Email Invoice to (will default to PM if no other addresses are listed): scadman@environcorp.com			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE/TIME: 3/4/14 14:10	DATE/TIME: 3.4.14 1410	DATE/TIME: 3.4.14 1700	DATE/TIME: 3/4/14 1900

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

Subcon / Forward Lab / Split WC

Lab / Analysis: Newcastle / Asbestos

Organised By / Date:

Relinquished By / Date:

Courier:

WO No:

Attach By PO / Internal Sheet:

ALS USE ONLY	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	DATE / TIME		TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	TPH/BTEX	PAHs	8 metals	asbestos ID (14), (31)	OC/OP Pesticides	asbestos 200N	pH, CEC, TOC	HOLD
	Parcel 13												Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis:
1	Lot 460 TP1	31/3/14	S	glass jars	2				X		X		E-MAILED
2	TP2		S		2				X		X		
3	TP3		S		2				X		X		
4	TP4	Q	S		2	X	X	X	X	X	X		Not tested
5	TP8	O	S		2			X	X				
6	Parcel 13 Lot 459 TP11	Q	S		2	X	X	X	X	X	X		
7	QA1	Q	S		2	X	X	X	X	X	X		
8	TP12	O	S		2	X	X	X	X	X	X		
~~STOR~~	~~HOLD~~ (46) TP15		S		2				X		X		
9	Parcel 13 Lot 458 TP16	1/4/14	S	glass jars	2	X	X	X	X	X	X		
10	TP17	O	S		2				X				
11	QA2	Q	S		2	X	X	X	X	X	X		
12	TP19	O	S		2			X	X		X		
				TOTAL	0	0	0	0	0	0	0	0	Not tested

Environmental Division
Sydney
Work Order
ES1407306

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; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

CHAIN OF CUSTODY

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☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: Environ Australia Pty Ltd	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☑ Standard TAT (List due date):	**FOR LABORATORY USE ONLY (Circle)**
OFFICE: 19B, 50 Glebe Road, The Junction, NSW 2291		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT: Hydro Buffer Zone Investigation — **PROJECT NO** AS130348	**ALS QUOTE NO.:**	**COC SEQUENCE NUMBER (Circle)** COC: 1 2 3 4 5 6 7	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER:: AS130348 — **PURCHASE ORDER NO.:**	**COUNTRY OF ORIGIN:**	OF: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Steve Cadman	**CONTACT PH:** 49625444		Other comment:
SAMPLER: Kate Woods/Steve Cadman	**SAMPLER MOBILE:** 0423583538		
COC Emailed to ALS? (YES / NO) Yes	**EDD FORMAT (or default):**		
Email Reports to (will default to PM if no other addresses are listed): ~~scadman@environcorp.com~~ kwoods@environ-corp-com			
Email Invoice to (will default to PM if no other addresses are listed): scadman@environcorp.com			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
K Woods	KE	KE	
DATE/TIME: 3/4/14 14:10	DATE/TIME: 3/4/14 1410	DATE/TIME: 3-4-14 1700	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	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	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	TPH/BTEX	PAHs	8 metals	asbestos ID	OC/OP Pesticides	asbestos 200N	pH, CEC, TOC	HOLD	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
SNR	Parcel 13 Lot 458 TP20	1/4/14	S	glass jars	2				X		X			
SNR	TP21		S		2				X		X			
13	TP22		S		2								X	
14	TP23		S		2	X	X	X	X	X	X			Only if pre-selected
15	Parcel 13 Lot 459 TP27		S		2				X		X			
16	TP28		S		2				X		X			
17	TP29		S		2				X		X			
18	TP30		S		2				X		X			
19	TP31		S		2				X		X			
20	TP32		S		2				X		X			
21	TP33 ~~TP34~~		S		2				X		X			
22	TP34	2/4/14	S		2				X		X			
23	TP35		S		2				X		X			
				TOTAL	0	0	0	0	0	0	0	0		

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; U = Ultra-pure Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

CHAIN OF CUSTODY

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WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: Environ Australia Pty Ltd

OFFICE: 19B, 50 Glebe Road, The Junction, NSW 2291

PROJECT: Hydro Buffer Zone Investigation — PROJECT NO AS130348

ORDER NUMBER:: AS130348 — PURCHASE ORDER NO.:

PROJECT MANAGER: Steve Cadman — CONTACT PH: 49625444

SAMPLER: Kate Woods/Steve Cadman — SAMPLER MOBILE: 0423583538

COC Emailed to ALS? (YES / NO) Yes — EDD FORMAT (or default):

Email Reports to (will default to PM if no other addresses are listed): ~~scadman@environcorp.com~~ kwoods@environcorp.com

Email Invoice to (will default to PM if no other addresses are listed): scadman@environcorp.com

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

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.:

COUNTRY OF ORIGIN:

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:			

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE/TIME: 3/4/14 14:10	DATE/TIME: 3/4/14 1400	DATE/TIME: 3.4.14 1700	DATE/TIME:

ALS USE ONLY	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	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	TPH/BTEX	PAHs	8 metals	asbestos ID	OC/OP Pesticides	asbestos 200N	pH, CEC, TOC	HOLD	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	Parcel 13, Lot 459													
24	TP36	2/4/14	S	glass jars	2				X		X			
25	TP37		S		2				X		X			
26	TP38		S		2				X		X			
27	TP39	0 - 0.5	S		2				X		X			
28	TP41	0	S		2								X	
29	TP42	0	S		2								X	
30	TP44	0	S		2								X	
31	Parcel 12, Lot 11 TP45	0	S		2	X	X		X				X	
32	TP46	0	S		2								X	
33	TP47	0	S		2								X	
34	Parcel 12, Lot 18 TP49	3/4/14	S		2				X				X	
35	TP50	0	S		2	X	X	X	X					
36	QA1	0	S		2	X	X	X	X					
				TOTAL	0	0	0	0	0	0	0	0		

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; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

CHAIN OF CUSTODY

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CLIENT: Environ Australia Pty Ltd	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.e., Ultra Trace Organics)	☑ Standard TAT (List due date):	**FOR LABORATORY USE ONLY (Circle)**
OFFICE: 19B, 50 Glebe Road, The Junction, NSW 2291		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT: Hydro Buffer Zone Investigation — **PROJECT NO** AS130348	**ALS QUOTE NO.:**	**COC SEQUENCE NUMBER (Circle)**	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER:: AS130348 — **PURCHASE ORDER NO.:**	**COUNTRY OF ORIGIN:**	COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Steve Cadman — **CONTACT PH:** 49625444		OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: Kate Woods/Steve Cadman — **SAMPLER MOBILE:** 0423583538			
COC Emailed to ALS? (YES / NO) Yes — **EDD FORMAT (or default):**			
Email Reports to (will default to PM if no other addresses are listed): ~~scadman@environcorp.com~~ kwoods@environcorp.com	**RELINQUISHED BY:** KWoods — **DATE/TIME:** 3/4/14 14:10	**RECEIVED BY:** — **DATE/TIME:** 3/4/14 1410	**RELINQUISHED BY:** — **DATE/TIME:** 3.4.14 1700
Email Invoice to (will default to PM if no other addresses are listed): scadman@environcorp.com			**RECEIVED BY:** — **DATE/TIME:**
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:			

ALS USE ONLY	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	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	TPH/BTEX	PAHs	8 metals	asbestos ID	OC/OP Pesticides	asbestos 200N	pH, CEC, TOC	HOLD	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
37	Parcel 13 lot 460 TP1 ACM	31/3/14	S	ziplock	1								X	
38	TP3 ACM	31/3/14	S	ziplock	1								X	
39	Parcel 13 lot 459 TP12 ACM	↓	S	↓	1								X	
40	TP11 ACM	↓	S	↓	1								X	
41	TP27 ACM	1/4/14	S	↓	1								X	Additional Soils Kept Frozen
42	Parcel 13 lot 458 TP23 ACM	↓	S	↓	1				X					
43	TP19 ACM	↓	S	↓	1				X				~~X~~	
44	TP16 ACM	↓	S	↓	1								X	
			S										X	
	Extra Samples Received		S											
45	Parcel 13 lot 458 SP2		S	Jar	1									
46	Parcel 13 lot 459 TP		S	Jar	2									
47	Parcel 13 lot 458 TP18		S	Jar	2									Additional Soil Kept Frozen
48	PARCEL 13 LOT 459 TP39 0.5-1.0.				TOTAL	0	0	0	0	0	0	0	0	

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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; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

CERTIFICATE OF ANALYSIS

Work Order	: **ES1407306**	Page	: 1 of 14
Client	: **ENVIRON AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR STEVE CADMAN	Contact	: Client Services
Address	: PO BOX 564 MAITLAND NSW, AUSTRALIA 2320	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: scadman@environcorp.com	E-mail	: sydney@alsglobal.com
Telephone	: +61 02 49344354	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 49344359	Facsimile	: +61-2-8784 8500
Project	: HYDRO BUFFER ZONE INVESTIGATION	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: AS130348		
C-O-C number	: ----	Date Samples Received	: 03-APR-2014
Sampler	: K.WOODS/S.CADMAN	Issue Date	: 15-APR-2014
Site	: ----		
		No. of samples received	: 48
Quote number	: SY/433/13	No. of samples analysed	: 12

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
- Surrogate Control 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 in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Shobhna Chandra	Metals Coordinator	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.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

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

- **ALS is not NATA accredited for the analysis of Bifenthrin in soils when performed under ALS Method EP068D**
- **EA200 Legend**
- **EA200 'Am' Amosite (brown asbestos)**
- **EA200 'Ch' Chrysotile (white asbestos)**
- **EA200 'Cr' Crocidolite (blue asbestos)**
- **EA200 'Trace' - Asbestos fibres detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres**
- **EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.**
- **EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.**
- **EA200: Negative results for vinyl tiles should be confirmed by an independent analytical technique.**
- **EA200Q: ALS laboratory procedures and methods used for the identification and quantitation of asbestos are consistent with AS4964-2004 and the requirements of the 2013 NEPM for Assessment of Site Contamination**
- **EA200Q: Asbestos weights and percentages are not covered under the Scope of NATA Accreditation.**
  Weights of Asbestos are based on extracted bulk asbestos, fibre bundles, and/or ACM and do not include respirable fibres (if present).
  Percentages for Asbestos content in ACM are based on the 2013 NEPM default values. All numerical results under this method are approximate and should be used as a guide only.

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Client sample ID	PARCEL 13 LOT 460 TP4	PARCEL 13 LOT 460 TP8	PARCEL 13 LOT 459 TP11	PARCEL 13 LOT 459 QA1	PARCEL 13 LOT 459 TP12
				Client sampling date / time	31-MAR-2014 15:00	31-MAR-2014 15:00	31-MAR-2014 15:00	31-MAR-2014 15:00	31-MAR-2014 15:00
					ES1407306-004	ES1407306-005	ES1407306-006	ES1407306-007	ES1407306-008
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1.0	%		**18.9**	**13.7**	**19.9**	**21.2**	**25.4**
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		**8**	**14**	**14**	**10**	**18**
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	**1**
Chromium	7440-47-3	2	mg/kg		**27**	**31**	**12**	**11**	**23**
Copper	7440-50-8	5	mg/kg		<5	**8**	**14**	**22**	**22**
Lead	7439-92-1	5	mg/kg		**14**	**16**	**13**	**21**	**56**
Nickel	7440-02-0	2	mg/kg		**4**	**4**	**6**	**7**	**13**
Zinc	7440-66-6	5	mg/kg		**362**	**119**	**283**	**455**	**535**
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		<0.05	----	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		<0.05	----	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg		<0.05	----	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg		<0.05	----	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg		<0.05	----	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg		<0.05	----	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg		<0.05	----	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg		<0.05	----	<0.05	<0.05	<0.05
^ **Total Chlordane (sum)**	----	0.05	mg/kg		<0.05	----	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg		<0.05	----	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	----	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	----	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg		<0.05	----	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	----	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg		<0.05	----	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	----	<0.05	<0.05	<0.05
^ **Endosulfan (sum)**	115-29-7	0.05	mg/kg		<0.05	----	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	----	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	----	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	----	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	----	<0.2	<0.2	<0.2

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Client sample ID: PARCEL 13 LOT 460 TP4	PARCEL 13 LOT 460 TP8	PARCEL 13 LOT 459 TP11	PARCEL 13 LOT 459 QA1	PARCEL 13 LOT 459 TP12
Client sampling date / time				31-MAR-2014 15:00	31-MAR-2014 15:00	31-MAR-2014 15:00	31-MAR-2014 15:00	31-MAR-2014 15:00
				ES1407306-004	ES1407306-005	ES1407306-006	ES1407306-007	ES1407306-008
EP068A: Organochlorine Pesticides (OC) - Continued								
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	----	<0.2	<0.2	<0.2
^ **Sum of Aldrin + Dieldrin**	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
^ **Sum of DDD + DDE + DDT**	----	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	----	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	----	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg	<0.2	----	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	----	<0.05	<0.05	<0.05
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Client sample ID: PARCEL 13 LOT 460 TP4	PARCEL 13 LOT 460 TP8	PARCEL 13 LOT 459 TP11	PARCEL 13 LOT 459 QA1	PARCEL 13 LOT 459 TP12
Client sampling date / time				31-MAR-2014 15:00	31-MAR-2014 15:00	31-MAR-2014 15:00	31-MAR-2014 15:00	31-MAR-2014 15:00
				ES1407306-004	ES1407306-005	ES1407306-006	ES1407306-007	ES1407306-008
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**0.6**	----	**0.6**	**0.6**	**0.6**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**1.2**	----	**1.2**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	----	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	----	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	----	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	----	<100	<100	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	<50	----	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	<10	<10	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	----	<10	<10	<10
>C10 - C16 Fraction	>C10_C16	50	mg/kg	<50	----	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	----	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	----	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	<50	----	<50	<50	<50
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<50	----	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	----	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Client sample ID: PARCEL 13 LOT 460 TP4	PARCEL 13 LOT 460 TP8	PARCEL 13 LOT 459 TP11	PARCEL 13 LOT 459 QA1	PARCEL 13 LOT 459 TP12
Client sampling date / time				31-MAR-2014 15:00	31-MAR-2014 15:00	31-MAR-2014 15:00	31-MAR-2014 15:00	31-MAR-2014 15:00
				ES1407306-004	ES1407306-005	ES1407306-006	ES1407306-007	ES1407306-008
EP080: BTEXN - Continued								
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	----	<0.2	<0.2	<0.2
^ **Total Xylenes**	1330-20-7	0.5	mg/kg	<0.5	----	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	----	<1	<1	<1
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.1	%	**88.5**	----	**82.0**	**84.9**	**72.2**
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.1	%	**88.6**	----	**82.8**	**78.6**	**79.5**
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	**121**	----	**110**	**119**	**111**
2-Chlorophenol-D4	93951-73-6	0.1	%	**115**	----	**106**	**115**	**105**
2.4.6-Tribromophenol	118-79-6	0.1	%	**102**	----	**99.3**	**97.8**	**94.0**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	**104**	----	**94.6**	**95.1**	**96.1**
Anthracene-d10	1719-06-8	0.1	%	**105**	----	**102**	**104**	**104**
4-Terphenyl-d14	1718-51-0	0.1	%	**120**	----	**116**	**117**	**117**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.1	%	**111**	----	**85.1**	**89.8**	**85.5**
Toluene-D8	2037-26-5	0.1	%	**123**	----	**85.9**	**88.1**	**83.2**
4-Bromofluorobenzene	460-00-4	0.1	%	**119**	----	**81.4**	**79.7**	**79.6**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	Client sample ID: PARCEL 13 LOT 458 TP16	PARCEL 13 LOT 458 QA2	PARCEL 13 LOT 458 TP19	PARCEL 13 LOT 458 TP230	PARCEL 12 LOT 11 TP45
				Client sampling date / time: 01-APR-2014 15:00	01-APR-2014 15:00	01-APR-2014 15:00	01-APR-2014 15:00	02-APR-2014 15:00
				ES1407306-009	ES1407306-011	ES1407306-012	ES1407306-014	ES1407306-031
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	5.5	5.6	8.1	14.7	12.1
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	15	6	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	----
Chromium	7440-47-3	2	mg/kg	9	5	10	16	----
Copper	7440-50-8	5	mg/kg	<5	<5	34	16	----
Lead	7439-92-1	5	mg/kg	12	9	17	25	----
Nickel	7440-02-0	2	mg/kg	5	5	6	14	----
Zinc	7440-66-6	5	mg/kg	160	130	362	572	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	----	<0.2	----

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Client sample ID: PARCEL 13 LOT 458 TP16	PARCEL 13 LOT 458 QA2	PARCEL 13 LOT 458 TP19	PARCEL 13 LOT 458 TP230	PARCEL 12 LOT 11 TP45
			Client sampling date / time	01-APR-2014 15:00	01-APR-2014 15:00	01-APR-2014 15:00	01-APR-2014 15:00	02-APR-2014 15:00
				ES1407306-009	ES1407306-011	ES1407306-012	ES1407306-014	ES1407306-031
EP068A: Organochlorine Pesticides (OC) - Continued								
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	----	<0.2	----
^ **Sum of Aldrin + Dieldrin**	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
^ **Sum of DDD + DDE + DDT**	----	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	----	<0.2	----
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	----	<0.2	----
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	----	<0.2	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	----	<0.05	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Client sample ID: PARCEL 13 LOT 458 TP16	PARCEL 13 LOT 458 QA2	PARCEL 13 LOT 458 TP19	PARCEL 13 LOT 458 TP230	PARCEL 12 LOT 11 TP45
Client sampling date / time				01-APR-2014 15:00	01-APR-2014 15:00	01-APR-2014 15:00	01-APR-2014 15:00	02-APR-2014 15:00
				ES1407306-009	ES1407306-011	ES1407306-012	ES1407306-014	ES1407306-031
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg	**0.6**	**0.6**	----	**0.6**	**0.6**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg	**1.2**	**1.2**	----	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	----	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	----	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	----	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	----	<100	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	<50	<50	----	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	----	<10	<10
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	<10	----	<10	<10
>C10 - C16 Fraction	>C10_C16	50	mg/kg	<50	<50	----	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	----	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	----	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	<50	<50	----	<50	<50
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	<50	<50	----	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	----	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Client sample ID: PARCEL 13 LOT 458 TP16	PARCEL 13 LOT 458 QA2	PARCEL 13 LOT 458 TP19	PARCEL 13 LOT 458 TP230	PARCEL 12 LOT 11 TP45
				Client sampling date / time: 01-APR-2014 15:00	01-APR-2014 15:00	01-APR-2014 15:00	01-APR-2014 15:00	02-APR-2014 15:00
				ES1407306-009	ES1407306-011	ES1407306-012	ES1407306-014	ES1407306-031
EP080: BTEXN - Continued								
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	<0.2	----	<0.2	<0.2
^ **Total Xylenes**	1330-20-7	0.5	mg/kg	<0.5	<0.5	----	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	----	<1	<1
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.1	%	**101**	**81.4**	----	**91.8**	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.1	%	**104**	**80.3**	----	**82.3**	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	**116**	**116**	----	**116**	**111**
2-Chlorophenol-D4	93951-73-6	0.1	%	**110**	**108**	----	**111**	**105**
2.4.6-Tribromophenol	118-79-6	0.1	%	**95.3**	**88.7**	----	**94.7**	**97.2**
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	**94.8**	**93.1**	----	**94.4**	**103**
Anthracene-d10	1719-06-8	0.1	%	**95.6**	**101**	----	**104**	**96.2**
4-Terphenyl-d14	1718-51-0	0.1	%	**115**	**114**	----	**116**	**113**
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.1	%	**100**	**98.7**	----	**96.8**	**96.3**
Toluene-D8	2037-26-5	0.1	%	**97.8**	**94.0**	----	**93.5**	**93.2**
4-Bromofluorobenzene	460-00-4	0.1	%	**94.2**	**89.7**	----	**87.0**	**84.8**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	PARCEL 12 LOT 10 TP50	PARCEL 12 LOT 10 QA1	----	----	----
			Client sampling date / time	03-APR-2014 15:00	03-APR-2014 15:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1407306-035	ES1407306-036	----	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	27.0	18.2	----	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	5	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg	7	13	----	----	----
Copper	7440-50-8	5	mg/kg	16	23	----	----	----
Lead	7439-92-1	5	mg/kg	<5	6	----	----	----
Nickel	7440-02-0	2	mg/kg	4	8	----	----	----
Zinc	7440-66-6	5	mg/kg	31	32	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	0.2	0.3	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	0.8	<0.5	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	7.0	0.8	----	----	----
Anthracene	120-12-7	0.5	mg/kg	0.6	<0.5	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	1.6	<0.5	----	----	----
Pyrene	129-00-0	0.5	mg/kg	0.6	<0.5	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	10.6	0.8	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	----	----	----
EP080/071: Total Petroleum Hydrocarbons								

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	PARCEL 12 LOT 10 TP50	PARCEL 12 LOT 10 QA1	----	----	----
				Client sampling date / time	03-APR-2014 15:00	03-APR-2014 15:00	----	----	----
Compound	CAS Number	LOR	Unit		ES1407306-035	ES1407306-036	----	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	----	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	----	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	----	----	----
>C10 - C16 Fraction	>C10_C16	50	mg/kg		<50	<50	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	----	----	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	----	----	----
^ Total Xylenes	1330-20-7	0.5	mg/kg		<0.5	<0.5	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.1	%		111	118	----	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%		104	112	----	----	----
2.4.6-Tribromophenol	118-79-6	0.1	%		94.0	97.8	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.1	%		90.5	96.6	----	----	----
Anthracene-d10	1719-06-8	0.1	%		98.5	104	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%		112	117	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		81.8	95.6	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	PARCEL 12 LOT 10 TP50	PARCEL 12 LOT 10 QA1	----	----	----
			Client sampling date / time	03-APR-2014 15:00	03-APR-2014 15:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1407306-035	ES1407306-036	----	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued								
Toluene-D8	2037-26-5	0.1	%	**83.2**	**93.3**	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	**79.9**	**88.9**	----	----	----

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	72.8	133.2
Toluene-D8	2037-26-5	73.9	132.1
4-Bromofluorobenzene	460-00-4	71.6	130.0

QUALITY CONTROL REPORT

Work Order	: **ES1407306**	Page	: 1 of 15
Client	: **ENVIRON AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR STEVE CADMAN	Contact	: Client Services
Address	: PO BOX 564 MAITLAND NSW, AUSTRALIA 2320	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: scadman@environcorp.com	E-mail	: sydney@alsglobal.com
Telephone	: +61 02 49344354	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 49344359	Facsimile	: +61-2-8784 8500
Project	: HYDRO BUFFER ZONE INVESTIGATION	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 03-APR-2014
Sampler	: K.WOODS/S.CADMAN	Issue Date	: 15-APR-2014
Order number	: AS130348		
		No. of samples received	: 48
Quote number	: SY/433/13	No. of samples analysed	: 12

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
Pabi Subba	Senior Organic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Shobhna Chandra	Metals Coordinator	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: 3378696)									
ES1407278-003	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	0.0	No Limit
ES1407278-014	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	0.0	No Limit
EA055: Moisture Content (QC Lot: 3378697)									
ES1407306-012	PARCEL 13 LOT 458 TP19	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	8.1	8.9	8.5	No Limit
ES1407368-007	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	0.0	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 3381850)									
ES1407266-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	<5	0.0	No Limit
ES1407302-006	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	14	15	7.6	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	48	46	4.4	0% - 20%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	29	28	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	46	45	3.4	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 3381852)									
ES1407306-012	PARCEL 13 LOT 458 TP19	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	10	10	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	6	6	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	15	14	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	34	36	7.7	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	17	25	38.6	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	362	354	2.3	0% - 20%
ES1407325-007	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	29	26	11.9	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	17	15	10.7	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	20	17	18.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	13	11	10.7	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	45	51	11.8	0% - 50%

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 (%)*
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3381851)									
ES1407266-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES1407302-006	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3381853)									
ES1407306-012	PARCEL 13 LOT 458 TP19	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES1407325-007	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 3378345)									
ES1407420-003	Anonymous	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
ES1407420-011	Anonymous	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.25	<0.25	0.0	No Limit

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 (%)*
EP068A: Organochlorine Pesticides (OC) (QC Lot: 3378345) - continued									
ES1407420-011	Anonymous	EP068: Endrin	72-20-8	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 3378345)									
ES1407420-003	Anonymous	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
ES1407420-011	Anonymous	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.25	<0.25	0.0	No Limit

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 (%)*
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 3378345) - continued									
ES1407420-011	Anonymous	EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.25	<0.25	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3378351)									
ES1407306-004	PARCEL 13 LOT 460 TP4	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
ES1407420-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	0.9	58.3	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	0.6	0.7	17.9	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	1.4	1.4	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	1.3	1.3	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	0.8	0.8	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	0.8	0.8	0.0	No Limit
		EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	1.1	1.1	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	0.8	0.8	0.0	No Limit

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 (%)*
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3378351) - continued									
ES1407420-001	Anonymous	EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	0.6	0.6	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	7.4	8.4	12.6	0% - 50%
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	1.0	1.0	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3377659)									
ES1407306-004	PARCEL 13 LOT 460 TP4	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
ES1407368-021	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3378350)									
ES1407306-004	PARCEL 13 LOT 460 TP4	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
ES1407420-001	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QC Lot: 3377659)									
ES1407306-004	PARCEL 13 LOT 460 TP4	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
ES1407368-021	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QC Lot: 3378350)									
ES1407306-004	PARCEL 13 LOT 460 TP4	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	>C10_C16	50	mg/kg	<50	<50	0.0	No Limit
ES1407420-001	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	>C10_C16	50	mg/kg	<50	<50	0.0	No Limit
EP080: BTEXN (QC Lot: 3377659)									
ES1407306-004	PARCEL 13 LOT 460 TP4	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
ES1407368-021	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit

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 (%)*
EP080: BTEXN (QC Lot: 3377659) - continued									
ES1407368-021	Anonymous	EP080: Naphthalene	91-20-3	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
EG005T: Total Metals by ICP-AES (QCLot: 3381850)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	109	92	130
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	106	87	121
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	99.5	80	136
EG005T: Copper	7440-50-8	5	mg/kg	<5	32.0 mg/kg	120	93	127
EG005T: Lead	7439-92-1	5	mg/kg	<5	40.0 mg/kg	100	86	124
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55.0 mg/kg	107	93	131
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	108	81	133
EG005T: Total Metals by ICP-AES (QCLot: 3381852)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	112	92	130
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	110	87	121
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	103	80	136
EG005T: Copper	7440-50-8	5	mg/kg	<5	32.0 mg/kg	116	93	127
EG005T: Lead	7439-92-1	5	mg/kg	<5	40.0 mg/kg	108	86	124
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55.0 mg/kg	110	93	131
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	108	81	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3381851)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	89.6	70	105
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3381853)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	89.5	70	105
EP068A: Organochlorine Pesticides (OC) (QCLot: 3378345)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	90.1	71	113
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	91.2	66	122
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	93.8	69	119
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	91.1	71	115
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	85.2	65	113
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	90.9	68	116
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	89.6	68	118
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	87.2	68	116
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	84.6	68	120
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	83.5	69	119
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	85.7	67	121
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	85.2	66	118
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	87.6	69	117
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	83.4	67	123

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 3378345) - continued								
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	89.5	76	120
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	98.4	76	120
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	86.5	57.3	115
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	76.9	60	124
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	80.2	67	127
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	83.1	65	123
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	78.8	65	129
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3378345)								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	81.3	56	126
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	84.7	64	128
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	78.4	54	122
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	74.6	64	124
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	77.4	73	117
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	83.7	55	119
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	78.6	69	123
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	75.1	70	120
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	84.2	71	115
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	81.6	68	114
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	81.9	68	122
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	82.1	69	115
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	81.4	70	118
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	80.7	68	116
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	87.4	64	120
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	80.8	68	116
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	83.3	70	118
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	82.4	67	123
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	82.2	42	126
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3378351)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	4 mg/kg	94.6	80	124
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	4 mg/kg	93.8	77	123
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	4 mg/kg	88.8	79	123
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	4 mg/kg	85.5	77	123
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	4 mg/kg	93.5	79	123
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	4 mg/kg	92.5	79	123
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	4 mg/kg	94.0	79	123
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	4 mg/kg	93.7	79	125
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	4 mg/kg	91.8	73	121
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	4 mg/kg	94.5	81	123
EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	4 mg/kg	85.8	70	118

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3378351) - continued								
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	4 mg/kg	91.9	77	123
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	4 mg/kg	85.2	76	122
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	4 mg/kg	82.7	71	113
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	4 mg/kg	82.2	71.7	113
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	4 mg/kg	84.6	72.4	114
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3377659)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	117	68.4	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3378350)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	87.2	71	131
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	90.5	74	138
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	82.6	64	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3377659)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	116	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3378350)								
EP071: >C10 - C16 Fraction	>C10_C16	50	mg/kg	<50	250 mg/kg	85.0	70	130
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	90.0	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----
		50	mg/kg	----	150 mg/kg	72.9	63	131
EP080: BTEXN (QCLot: 3377659)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	111	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	108	62	128
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	107	58	118
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	104	60	120
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	106	60	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	97.6	62	138

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**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005T: Total Metals by ICP-AES (QCLot: 3381850)							
ES1407266-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	97.3	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	96.3	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	99.5	70	130

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
EG005T: Total Metals by ICP-AES (QCLot: 3381850) - continued							
ES1407266-001	Anonymous	EG005T: Copper	7440-50-8	125 mg/kg	106	70	130
		EG005T: Lead	7439-92-1	125 mg/kg	95.1	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	86.4	70	130
		EG005T: Zinc	7440-66-6	125 mg/kg	93.8	70	130
EG005T: Total Metals by ICP-AES (QCLot: 3381852)							
ES1407306-012	PARCEL 13 LOT 458 TP19	EG005T: Arsenic	7440-38-2	50 mg/kg	100	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	103	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	106	70	130
		EG005T: Copper	7440-50-8	125 mg/kg	102	70	130
		EG005T: Lead	7439-92-1	125 mg/kg	104	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	97.9	70	130
		EG005T: Zinc	7440-66-6	125 mg/kg	83.9	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3381851)							
ES1407266-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	97.6	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3381853)							
ES1407306-012	PARCEL 13 LOT 458 TP19	EG035T: Mercury	7439-97-6	5 mg/kg	99.0	70	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 3378345)							
ES1407420-003	Anonymous	EP068: gamma-BHC	58-89-9	0.5 mg/kg	102	70	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	104	70	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	107	70	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	103	70	130
		EP068: Endrin	72-20-8	2 mg/kg	104	70	130
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	84.3	70	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3378345)							
ES1407420-003	Anonymous	EP068: Diazinon	333-41-5	0.5 mg/kg	101	70	130
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	78.9	70	130
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	106	70	130
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	71.3	70	130
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	82.4	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3378351)							
ES1407306-004	PARCEL 13 LOT 460 TP4	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	92.4	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	97.2	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3377659)							
ES1407306-004	PARCEL 13 LOT 460 TP4	EP080: C6 - C9 Fraction	----	32.5 mg/kg	84.1	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3378350)							
ES1407306-004	PARCEL 13 LOT 460 TP4	EP071: C10 - C14 Fraction	----	640 mg/kg	90.8	73	137
		EP071: C15 - C28 Fraction	----	3140 mg/kg	101	53	131

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
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3378350) - continued							
ES1407306-004	PARCEL 13 LOT 460 TP4	EP071: C29 - C36 Fraction	----	2860 mg/kg	97.2	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3377659)							
ES1407306-004	PARCEL 13 LOT 460 TP4	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	80.9	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3378350)							
ES1407306-004	PARCEL 13 LOT 460 TP4	EP071: >C10 - C16 Fraction	>C10_C16	850 mg/kg	112	73	137
		EP071: >C16 - C34 Fraction	----	4800 mg/kg	98.9	53	131
		EP071: >C34 - C40 Fraction	----	2400 mg/kg	82.0	52	132
EP080: BTEXN (QCLot: 3377659)							
ES1407306-004	PARCEL 13 LOT 460 TP4	EP080: Benzene	71-43-2	2.5 mg/kg	72.1	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	72.2	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	75.2	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	74.1	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	76.0	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	70.7	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
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3377659)										
ES1407306-004	PARCEL 13 LOT 460 TP4	EP080: C6 - C9 Fraction	----	32.5 mg/kg	84.1	----	70	130	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3377659)										
ES1407306-004	PARCEL 13 LOT 460 TP4	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	80.9	----	70	130	----	----
EP080: BTEXN (QCLot: 3377659)										
ES1407306-004	PARCEL 13 LOT 460 TP4	EP080: Benzene	71-43-2	2.5 mg/kg	72.1	----	70	130	----	----
		EP080: Toluene	108-88-3	2.5 mg/kg	72.2	----	70	130	----	----
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	75.2	----	70	130	----	----
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	74.1	----	70	130	----	----
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	76.0	----	70	130	----	----
		EP080: Naphthalene	91-20-3	2.5 mg/kg	70.7	----	70	130	----	----
EP068A: Organochlorine Pesticides (OC) (QCLot: 3378345)										
ES1407420-003	Anonymous	EP068: gamma-BHC	58-89-9	0.5 mg/kg	102	----	70	130	----	----

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
EP068A: Organochlorine Pesticides (OC) (QCLot: 3378345) - continued										
ES1407420-003	Anonymous	EP068: Heptachlor	76-44-8	0.5 mg/kg	104	----	70	130	----	----
		EP068: Aldrin	309-00-2	0.5 mg/kg	107	----	70	130	----	----
		EP068: Dieldrin	60-57-1	0.5 mg/kg	103	----	70	130	----	----
		EP068: Endrin	72-20-8	2 mg/kg	104	----	70	130	----	----
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	84.3	----	70	130	----	----
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3378345)										
ES1407420-003	Anonymous	EP068: Diazinon	333-41-5	0.5 mg/kg	101	----	70	130	----	----
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	78.9	----	70	130	----	----
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	106	----	70	130	----	----
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	71.3	----	70	130	----	----
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	82.4	----	70	130	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3378350)										
ES1407306-004	PARCEL 13 LOT 460 TP4	EP071: C10 - C14 Fraction	----	640 mg/kg	90.8	----	73	137	----	----
		EP071: C15 - C28 Fraction	----	3140 mg/kg	101	----	53	131	----	----
		EP071: C29 - C36 Fraction	----	2860 mg/kg	97.2	----	52	132	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3378350)										
ES1407306-004	PARCEL 13 LOT 460 TP4	EP071: >C10 - C16 Fraction	>C10_C16	850 mg/kg	112	----	73	137	----	----
		EP071: >C16 - C34 Fraction	----	4800 mg/kg	98.9	----	53	131	----	----
		EP071: >C34 - C40 Fraction	----	2400 mg/kg	82.0	----	52	132	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3378351)										
ES1407306-004	PARCEL 13 LOT 460 TP4	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	92.4	----	70	130	----	----
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	97.2	----	70	130	----	----
EG005T: Total Metals by ICP-AES (QCLot: 3381850)										
ES1407266-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	97.3	----	70	130	----	----
		EG005T: Cadmium	7440-43-9	50 mg/kg	96.3	----	70	130	----	----
		EG005T: Chromium	7440-47-3	50 mg/kg	99.5	----	70	130	----	----
		EG005T: Copper	7440-50-8	125 mg/kg	106	----	70	130	----	----
		EG005T: Lead	7439-92-1	125 mg/kg	95.1	----	70	130	----	----
		EG005T: Nickel	7440-02-0	50 mg/kg	86.4	----	70	130	----	----
		EG005T: Zinc	7440-66-6	125 mg/kg	93.8	----	70	130	----	----
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3381851)										
ES1407266-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	97.6	----	70	130	----	----
EG005T: Total Metals by ICP-AES (QCLot: 3381852)										
ES1407306-012	PARCEL 13 LOT 458 TP19	EG005T: Arsenic	7440-38-2	50 mg/kg	100	----	70	130	----	----
		EG005T: Cadmium	7440-43-9	50 mg/kg	103	----	70	130	----	----
		EG005T: Chromium	7440-47-3	50 mg/kg	106	----	70	130	----	----
		EG005T: Copper	7440-50-8	125 mg/kg	102	----	70	130	----	----
		EG005T: Lead	7439-92-1	125 mg/kg	104	----	70	130	----	----

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
EG005T: Total Metals by ICP-AES (QCLot: 3381852) - continued										
ES1407306-012	PARCEL 13 LOT 458 TP19	EG005T: Nickel	7440-02-0	50 mg/kg	97.9	----	70	130	----	----
		EG005T: Zinc	7440-66-6	125 mg/kg	83.9	----	70	130	----	----
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3381853)										
ES1407306-012	PARCEL 13 LOT 458 TP19	EG035T: Mercury	7439-97-6	5 mg/kg	99.0	----	70	130	----	----

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **ES1407306**	Page	: 1 of 7
Client	: ENVIRON AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MR STEVE CADMAN	Contact	: Client Services
Address	: PO BOX 564 MAITLAND NSW, AUSTRALIA 2320	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: scadman@environcorp.com	E-mail	: sydney@alsglobal.com
Telephone	: +61 02 49344354	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 49344359	Facsimile	: +61-2-8784 8500
Project	: HYDRO BUFFER ZONE INVESTIGATION	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 03-APR-2014
Sampler	: K.WOODS/S.CADMAN	Issue Date	: 15-APR-2014
Order number	: AS130348		
		No. of samples received	: 48
Quote number	: SY/433/13	No. of samples analysed	: 12

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) PARCEL 13 LOT 458 TP16, PARCEL 13 LOT 458 QA2, PARCEL 13 LOT 458 TP19, PARCEL 13 LOT 458 TP230	**01-APR-2014**	**----**	----	----	**07-APR-2014**	15-APR-2014	✓
Soil Glass Jar - Unpreserved (EA055-103) PARCEL 12 LOT 11 TP45	**02-APR-2014**	**----**	----	----	**07-APR-2014**	16-APR-2014	✓
Soil Glass Jar - Unpreserved (EA055-103) PARCEL 12 LOT 10 TP50, PARCEL 12 LOT 10 QA1	**03-APR-2014**	**----**	----	----	**07-APR-2014**	17-APR-2014	✓
Soil Glass Jar - Unpreserved (EA055-103) PARCEL 13 LOT 460 TP4, PARCEL 13 LOT 460 TP8, PARCEL 13 LOT 459 TP11, PARCEL 13 LOT 459 QA1, PARCEL 13 LOT 459 TP12	**31-MAR-2014**	**----**	----	----	**07-APR-2014**	14-APR-2014	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T) PARCEL 13 LOT 458 TP16, PARCEL 13 LOT 458 QA2, PARCEL 13 LOT 458 TP19, PARCEL 13 LOT 458 TP230	**01-APR-2014**	**09-APR-2014**	28-SEP-2014	✓	**09-APR-2014**	28-SEP-2014	✓
Soil Glass Jar - Unpreserved (EG005T) PARCEL 12 LOT 10 TP50, PARCEL 12 LOT 10 QA1	**03-APR-2014**	**09-APR-2014**	30-SEP-2014	✓	**09-APR-2014**	30-SEP-2014	✓
Soil Glass Jar - Unpreserved (EG005T) PARCEL 13 LOT 460 TP4, PARCEL 13 LOT 460 TP8, PARCEL 13 LOT 459 TP11, PARCEL 13 LOT 459 QA1, PARCEL 13 LOT 459 TP12	**31-MAR-2014**	**09-APR-2014**	27-SEP-2014	✓	**09-APR-2014**	27-SEP-2014	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T) PARCEL 13 LOT 458 TP16, PARCEL 13 LOT 458 QA2, PARCEL 13 LOT 458 TP19, PARCEL 13 LOT 458 TP230	**01-APR-2014**	**09-APR-2014**	29-APR-2014	✓	**10-APR-2014**	29-APR-2014	✓
Soil Glass Jar - Unpreserved (EG035T) PARCEL 12 LOT 10 TP50, PARCEL 12 LOT 10 QA1	**03-APR-2014**	**09-APR-2014**	01-MAY-2014	✓	**10-APR-2014**	01-MAY-2014	✓
Soil Glass Jar - Unpreserved (EG035T) PARCEL 13 LOT 460 TP4, PARCEL 13 LOT 460 TP8, PARCEL 13 LOT 459 TP11, PARCEL 13 LOT 459 QA1, PARCEL 13 LOT 459 TP12	**31-MAR-2014**	**09-APR-2014**	28-APR-2014	✓	**10-APR-2014**	28-APR-2014	✓

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
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068)								
PARCEL 13 LOT 458 TP16,	PARCEL 13 LOT 458 QA2,	**01-APR-2014**	**07-APR-2014**	15-APR-2014	✓	**08-APR-2014**	17-MAY-2014	✓
PARCEL 13 LOT 458 TP230								
Soil Glass Jar - Unpreserved (EP068)								
PARCEL 13 LOT 460 TP4,	PARCEL 13 LOT 459 TP11,	**31-MAR-2014**	**07-APR-2014**	14-APR-2014	✓	**08-APR-2014**	17-MAY-2014	✓
PARCEL 13 LOT 459 QA1,	PARCEL 13 LOT 459 TP12							
EP068B: Organophosphorus Pesticides (OP)								
Soil Glass Jar - Unpreserved (EP068)								
PARCEL 13 LOT 458 TP16,	PARCEL 13 LOT 458 QA2,	**01-APR-2014**	**07-APR-2014**	15-APR-2014	✓	**08-APR-2014**	17-MAY-2014	✓
PARCEL 13 LOT 458 TP230								
Soil Glass Jar - Unpreserved (EP068)								
PARCEL 13 LOT 460 TP4,	PARCEL 13 LOT 459 TP11,	**31-MAR-2014**	**07-APR-2014**	14-APR-2014	✓	**08-APR-2014**	17-MAY-2014	✓
PARCEL 13 LOT 459 QA1,	PARCEL 13 LOT 459 TP12							
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013								
Soil Glass Jar - Unpreserved (EP071)								
PARCEL 13 LOT 458 TP16,	PARCEL 13 LOT 458 QA2,	**01-APR-2014**	**07-APR-2014**	15-APR-2014	✓	**08-APR-2014**	17-MAY-2014	✓
PARCEL 13 LOT 458 TP230								
Soil Glass Jar - Unpreserved (EP071)								
PARCEL 12 LOT 11 TP45		**02-APR-2014**	**07-APR-2014**	16-APR-2014	✓	**08-APR-2014**	17-MAY-2014	✓
Soil Glass Jar - Unpreserved (EP071)								
PARCEL 12 LOT 10 TP50,	PARCEL 12 LOT 10 QA1	**03-APR-2014**	**07-APR-2014**	17-APR-2014	✓	**08-APR-2014**	17-MAY-2014	✓
Soil Glass Jar - Unpreserved (EP071)								
PARCEL 13 LOT 460 TP4,	PARCEL 13 LOT 459 TP11,	**31-MAR-2014**	**07-APR-2014**	14-APR-2014	✓	**08-APR-2014**	17-MAY-2014	✓
PARCEL 13 LOT 459 QA1,	PARCEL 13 LOT 459 TP12							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM))								
PARCEL 13 LOT 458 TP16,	PARCEL 13 LOT 458 QA2,	**01-APR-2014**	**07-APR-2014**	15-APR-2014	✓	**08-APR-2014**	17-MAY-2014	✓
PARCEL 13 LOT 458 TP230								
Soil Glass Jar - Unpreserved (EP075(SIM))								
PARCEL 12 LOT 11 TP45		**02-APR-2014**	**07-APR-2014**	16-APR-2014	✓	**08-APR-2014**	17-MAY-2014	✓
Soil Glass Jar - Unpreserved (EP075(SIM))								
PARCEL 12 LOT 10 TP50,	PARCEL 12 LOT 10 QA1	**03-APR-2014**	**07-APR-2014**	17-APR-2014	✓	**08-APR-2014**	17-MAY-2014	✓
Soil Glass Jar - Unpreserved (EP075(SIM))								
PARCEL 13 LOT 460 TP4,	PARCEL 13 LOT 459 TP11,	**31-MAR-2014**	**07-APR-2014**	14-APR-2014	✓	**08-APR-2014**	17-MAY-2014	✓
PARCEL 13 LOT 459 QA1,	PARCEL 13 LOT 459 TP12							

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
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080) PARCEL 13 LOT 458 TP16, PARCEL 13 LOT 458 TP230	PARCEL 13 LOT 458 QA2,	**01-APR-2014**	**07-APR-2014**	15-APR-2014	✓	**08-APR-2014**	15-APR-2014	✓
Soil Glass Jar - Unpreserved (EP080) PARCEL 12 LOT 11 TP45		**02-APR-2014**	**07-APR-2014**	16-APR-2014	✓	**08-APR-2014**	16-APR-2014	✓
Soil Glass Jar - Unpreserved (EP080) PARCEL 12 LOT 10 TP50,	PARCEL 12 LOT 10 QA1	**03-APR-2014**	**07-APR-2014**	17-APR-2014	✓	**08-APR-2014**	17-APR-2014	✓
Soil Glass Jar - Unpreserved (EP080) PARCEL 13 LOT 460 TP4, PARCEL 13 LOT 459 QA1,	PARCEL 13 LOT 459 TP11, PARCEL 13 LOT 459 TP12	**31-MAR-2014**	**07-APR-2014**	14-APR-2014	✓	**08-APR-2014**	14-APR-2014	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013								
Soil Glass Jar - Unpreserved (EP080) PARCEL 13 LOT 458 TP16, PARCEL 13 LOT 458 TP230	PARCEL 13 LOT 458 QA2,	**01-APR-2014**	**07-APR-2014**	15-APR-2014	✓	**08-APR-2014**	15-APR-2014	✓
Soil Glass Jar - Unpreserved (EP080) PARCEL 12 LOT 11 TP45		**02-APR-2014**	**07-APR-2014**	16-APR-2014	✓	**08-APR-2014**	16-APR-2014	✓
Soil Glass Jar - Unpreserved (EP080) PARCEL 12 LOT 10 TP50,	PARCEL 12 LOT 10 QA1	**03-APR-2014**	**07-APR-2014**	17-APR-2014	✓	**08-APR-2014**	17-APR-2014	✓
Soil Glass Jar - Unpreserved (EP080) PARCEL 13 LOT 460 TP4, PARCEL 13 LOT 459 QA1,	PARCEL 13 LOT 459 TP11, PARCEL 13 LOT 459 TP12	**31-MAR-2014**	**07-APR-2014**	14-APR-2014	✓	**08-APR-2014**	14-APR-2014	✓

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)							
Moisture Content	EA055-103	4	40	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (SIM)	EP075(SIM)	2	18	**11.1**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	2	18	**11.1**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	4	34	**11.8**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	4	34	**11.8**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	2	20	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	2	19	**10.5**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
PAH/Phenols (SIM)	EP075(SIM)	1	18	**5.6**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	18	**5.6**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	2	34	**5.9**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	2	34	**5.9**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	19	**5.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
PAH/Phenols (SIM)	EP075(SIM)	1	18	**5.6**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	18	**5.6**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	2	34	**5.9**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	2	34	**5.9**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	19	**5.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
PAH/Phenols (SIM)	EP075(SIM)	1	18	**5.6**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	18	**5.6**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	2	34	**5.9**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	2	34	**5.9**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	19	**5.3**	**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).
Total Metals by ICP-AES	EG005T	SOIL	(APHA 21st ed., 3120; USEPA SW 846 - 6010) (ICPAES) Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	AS 3550, APHA 21st ed., 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Pesticides by GCMS	EP068	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 504,505)
TPH - Semivolatile Fraction	EP071	SOIL	(USEPA SW 846 - 8015A) Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)
PAH/Phenols (SIM)	EP075(SIM)	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TPH Volatiles/BTEX	EP080	SOIL	(USEPA SW 846 - 8260B) Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 501)

Preparation Methods	Method	Matrix	Method Descriptions
Methanolic Extraction of Soils for Purge and Trap	* ORG16	SOIL	(USEPA SW 846 - 5030A) 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids (Option A - Concentrating)	ORG17A	SOIL	In-house, Mechanical agitation (tumbler). 20g of sample, Na2SO4 and surrogate are extracted with 150mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Tumbler Extraction of Solids (Option B - Non-concentrating)	ORG17B	SOIL	In-house, Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 20mL 1:1 DCM/Acetone by end over end tumble. The solvent is transferred directly to a GC vial 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.**

Appendix F

QA/QC Assessment

APPENDIX F

DATA QUALITY OBJECTIVES

To ensure that reliable data of adequate type was collected and assessed for the investigation, the seven-step Data Quality Objective (DQO) approach, endorsed in the NSW DEC (2006) Guidelines for the NSW Site Auditor Scheme 2nd Edition, will be adopted. The DQOs set quality assurance and quality control parameters for the field and laboratory programs to ensure data of appropriate reliability will be used to assess the environmental conditions at Parcel 12.

ENVIRON has developed DQOs in accordance with the seven-step process, which is presented below.

Step 1 – State the Problem

Based on the information available from the Phase 1 ESA, uses of Parcel 12 include an unknown development in the 1950s and rural residential landuse from the 1970s to the present day. These uses of Parcel 12 require confirmation via a site walkover and judgemental sampling. In addition, the potential for fluoride in surface soils from dust deposition from the Hydro smelter requires assessment.

Step 2 – Identification of the Goals (Decisions) of the Study

The following decisions are to be made from this study:

- Are the current and former uses of Parcel 12 consistent with site observations?
- Has Parcel 12 been impacted by fluoride from dust deposition from the Hydro smelter?
- Has Parcel 12 been impacted by other contaminants from historical site use?
- Is Parcel 12 suitable for low rural residential (R2) and rural landscape (RU2) landuse?

Step 3 – Identify Information Inputs to the Decision or Goal of the Study

The inputs required to make the above decisions as listed below:

- A site walkover, including collection of field notes and photographs;
- Results of surface soil samples collected for fluoride analysis;
- Results of other soil samples from fill/ hummocky ground collected for suitable analysis during the site walkover;
- Proposed land use;
- Appropriate NSW contamination guidelines.

Step 4 – Define the Study Boundaries

Spatial boundaries - the study boundaries have been defined as the spatial boundary of Parcel 12, as shown on Figure 1.

Vertical boundaries – as areas of concern at Parcel 12 are restricted to surface soils, the vertical boundary of the study is the top 200mm unless subsurface contamination issues are identified during the site walkover.

Temporal boundaries – the temporal boundary is limited to the data collected during the investigation works.

Constraints within the study boundaries – This investigation does not require investigation of subsurface soils or groundwater unless impacts to subsurface soils or groundwater are considered likely to have occurred from the historical site activities.

Step 5 – Develop a Decision Rule

The decision rules for this investigation are as follows:

- If it is determined that the data generated through this investigation is reliable for use in producing a site conceptual model and assessing the suitability of Parcel 12 for low rural residential (R2) and rural landscape (RU2) landuse, then an assessment of the suitability of Parcel 12 for low rural residential (R2) and rural landscape (RU2) landuse will be made;

- If it is determined that the data generated through this investigation is not suitable, comprehensive or reliable for use in producing a site conceptual model, then further investigations may be recommended prior to the development of a site conceptual model and assessment of the suitability of Parcel 12 for low rural residential (R2) and rural landscape (RU2) landuse.

Step 6 – Specify Performance or Acceptance Criteria that the Data need to Achieve

Acceptable limits on decision errors have been developed based on the Data Quality Indicators (DQIs) of precision, accuracy, representativeness, comparability and completeness. The DQIs for this investigation are outlined below.

The potential for significant decision errors were minimized by:

- Completion of a QA/QC assessment of the investigation data to assess if the data satisfies the DQIs;

- Assessment of whether appropriate sampling and analytical densities were completed for the purpose of the investigation; and

- Ensuring that the criteria set for the investigation were appropriate for the proposed use of Parcel 12.

Minimization of the potential for significant decision errors limits the potential that a conclusive statement may be incorrect.

Step 7 – Optimisation of the Design of Collection of Data

The collection of data was optimized by the completion of a Phase 1 ESA, data gap review and development of a sampling strategy. Attainment of the DQOs has been assessed by reference to the DQIs, presented below.

DATA QUALITY INDICATORS

The project Data Quality Indicators (DQIs) have been established to set acceptance limits on field and laboratory data collected as part of this investigation. Field and laboratory procedures acceptance limits are set at different levels for different projects and by different laboratories. Non-compliances with acceptance limits are to be documented and discussed in the report. The DQIs are presented in Table A.

Table A: Data Quality Indicators

DQI	Field	Laboratory	Acceptability Limits
Completeness	All critical locations sampled, including targeted sampling of areas of environmental concern identified during the site walkover. Fluoride soil sampling completed on a reduced density to identify if fluoride in surface soils is an issue. All samples collected Experienced sampler Documentation correct	All critical samples analysed and all analytes analysed according to Standard Operating Procedures (SOPs) Appropriate Practical Quantitation Limits (PQLs) Sample documentation complete Sample holding times complied with	As per NEPM (2013)
Comparability	Experienced sampler In the event of multiple sampling events: Same types of samples collected Same sampling methodologies used Climatic conditions	Same analytical methods used Same PQLs Same units Same primary and secondary laboratories	As per NEPM (2013)
Representativeness	Appropriate media sampled Relevant media sampled	All samples analysed according to SOPs	
Precision	Collection of duplicate samples Sampling methodologies appropriate and complied with	Analysis of: Blind duplicate samples at rate of 1 in 10 samples Split duplicate samples at rate of 1 in 20 samples Laboratory duplicate samples	 RPD of 30 to 50% RPD of 30 to 50% RPD of 30 to 50%

Accuracy	Sampling methodologies appropriate and complied with.	Analysis of: Method blanks Matrix spikes Surrogate spikes Laboratory control samples Reagent blanks Reference material	 Non-detect 70 to 130% 70-130% 70 to 130%

QUALITY ASSURANCE AND QUALITY CONTROL

A quality assurance assessment for this report is presented in Table A and B below. An assessment was made of data completeness, comparability, representativeness, precision and accuracy based on field and laboratory considerations, as outlined in NSW DEC (2006) and NSW EPA (2007) guidelines.

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

Sampling Methodology	ENVIRON Assessment
Sampling Pattern and Locations	Surface soil sampling was undertaken on a grid pattern across the site to assess the impact of particulate fallout from Hydro Aluminium Smelter. Sampling of fill material was completed on a targeted basis.
Sampling Density	Three soil samples were collected from a grid across the entire site which is approximately 4.3 ha. The purpose of the sampling was to assess for impacts from smelter particulate fallout and therefore is considered suitable in density and spatial layout. Five representative soil samples were collected from test pits that encountered fill. Given the homogeneous nature of the fill and its limited vertical distribution, this sampling density is considered adequate.
Sample depths	Surface soil samples were collected from a grid across the entire site from the ground surface. Fill soil samples were collected from within 0.6m of the ground surface, which constitutes the maximum depth of fill.
Sample Collection Method	Surface soil samples across Parcel 12 were collected directly from the ground surface using using dedicated disposable gloves and a hand trowel. The hand trowel was brushed clean prior to sample collection. Fill soil samples were collected from the centre of the back hoe bucket using dedicated disposable gloves. Soil samples were collected into laboratory supplied, acid rinsed glass jars.
Decontamination Procedures	Surface soil samples across Parcel 12 were collected directly from the ground surface using using dedicated disposable gloves and a hand trowel. The hand trowel was generally used to loosen the soil prior to sampling and was brushed clean between sample locations. As fill soil samples were collected from the centre of the back

Table A: QA/QC – Sampling and Analysis Methodology Assessment	
Sampling Methodology	**ENVIRON Assessment**
	hoe bucket, decontamination of the back hoe was not required.
Sample handling and containers	All soil samples were placed into laboratory-supplied acid-rinsed glass jars and paper bags for fluoride analysis. Soil samples were placed on ice following collection and during transportation to the laboratory.
Chain of Custody	Samples were transported to the laboratory under chain of custody conditions. The chain of custody forms were signed by the laboratory on receipt of the samples.
Detailed description of field screening protocols	Field screening for volatiles was not completed during soil sampling as volatile contaminants were not the main chemical of concern.
Calibration of field equipment	Field equipment requiring calibration was hired from a rental company who calibrated the equipment prior to hire.
Sampling Logs	The lithology of surface soil samples was documented on the field information sheets, which are included in Appendix D.

Table B: QA/QC – Field and Lab Quality Assurance and Quality Control	
Field and Lab QA/QC	**ENVIRON Comments**
Field quality control samples	One intra-laboratory duplicate soil sample was collected at Parcel 12 during the fill soil sampling, with duplicates collected at a rate of one per 5 primary samples. No rinsate blank samples were collected.
Field quality control results	The Relative Percent Differences (RPDs) between the primary and duplicate pair were less than 50% for all analytes.
NATA registered laboratory and NATA endorsed methods	ALS was used as the primary laboratory. ALS laboratory certificates are NATA stamped and the lab is accredited for the analyses performed for this assessment.
Analytical methods	A summary of analytical methods were included in the laboratory test certificates.
Holding times	Review of the COCs and laboratory certificates indicate that holding times were met.
Practical Quantitation Limits (PQLs)	PQLs for all soil analytes were below Parcel 12 assessment criteria.
Laboratory quality control samples	Laboratory quality control samples including duplicates, laboratory control samples, matrix spikes, surrogate spikes and blanks were undertaken by the laboratories at appropriate frequencies.
Laboratory quality control results	All results for laboratory soil duplicates, laboratory control samples, matrix spikes and surrogates were acceptable and no detections were made in blank samples.

Overall it is considered that the completed investigation works and the data obtained adequately complied with the requirements of NSW DEC (2006) and NSW EPA (2007) guidelines and that the data is of suitable quality to meet the project objectives.

Appendix G

Hazardous Materials Assessment

Hazardous Materials Audit
Parcel 12

Prepared for:
Hydro Aluminium Kurri Kurri Pty Limited

Prepared by:
ENVIRON Australia Pty Ltd

Date:
August 2014

Project Number:
AS130348

ENVIRON

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VERSION CONTROL RECORD

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Hydro Parcel 12 Draft Hazardous Materials Audit	15 August 2014	Draft 1	S Taylor	F Robinson

Contents

Acronyms and Abbreviations

ACM: Asbestos containing material

EMP: Employment Parcel

LBP: Lead based paint

PCB: Polychlorinated biphenyl compounds

SMF: Synthetic mineral fibre

1 Introduction

ENVIRON Australia Pty Ltd (ENVIRON) was engaged by Hydro Aluminium Kurri Kurri Pty Ltd (Hydro) to undertake a hazardous materials audit of the buildings located within Parcel 12, within the buffer zone of the former Hydro Aluminium smelter at Kurri Kurri, NSW.

1.1 Objectives and Scope of Work

The survey was undertaken in order for Hydro Aluminium to effectively manage its compliance obligations with respect to asbestos containing materials (ACM), and to identify and manage risks associated with other hazardous materials potentially present in the buildings to an acceptable level.

Hazardous materials other than ACM were polychlorinated biphenyl compounds (PCB), synthetic mineral fibre (SMF), and lead based paint (LBP).

1.2 Legislative Requirements, Standards and Codes of Practice

In NSW, management of asbestos is governed by the following principal legislation and guidance documents:

- Workplace Health and Safety Regulation 2011 (Part 8)
- *Code of Practice for the Management and Control of Asbestos in Workplace* (NOHSC, 2005a).
- *NOHSC Code of Practice for the Safe Removal of Asbestos 2nd Edition* (NOHSC, 2005b).

The following codes of practice and standards apply to the other hazardous materials:

- *National Code of Practice for the Safe Use of Synthetic Mineral Fibres* (NOHSC, 1990).
- *Identification Of PCB-Containing Capacitors* (ANZECC, 1997).
- Australian Standard *AS4361.2 Guide to Lead Paint Management – Residential and Commercial Buildings*.

1.3 Survey Methodology

The hazardous materials survey was undertaken of structures within EMP 2.

The survey methodology involved the following:

- An inspection of the accessible sections of the outside and inside of all buildings, as well as any accessible power boxes on power poles within the properties.
- Wherever possible, confirmation of the presence or absence of asbestos in a material was via identification in the field.
- Where the presence or absence of asbestos could not be determined in the field, a sample was taken for laboratory analysis.
- The age of the building and the fluorescent light fittings were estimated, and those that potentially include capacitors that contain PCBs (as discussed in *Identification Of PCB-Containing Capacitors* (ANZECC, 1997)) were noted.
- Visual confirmation of SMF.

- The age of the building and the condition of the paint was observed and the likelihood of lead-based paint being present noted.

1.4 Survey Limitations

Any restrictions or limitations on the survey, such as access not gained to areas or areas not accessible due to safety restrictions, are outlined in Section 2.2 of this report. The reader is also referred to ENIVRON's limitations in Appendix Section 6.

2 Surveys Details

2.1 Buildings Descriptions

The hazardous materials survey was undertaken on 20 May 2014 by ENVIRON Senior Environmental Scientist Shaun Taylor.

Table 1 describes the following:

- The building type (such as residential home, shed, garage).
- Main construction materials used in construction of the building.
- An estimate as to whether the structure was built prior to 1990 (1990 is commonly regarded as a 'cut-off date' for asbestos in construction materials. It is also a good indicator as to the likelihood of PCBs being used in fluorescent lighting capacitors).
- Any areas not accessible within the building.

A total of 15 buildings within four properties were inspected for hazardous materials.

2.2 Survey Methodology

The methodology undertaken for the survey is described as follows.

Develop Project OHS Plan, and Survey Protocol and Survey Templates

A Health and Safety Plan was developed for the contamination and hazardous materials investigations within the buffer zone in advance of the works commencing and endorsed internally.

A hazardous materials protocol and data collection template specific to the project was developed, to ensure a consistent approach to the surveys and data collection.

Project Scheduling and Communications

Tenants' contact details were provided by Hydro and a scheduled date for the survey agreed to between ENVIRON and the tenant. Each tenant was notified of the survey program and process by Hydro (via the real estate agent) in advance. Prior to the scheduled date, ENVIRON contacted the tenant to confirm the date, arrival time, and any likely access issues or restricted areas.

Conduct Hazardous Materials Survey

The survey included a thorough visual inspection of all accessible areas of the buildings and structures, and collection of representative samples for the purpose of analytical confirmation where materials could not be visually identified.

As the houses were inhabited by tenants, some areas (such as the ceiling cavity) were inaccessible due to the location of furniture and appliances. For this reason sampling of some material was also not appropriate as it would require disturbance of material that was not damaged.

Data Collection

Survey data collected included the type, form, location, extent/ quantity, condition and accessibility of ACM and synthetic mineral fibre products, the likely presence of PCB in fluorescent light fittings, and the likely presence of LBP. Photographs were also taken of the observed potential/ confirmed hazardous materials.

In addition, any other observations of concern (such as potential for contamination in the surrounding area) were documented.

Sample Analysis

Any asbestos sample analysis was undertaken using polarised light microscopy, in conjunction with dispersion staining techniques. Where possible, the presence of asbestos (but not the type of asbestos) was confirmed in the field.

SMF and PCB were visually identified during the surveys. The presence of lead in paint was assumed based on the likely age of the building and the condition of painted surfaces.

Areas not Accessed

During the audit, all areas of the buildings and structures within the area which were both readily accessible and safe to access were inspected. Where access was not available to areas which could potentially hazardous materials, the locations and the reasons inaccessibility were noted. Any areas not accessed are documented within Section 2 of this report.

Other Observations

In addition to the survey of structures within the property, the surveyor also noted potential issues of concern, such as:

- Evidence of subsurface hazardous materials (such as ACM service conduits).
- Evidence of hazardous material fragments/ waste in soils or elsewhere within the property.
- Other potential issues of concern (such as possible soil contamination).

2.3 Sample Collection and Laboratory Analysis

During the survey one sample was collected and analysed for the presence of asbestos (all forms) at a NATA accredited asbestos identification facility. The results of the analysis is summarised in Section 3, with the supporting laboratory analytical certificate contained in Appendix C.

The remaining ACM were confirmed through visual confirmation of the presence of asbestos (but not the type of asbestos) in the field.

Table 1: Hazardous Materials Audit Building Details				
Property	**Building Type/s**	**Main Construction Materials**	**Estimated Pre or Post 1990 construction**	**Any Inaccessible Areas**
Parcel 12				
1 McLeod Road	House	Cement sheeting Timber Brick Concrete Corrugated iron	Pre-1990	Roof and wall cavities
	Garage	Cement sheeting (hardiplank) Timber Corrugated iron Concrete	Pre-1990	N/A
	Unit 1A (separate accommodation to house)	Cement sheeting Timber Brick Concrete Corrugated iron	Pre-1990	Roof and wall cavities
	Shed	Corrugated iron Metal	Pre-1990	Interior
3 McLeod Road	House	Cement sheeting Timber Brick Concrete Corrugated iron Masonite	Pre-1990	Roof and wall cavities
	Small shed	Corrugated iron Metal Cement sheeting Timber	Post-1990 (tenant advised 2000)	
	Large shed	Corrugated iron Metal	Post-1990 (tenant advised 2002)	

Table 1: Hazardous Materials Audit Building Details				
Property	**Building Type/s**	**Main Construction Materials**	**Estimated Pre or Post 1990 construction**	**Any Inaccessible Areas**
		Timber		
5 McLeod Road	Main House	Cement sheeting Timber Brick Concrete Corrugated iron Masonite	Pre-1990	Roof and wall cavities
	Brick Section	Cement sheeting Timber Brick Concrete Corrugated iron	Pre-1990	Roof and wall cavities
	Garage	Cement sheeting Timber Concrete Corrugated iron Masonite	Post-1990	
	Sheds (for animals)	Corrugated iron	Various	Inside sheds (within stocked areas)

3 Findings

3.1 Hazardous Materials Register

The results of the survey are presented in Appendix B.

The following provides a summary of the hazardous materials identified. Representative photographs of the identified hazardous materials are provided in Appendix A.

3.2 Asbestos Containing Materials

Asbestos cement sheeting was found in the following locations:

- 1 McLeod Road: at various locations to the exterior and interior of the house, garage and separate unit.
- 3 McLeod Road: at various locations to the exterior of the house.
- 5 McLeod Road: at various locations to the exterior and interior of the house.

Three samples were collected (the exterior wall of the garage at 1 McLeod Road, infill panels used to the outdoor area at the back of the garage at 5 McLeod Road, and the infill panels used for the former garage to the brick section a 5 McLeod Road) for laboratory analysis. The results confirmed asbestos was present only in the infill panels to the outdoor area at 5 McLeod Road. The laboratory certificates are presented in Appendix C.

3.3 Synthetic Mineral Fibre Materials

No SMF were observed. However, the wall and roof cavities of most buildings could not be accessed, and there is potential that SMF was used as insulation in such spaces.

3.4 Polychlorinated Biphenyls

There is potential that some of the fluorescent light fittings used may also have capacitors containing PCBs.

3.5 Lead Based Paint

Due to the expected age of most structures lead based paint is potentially present. The majority of lead based paint, however, is likely to be painted onto ACM used on the exterior of the buildings.

AS4361.2 Guide to Lead Paint Management – Residential and Commercial Buildings notes that lead based paint was used mainly on exterior surfaces and to a lesser extent on interior doors and architraves, especially in undercoats and primers where concentrations of up to 20% lead were commonly used. It also notes that while paints produced for Australian dwellings from the 1970s onwards (and therefore applicable for this property) contain less than 1% lead, it is possible that industrial paints, having higher concentrations of lead, may have been applied to housing and commercial buildings.

3.6 Other Observations

In addition to the hazardous materials observed in the buildings within the parcel, the following potential issues of concern were also identified:

- There appeared to be a number of rabbit burrows near the sheds at 3 McLeod Road.

4 Recommendations

The following are general management measures to be implemented for hazardous materials management, either in the event that the building is to be retained and occupied, or the building is to be demolished.

4.1 Asbestos Containing Materials

4.1.1 Building Maintenance/ Retention

- The asbestos containing materials identified on site generally do not pose a significant health risk and may remain in situ if they remain undamaged and sealed (by paint).
- Damaged ACM should be removed and replace. Where damage is minor (such as minor cracks, drilled holes or worn edges to sections of the walls and ceilings within the occupied houses) any minor cracks should be sealed with PVA glue and painted (no sanding of materials prior to painting) as a temporary measure. However it is recommended that a program for removal of these materials also be developed and implemented.
- A copy of the asbestos and hazardous materials register is to be kept at the Hydro Aluminium Smelter and made available to employees or contractors undertaking work on the buildings.
- No sanding, blasting, drilling, or similar abrasive activity is to be undertaken on any identified ACMs.
- The *National Code of Practice for the Management and Control of Asbestos in Workplaces* recommends, and the Work Health and Safety Regulation 2011 requires, labelling of any identified ACM in the workplace where practicable.

  While such labelling is not required in a rental property under the regulation (and notification of tenants on the presence of asbestos is not required by the NSW Department of Fair Trading), Hydro should consider labelling the ACM, or advising tenants of the presence of ACM, particularly those in locations where it is easily accessible and more likely to be damaged or impacted (such as the walls).

  Where asbestos (zelemite) has been identified in the power box of an occupied house these should be labelled as containing asbestos for the information of electricity supply company personnel accessing the box.
- If installed, periodically reinspect asbestos warning labels to ensure they are legible and in good condition.
- In the event that any of the ACM is damaged while the building is still occupied by tenants, the material should be immediately removed.

4.1.2 Building Demolition

- If necessary due to demolition or refurbishment works, remove identified ACMs under controlled conditions using an appropriately licensed removal contractor.
- Any asbestos work is carried out in accordance with the *Code of Practice for the Management and Control of Asbestos in the Workplace [NOHSC: 2018 (2005)].*

- Ensure appropriately licenced removalists are used for any planned removal, and that any removal works are undertaken in accordance with the *NOHSC Code of Practice for the Safe Removal of Asbestos 2nd Edition [NOHSC:2002(2005)].*

4.2 Synthetic Mineral Fibre Materials

- Apply caution when entering ceiling voids and ensure contractors or persons entering ceiling voids or performing work on synthetic mineral fibre materials wear appropriate PPE, particularly if they have breathing disorders such as asthma.
- Remove any SMF debris as part of routine site housekeeping.
- Ensure contractors or persons performing work on SMF materials adhere to the guidelines outlined in the *National Code of Practice for Synthetic Mineral Fibres [NOHSC 1004 (1990)], May 1990*; and the *Industry code of Practice for the Safe Use of Glass Wool and Rock Wool Insulation Products, April, 2003.*

4.3 Polychlorinated Biphenyls

- Undamaged capacitors (containing PCBs) are unlikely to pose a health risk. Therefore they are unlikely to pose a risk if they remain in-situ.
- In the event that the light fittings are to be removed, and it is confirmed that the capacitors contain PCBs, the requirements of the *Identification Of PCB-Containing Capacitors* should be implemented for removal, temporary storage, transportation and disposal.

4.4 Lead Based Paint

- The vast majority of the exterior paints (which could potentially be LBP) were applied to ACM. Therefore:
  - In the event that the building is to be demolished, these materials would be managed in accordance with **Section 4.1.2** as asbestos containing materials. These management procedures are considered appropriate for LBP.
  - If the building is to be retained and surfaces repainted, no abrasion (mechanical or manual) should be applied to these surfaces. This is required to avoid both the generation of airborne asbestos fibres and potentially lead bearing particles.
- Abrasion should not be used on any of the remaining paint on non-asbestos containing material surfaces to avoid the potential generation of lead bearing particles without previously testing to confirm that LBP are absent.
- In the event that the building is demolished, the PPE to be worn when managing ACM and SMF would appropriately protect demolition personnel from LBP.

5 References

Australian and New Zealand Council Environment Conservation Council (ANZECC). 1997. "Identification Of PCB-Containing Capacitors".

National Occupational Health and Safety Council. (NOHSC). 1990. "National Code of Practice for the Safe Use of Synthetic Mineral Fibres".

National Occupational Health and Safety Council. (NOHSC). 2005a. "Code of Practice for the Management and Control of Asbestos in Workplace.

National Occupational Health and Safety Council. (NOHSC). 2005b. "Code of Practice for the Safe Removal of Asbestos 2nd Edition".

Standards Australia. 1998. "AS4361.2 Guide to Lead Paint Management – Residential and Commercial Buildings"

6 Limitations

ENVIRON Australia prepared this report in accordance with the scope of work as outlined in our proposal to Hydro Aluminium Kurri Kurri Pty Limited dated 18 September 2013 and in accordance with our understanding and interpretation of current regulatory standards.

A representative program of sampling and laboratory analyses was undertaken as part of this investigation, based on past and present known uses of the site. While every care has been taken, concentrations of contaminants measured may not be representative of conditions between the locations sampled and investigated. We cannot therefore preclude the presence of materials that may be hazardous.

Site conditions may change over time. This report is based on conditions encountered at the site at the time of the report and ENVIRON disclaims responsibility for any changes that may have occurred after this time.

The conclusions presented in this report represent ENVIRON's professional judgement based on information made available during the course of this assignment and are true and correct to the best of ENVIRON's knowledge as at the date of the assessment.

This report does not purport to give legal advice. This advice can only be given by qualified legal advisors.

6.1 General Limitations regarding Sampling

It is not always possible to locate all hazardous materials in the course of an inspection, due to factors such as:

- Restrictions on access to internal construction components and other inaccessible parts of structures.
- Restrictions to access due to presence of tenant's belongings.
- The need to avoid damage in occupied buildings, such as when attempting to inspect behind wall panels or under carpets.
- Minimising inconvenience when premises are occupied or are in use whilst an inspection is being conducted.
- The availability of building/plant construction plans.

6.2 User Reliance

This report has been prepared exclusively for Hydro Aluminium Kurri Kurri Pty Ltd and may not be relied upon by any other person or entity without ENVIRON's express written permission.

Figures

Figure 1. Part of Parcel 12

Appendix A

Photographs

Photo 1: Section of the ACM sheeting exterior walls (including corner moulding) at 1 McLeod Road

Photo 2: Section of the ACM sheeting eaves at 1 McLeod Road

Photo 3: Section of the ACM corrugated sheeting used between the garden bed and under the house and Unit 1A at 1 McLeod Road.

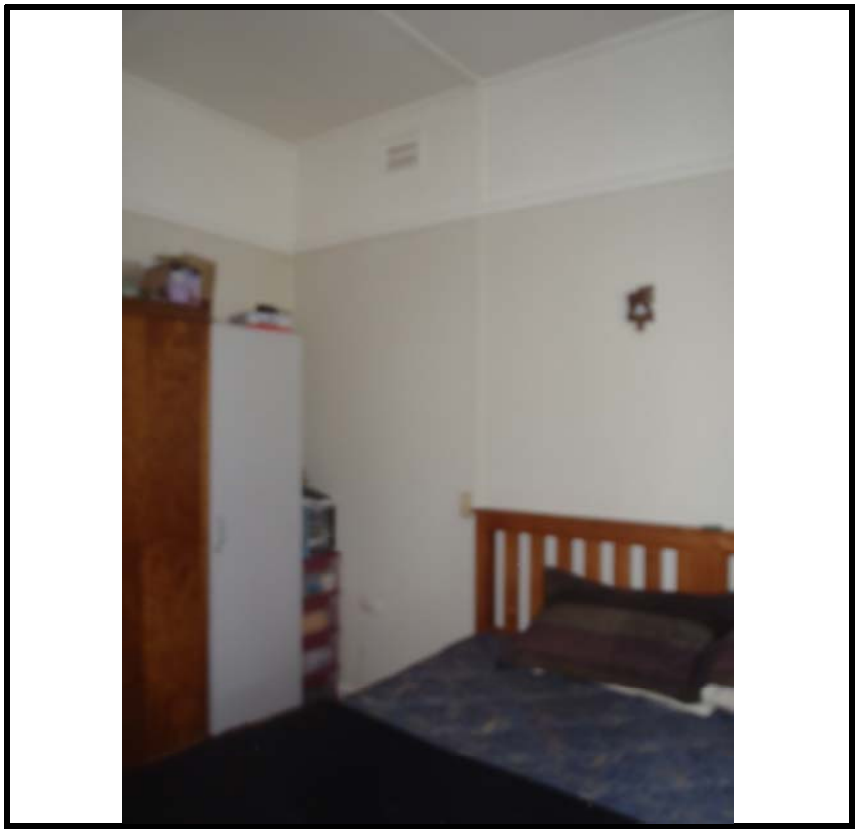

Photo 4: ACM sheeting used in the walls and ceiling to the main bedroom at 1McLeod Road.

Photo 5: ACM sheeting used in the walls and ceiling to the children's bedroom at 1McLeod Road.

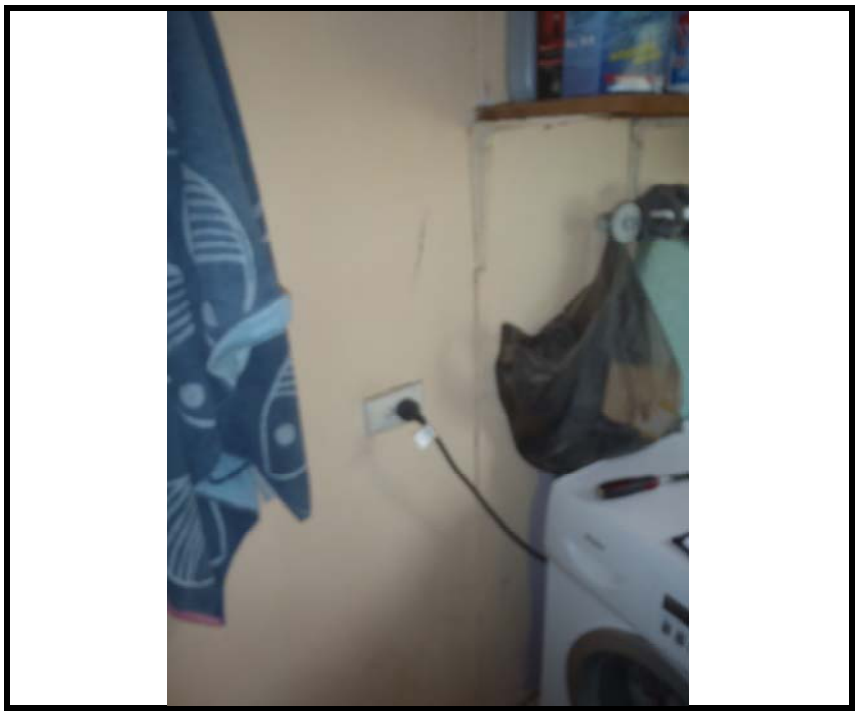

Photo 6: ACM sheeting used in the walls to the laundry at 1 McLeod Road

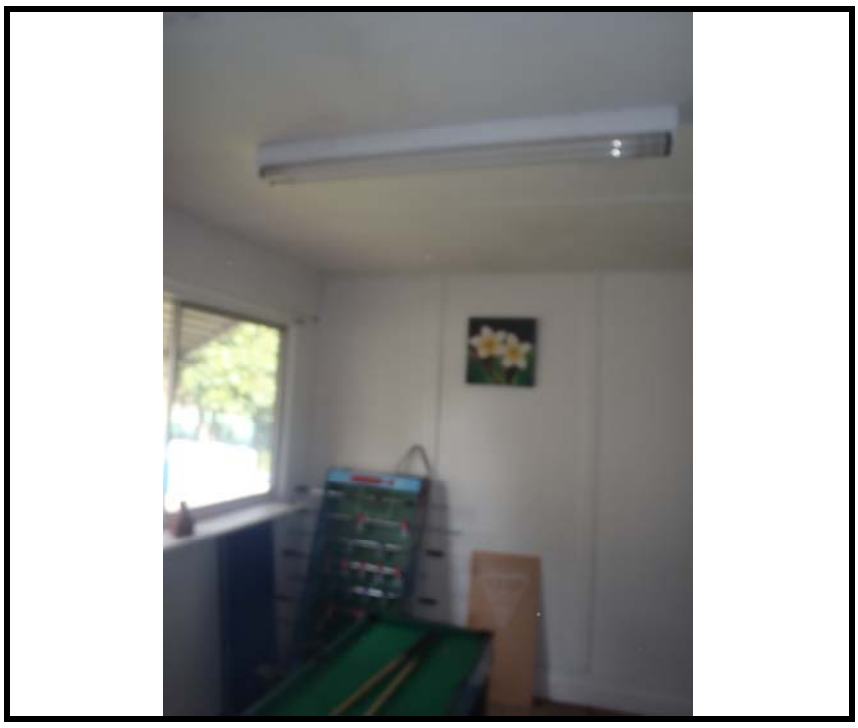

Photo 7: ACM sheeting used in the walls and ceiling to the games room; fluorescent light that potentially contains PCB also shown (at 1 McLeod Road)

Photo 8: ACM sheeting used in the walls and ceiling to the bathroom, including the patterned section to the lower 1.8m, at 1 McLeod Road.

Photo 9: Some of the ACM sheeting used to the side and above the back door at 1 McLeod Road.

Photo 10: One of the side panels constructed of ACM sheeting to the side of the back door awning at 1 McLeod Road.

Photo 11: Wallpapered ACM sheeting walls in living room of 1 McLeod Road.

Photo 12: Panels to exterior walls of the garage at 1 McLeod Road. Laboratory analysis concluded these are not ACM.

Photo 13: ACM sheeting exterior wall panels to Unit 1A at 1 McLeod Road.

Photo 14: One of the two ACM zelemite backing boards in power boxes attached to Unit 1A at 1 McLeod Road.

Photo 15: ACM sheeting to the walls and ceiling, and potentially PCB-containing fluorescent light in the bathroom area of Unit 1A at 1 McLeod Road.

Photo 16: ACM sheeting to the walls and ceiling of the entry room of Unit 1A at 1 McLeod Road.

Photo 17: ACM sheeting attached to timber frame used for front door to Unit 1A at 1 McLeod Road.

Photo 18: One of the potentially PCB-containing fluorescent light in the general area of Unit 1A at 1 McLeod Road.

Photo 19: ACM sheeting used in gable end , eaves and exterior wall panelling to 3 McLeod Avenue.

Photo 20: ACM sheeting used in exterior wall panelling to 3 McLeod Avenue.

Photo 21: Potentially PCB-containing fluorescent lights used in the large shed at 3 McLeod Road.

Photo 22: Example of the vinyl veneer used on the gable end and exterior walls to the main house at 5 McLeod Avenue. The veneer appears to cover ACM sheeting. The photo also shows ACM sheeting used for the eaves.

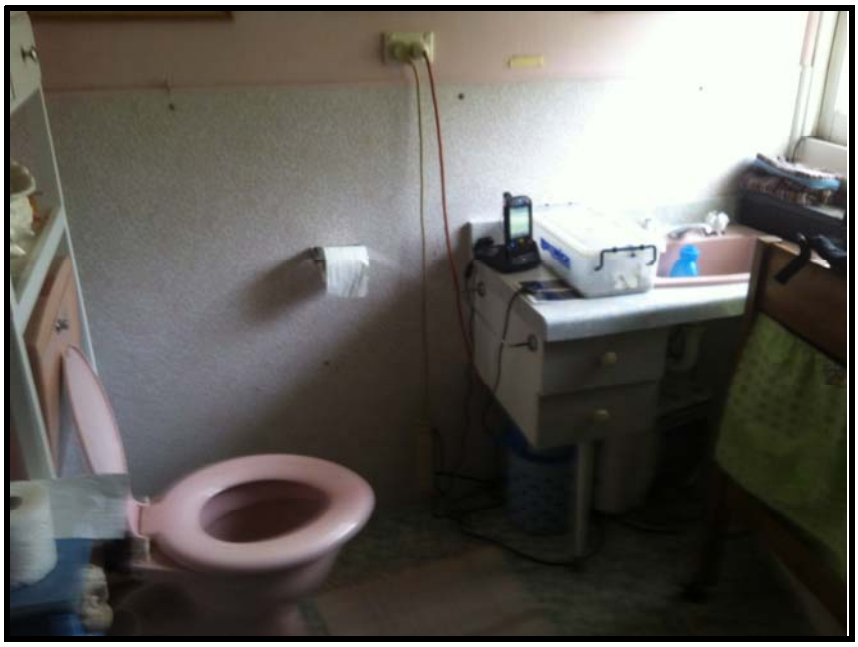

Photo 23: ACM sheeting (including lower section with pattern print) in walls to bathroom section of front room of 5 McLeod Road.

Photo 24: Example of ACM sheeting in walls to the main bedroom at 5 McLeod Road.

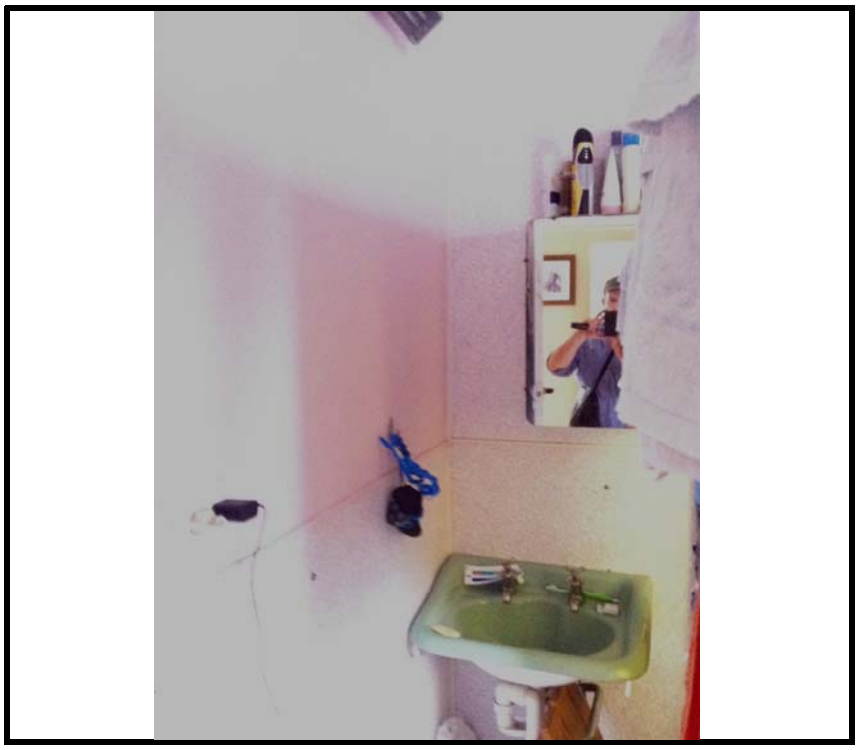

Photo 25: ACM sheeting used in pattern sections of walls to the bathroom at 5 McLeod Road.

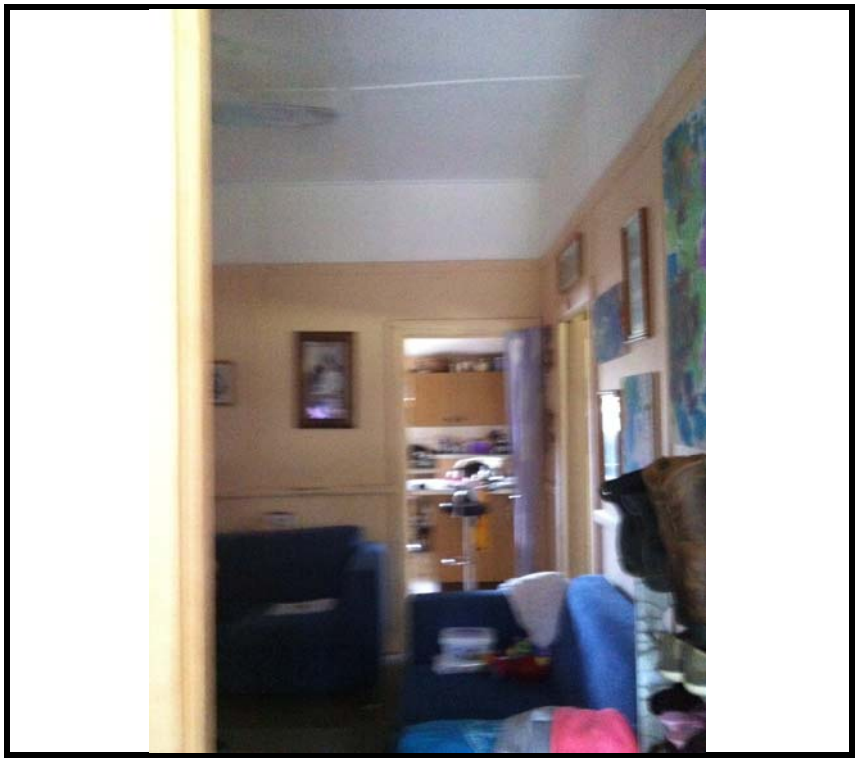

Photo 26: ACM sheeting used in walls and the ceiling of the living room at 5 McLeod Road.

Photo 27: Example of the ACM sheeting in the ceiling and the potentially PCB-containing fluorescent lights used in the brick section of 5 McLeod Road.

Photo 28: ACM sheeting (including behind corrugated iron) used to the side of the outdoor area at the rear of garage at 5 McLeod Road.

Photo 29: Example of the ACM sheeting used to the eaves and the undercover area at the rear to the brick section of 5 McLeod Road.

Photo 30: ACM sheeting (patterned) to walls and to the ceiling in the shower area of the brick section of 5 McLeod Road. ACM sheeting also used in the ceiling of the adjoining toilet room.

Photo 31: panels used as infill to a former garage entry to the brick section of 5 McLeod Road. Laboratory analysis concluded these are not ACM.

Photo 32: ACM zelemite back board to power box attached to the brick section of 5 McLeod Road.

Appendix B

Hazardous Materials Register

Date of Audit	Sector/ Area	Property Address	Building Name/ No.	Type of Haz Mat	Form of Haz Mat	Location	Description/ Condition	Accessibility	Est. Quantity	Photo Ref	Sample No.	Result
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Sheeting	Exterior walls to front and eastern sides (main house is weatherboard), including corner moulding	Fair, painted (some peeling) and minor damage	Ground level - 3m	200m2	1	Field	ACM
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Sheeting	Eaves to all sides (both extension and weatherboard section)	Fair - good, painted	3m - 5m above ground level	60m2	2	Assumed	ACM
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Corrugated sheeting	Used as edge between garden bed and under house along front and west side of house, and east wall of Unit 1A	Poor	Ground level	15m2	3	Field	ACM
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Sheeting	Walls and ceiling to main/ front bedroom	Good, painted and no damage	Ground level - 3m	70m2	4	Assumed	ACM
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Sheeting	Walls and ceiling to kid's bedroom	Good, painted and no damage	Ground level - 3m	50m2	5	Assumed	ACM
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Sheeting	Walls to laundry	Fair, painted bu minor damage	Ground level - 2.4m	20m2	6	Field	ACM
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Sheeting	Walls and ceilling to Games Room	Good, painted and no damage	Ground level - 2.4m	40m2	7	Assumed	ACM
20/05/2014	Parcel 12	1 McLeod Road	House	PCB	PCB	Ceiling to Games Room	Good	2.4m above ground level	1	7	Assumed	PCB
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Sheeting	Walls and ceiling to bathroom	Painted above 1.8m, below is the patterned print sheeting	Ground level - 3m	30m2	8	Assumed	ACM
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Sheeting	Panels to the sides and above the back door	Fair, painted and minor damage	Ground level - 2.2m	10m2	9	Field	ACM
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Sheeting	Side panels to back door landing awning	Good, painted (outer side)	2m above ground level	2m2	10	Field	ACM
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Sheeting	Walls and ceiling to dining area (excluding fire place wall)	Good, painted or wallpapered	Ground level - 2.4m	70m2	N/A	Assumed	ACM
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Sheeting	Walls to living room	Good, painted or wallpapered	Ground level - 2.4m	60m2	11	Assumed	ACM
20/05/2014	Parcel 12	1 McLeod Road	Garage	N/A	Sheet (Hardiplank)	Exterior walls to garage	Fair, painted with some minor damage	Ground level - 2.4m	150m2	12	LP12-ACM-01	NAD
20/05/2014	Parcel 12	1 McLeod Road	Unit 1A	ACM	Sheeting	Exterior walls to Unit 1A	Fair - painted but peeling, some damage including corner moulding	Ground level - 3m	150m2	13	Field	ACM
20/05/2014	Parcel 12	1 McLeod Road	Unit 1A	ACM	Zelemite	2 xpower boxes near front door to Unit 1A	Drilled holes	1.6m above ground level	2m2	14	Field	ACM
20/05/2014	Parcel 12	1 McLeod Road	Unit 1A	ACM	Sheeting	Walls and ceiling to bathroom area	Good, painted	Ground level - 2m	30m2	15	Assumed	ACM
20/05/2014	Parcel 12	1 McLeod Road	Unit 1A	PCB	PCB	Fluorescent light in bathroom area	Good	2m above ground level	1	15	Assumed	PCB
20/05/2014	Parcel 12	1 McLeod Road	Unit 1A	ACM	Sheeting	Walls and ceiling to entrance room	Good, painted	Ground level - 2.4m	25m2	16	Field	ACM
20/05/2014	Parcel 12	1 McLeod Road	Unit 1A	ACM	Sheeting	Front panel to the front door (attached to timber frame)	Good, painted	Ground level - 2m	4m2	17	Assumed	ACM
20/05/2014	Parcel 12	1 McLeod Road	Unit 1A	PCB	PCB	Fluorescent light in main living area	Good	2m above ground level	1	18	Assumed	PCB
20/05/2014	Parcel 12	3 McLeod Road	House	ACM	Sheeting (Hardiplank)	Exterior walls to the house	Fair, painted but some damage	At ground level - 3,5m	180m2	19 and 20	Field	ACM
20/05/2014	Parcel 12	3 McLeod Road	House	ACM	Sheeting	Gable end to front of house	Good, painted	3m - 5m above ground level	10m2	19	Assumed	ACM
20/05/2014	Parcel 12	3 McLeod Road	House	ACM	Sheeting	Eaves to house	Good, painted	3m - 5m above ground level	10m2	19	Assumed	ACM
20/05/2014	Parcel 12	3 McLeod Road	Large shed	PCB	PCB	Fluorescent lights - shed is built 2002 but lights appear old	Good	3.5m above ground level	6	21	Assumed	PCB
20/05/2014	Parcel 12	5 McLeod Road	Main House	ACM	Sheeting	Eaves to all sides	Good, painted	2.4m above ground level	30m2	22	Assumed	ACM
20/05/2014	Parcel 12	5 McLeod Road	Main House	ACM	Sheeting	Gable ends under corrugated vinyl veneer	Unknown - protected by veneer	4 - 10m above ground level	80m2	22	Assumed	ACM
20/05/2014	Parcel 12	5 McLeod Road	Main House	ACM	Sheeting	Exterior walls to main house beneath veneer panels (assumed it is on all walls, section of ACM found and field confirmed)	Unknown - protected by veneer	Ground level - 3m	300m2	22	Field	ACM
20/05/2014	Parcel 12	5 McLeod Road	Main House	ACM	Sheeting	Ceiling and walls to front room (with sink)	Good - bottom section of wall with sink is attached to has patterned print, remainder is printed	Ground level - 2.4m	30m2	23	Assumed	ACM
20/05/2014	Parcel 12	5 McLeod Road	Main House	ACM	Sheeting	Walls and ceilling to main bedroom	Good, painted	Ground level - 2.4m	40m2	24	Assumed	ACM
20/05/2014	Parcel 12	5 McLeod Road	Main House	ACM	Sheeting	Patterned walls to bathroom	Good, undamaged with patterned print surface	Ground level to 2m on most walls, to 1.3m on one wall	15m2	25	Assumed	ACM
20/05/2014	Parcel 12	5 McLeod Road	Main House	ACM	Sheeting	Wall and ceiling to living room	Good, painted	Ground level - 3.5m	80m2	26	Assumed	ACM
20/05/2014	Parcel 12	5 McLeod Road	Brick Section	PCB	PCB	Fluorescent lights within brick section (5) and others external (3)	Good	2.4m above ground level	8	27	Assumed	PCB
20/05/2014	Parcel 12	5 McLeod Road	Brick Section	ACM	Sheeting	Infill panels to back outdoor area at rear of garage	Unpainted but not damaged, some behind corrugated iron	Ground level - 2.4m	5m2	28	LP12-ACM-02	ACM
20/05/2014	Parcel 12	5 McLeod Road	Brick Section	ACM	Sheeting	Eaves to all sides of brick section, including back undercover section	Good, painted	2.4m above ground level	40m2	29	Assumed	ACM
20/05/2014	Parcel 12	5 McLeod Road	Brick Section	ACM	Sheeting	Walls of shower room in brick section	Good, patterned print surface	At ground level - 3m	8m2	30	Assumed	ACM
20/05/2014	Parcel 12	5 McLeod Road	Brick Section	ACM	Zelemite	Ceiling to shower and toilet in brick section	Good, painted	3m above ground level	8m2	30	Assumed	ACM
20/05/2014	Parcel 12	5 McLeod Road	Brick Section	ACM	Sheeting	Ceiling to brick section	Unpainted, edges sealed, undamaged	3m above ground level	150m2	27	Refer to LP12-ACM-02	ACM
20/05/2014	Parcel 12	5 McLeod Road	Brick Section	N/A	Sheeting	Infill panels to former garage in brick section	Poor - damaged and unpainted	Ground level - 2m	10m2	31	LP12-ACM-3	NAD
20/05/2014	Parcel 12	5 McLeod Road	Brick Section	ACM	Zelemite	Backing board to power box attached to brick section	Drilled holes	1.6m above ground level	1m2	32	Field	ACM

Glossary of Terms and Abbreviations Used in Registers

The following provides an explanation of terms and abbreviations used in the registers.

Location	The location within the building (e.g bathroom) and the use of the material (e.g. floor covering, soffit lining, pipe lagging)
ACM	Asbestos containing material
Bonded	Refers to ACM with its fibres firmly bound within the host media.
AC sheeting	Asbestos cement sheeting
Condition	Refers to the physical state or condition of the material in accordance with the following: • Good – material shows no, or very minor damage and/or deterioration • Fair – material shows signs of minor damage and/or deterioration • Poor – material shows sign of significant damaged and/or deterioration or the material is partly or wholly unserviceable for its intended use.
Description	Description of the material identified e.g. vinyl tile, fibre cement sheeting etc.
Friable	ACM that may be crumbled pulverised or reduced to powder by hand pressure.
LBP	Lead based paint:
Result	Refers to result of ACM or LBP analysis. • For asbestos, this is the type identified during laboratory analysis. The three main commercial asbestos types found in Australia area: chrysotile (CH-white), amosite (A-brown or grey), and crocidolite (C-blue). • NAD means no asbestos was detected during laboratory analysis. • Materials shown as 'Refer to.....' have not been sampled but visually appear the same as other material previously sampled. • 'Assumed' refers to those materials not sampled (e.g. for safety reasons or restricted access) and which are not similar to previously sampled materials; or refers to paint that is assumed to be LBP due to building age and paint condition. • 'Field' means ACM where asbestos fibres identified in field but the type of asbestos not confirmed. • 'Potential' refers to fluorescent lights where it is assumed that PCBs are present due to their apparent age.
PCB	Polychlorinated Biphenyls
Risk	Refers to the level of risk posed by the material based on its condition. friability, accessibility and other factors such as exposure to disturbance. The levels of risk adopted for the survey are Urgent (U), High (H), Medium (M) and low (L) as defined in Appendix C of this report.
SMF	Synthetic mineral fibre
Type of Material	The type of hazardous material (ACM, SMF, PCB or LBP).

Appendix C

Laboratory Certificates

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com

☐BRISBANE 2 Byth Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com

☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com

☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

☐MUDGEE 1/29 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com

☐NEWCASTLE 5 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 9433 E: samples.newcastle@alsglobal.com

☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com

☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com

☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townesville.environmental@alsglobal.com

☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: ENVIRON Australia Pty Ltd	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT **(List due date):**	**FOR LABORATORY USE ONLY (Circle)**
OFFICE: Newcastle		☐ Non Standard or urgent TAT **(List due date):**	Custody Seal Intact? Yes No N/A
PROJECT: Hydro Alumium Buffer Zone	**PROJECT NO.: AS130348**	**ALS QUOTE NO.:**	**COC SEQUENCE NUMBER (Circle)** — Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER:	**PURCHASE ORDER NO.:**	**COUNTRY OF ORIGIN: Australia**	COC: 1 2 3 4 5 6 7 — Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Fiona Robinson	**CONTACT PH: 02 4962 5444**		OF: 1 2 3 4 5 6 7 — Other comment:
SAMPLER: Shaun Taylor	**SAMPLER MOBILE: 0408 386 663**	**RELINQUISHED BY:** Greenfield	**RECEIVED BY:**
COC Emailed to ALS? (YES / NO)	**EDD FORMAT (or default):**	DATE/TIME: 18/6/14 5pm	DATE/TIME: 18/6/14 1700
Email Reports to (will default to PM if no other addresses are listed): staylor@environcorp.com		**RELINQUISHED BY:**	**RECEIVED BY:**
Email Invoice to (will default to PM if no other addresses are listed): klewis@environcorp.com		DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	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	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	Asbestos							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	LP12-ACM-01		S	B	1	X							
2	LP12-ACM-02		S	B	1	X							
3	LP12-ACM-03		S	B	1	X							
				TOTAL									

2.5.16

Environmental Division
Newcastle
Work Order
EN1402087

Telephone : +61 2 4014 2500

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; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EN1402087**	Page	: 1 of 3
Client	: **ENVIRON AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Newcastle
Contact	: FIONA ROBINSON	Contact	: Peter Keyte
Address	: PO BOX 564 MAITLAND NSW, AUSTRALIA 2320	Address	: 5/585 Maitland Road Mayfield West NSW Australia 2304
E-mail	: frobinson@environcorp.com.au	E-mail	: peter.keyte@als.com.au
Telephone	: +61 02 49344354	Telephone	: 61-2-4968-9433
Facsimile	: +61 02 49344359	Facsimile	: +61-2-4968 0349
Project	: AS130348 - HYDRO ALUMIUM BUFFER ZONE	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 18-JUN-2014
Sampler	: SHAUN TAYLOR	Issue Date	: 25-JUN-2014
Site	: ----		
		No. of samples received	: 3
Quote number	: SY/578/14	No. of samples analysed	: 3

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
- Descriptive Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

WORLD RECOGNISED ACCREDITATION

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*
Christopher Owler	Team Leader - Asbestos	Newcastle - Asbestos

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.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

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

- **EA200 Legend**
- **EA200 'Am' Amosite (brown asbestos)**
- **EA200 'Ch' Chrysotile (white asbestos)**
- **EA200 'Cr' Crocidolite (blue asbestos)**
- **EA200 'Trace' - Asbestos fibres detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres**
- **EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.**
- **EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.**
- **EA200: Negative results for vinyl tiles should be confirmed by an independent analytical technique.**

Analytical Results

Sub-Matrix: SOLID (Matrix: SOIL)			Client sample ID	LP12-ACM-01	LP12-ACM-02	LP12-ACM-03	----	----
			Client sampling date / time	18-JUN-2014 15:00	18-JUN-2014 15:00	18-JUN-2014 15:00	----	----
Compound	CAS Number	LOR	Unit	EN1402087-001	EN1402087-002	EN1402087-003	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples								
Asbestos Detected	1332-21-4	0.1	g/kg	**No**	**Yes**	**No**	----	----
Asbestos Type	1332-21-4	-	--	**-**	**Ch**	**-**	----	----
Sample weight (dry)	----	0.01	g	**1.01**	**0.25**	**2.50**	----	----
APPROVED IDENTIFIER:	----	-	--	**C.OWLER**	**C.OWLER**	**C.OWLER**	----	----

Analytical Results

Descriptive Results

Sub-Matrix: **SOLID**

Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples		
EA200: Description	LP12-ACM-01 - 18-JUN-2014 15:00	One piece of organic fibre board approximately 20 x 20 x 3mm
EA200: Description	LP12-ACM-02 - 18-JUN-2014 15:00	One piece of bonded asbestos fibre board approximately 10 x 5 x 3mm
EA200: Description	LP12-ACM-03 - 18-JUN-2014 15:00	Four pieces of organic fibre board approximately 20 x 15 x 4mm

Environmental

QUALITY CONTROL REPORT

Work Order	: **EN1402087**	Page	: 1 of 4
Client	: **ENVIRON AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Newcastle
Contact	: FIONA ROBINSON	Contact	: Peter Keyte
Address	: PO BOX 564 MAITLAND NSW, AUSTRALIA 2320	Address	: 5/585 Maitland Road Mayfield West NSW Australia 2304
E-mail	: frobinson@environcorp.com.au	E-mail	: peter.keyte@als.com.au
Telephone	: +61 02 49344354	Telephone	: 61-2-4968-9433
Facsimile	: +61 02 49344359	Facsimile	: +61-2-4968 0349
Project	: AS130348 - HYDRO ALUMIUM BUFFER ZONE	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 18-JUN-2014
Sampler	: SHAUN TAYLOR	Issue Date	: 25-JUN-2014
Order number	: ----		
		No. of samples received	: 3
Quote number	: SY/578/14	No. of samples analysed	: 3

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.

WORLD RECOGNISED ACCREDITATION

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*
Christopher Owler	Team Leader - Asbestos	Newcastle - Asbestos

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%.

- **No Laboratory Duplicate (DUP) Results are required to be reported.**

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 Spike (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.

- **No Method Blank (MB) or Laboratory Control Spike (SCS) Results are required to be reported.**

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.

- **No Matrix Spike (MS) Results are required to be reported.**

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.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

Environmental

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EN1402087**	Page	: 1 of 5
Client	: ENVIRON AUSTRALIA PTY LTD	Laboratory	: Environmental Division Newcastle
Contact	: FIONA ROBINSON	Contact	: Peter Keyte
Address	: PO BOX 564 MAITLAND NSW, AUSTRALIA 2320	Address	: 5/585 Maitland Road Mayfield West NSW Australia 2304
E-mail	: frobinson@environcorp.com.au	E-mail	: peter.keyte@als.com.au
Telephone	: +61 02 49344354	Telephone	: 61-2-4968-9433
Facsimile	: +61 02 49344359	Facsimile	: +61-2-4968 0349
Project	: AS130348 - HYDRO ALUMIUM BUFFER ZONE	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 18-JUN-2014
Sampler	: SHAUN TAYLOR	Issue Date	: 25-JUN-2014
Order number	: ----		
		No. of samples received	: 3
Quote number	: SY/578/14	No. of samples analysed	: 3

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
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples							
Snap Lock Bag (EA200)							
LP12-ACM-01, LP12-ACM-02, LP12-ACM-03	**18-JUN-2014**	**---**	15-DEC-2014	----	**25-JUN-2014**	22-DEC-2014	✓

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:

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	

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
Asbestos Identification in bulk solids	EA200	SOIL	AS 4964 - 2004 Method for the qualitative identification of asbestos in bulk samples

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.**

Date of Audit	Sector/ Area	Property Address	Building Name/ No.	Type of Haz Mat	Form of Haz Mat	Location	Description/ Condition	Accessibility	Est. Quantity	Photo Ref	Sample No.	Result
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Sheeting	Exterior walls to front and eastern sides (main house is weatherboard), including corner moulding	Fair, painted (some peeling) and minor damage	Ground level - 3m	200m2	1	Field	ACM
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Sheeting	Eaves to all sides (both extension and weatherboard section)	Fair - good, painted	3m - 5m above ground level	60m2	2	Assumed	ACM
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Corrugated sheeting	Used as edge between garden bed and under house along front and west side of house, and east wall of Unit 1A	Poor	Ground level	15m2	3	Field	ACM
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Sheeting	Walls and ceiling to main/ front bedroom	Good, painted and no damage	Ground level - 3m	70m2	4	Assumed	ACM
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Sheeting	Walls and ceiling to kid's bedroom	Good, painted and no damage	Ground level - 3m	50m2	5	Assumed	ACM
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Sheeting	Walls to laundry	Fair, painted bu minor damage	Ground level - 2.4m	20m2	6	Field	ACM
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Sheeting	Walls and ceilling to Games Room	Good, painted and no damage	Ground level - 2.4m	40m2	7	Assumed	ACM
20/05/2014	Parcel 12	1 McLeod Road	House	PCB	PCB	Ceiling to Games Room	Good	2.4m above ground level	1	7	Assumed	PCB
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Sheeting	Walls and ceiling to bathroom	Painted above 1.8m, below is the patterned print sheeting	Ground level - 3m	30m2	8	Assumed	ACM
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Sheeting	Panels to the sides and above the back door	Fair, painted and minor damage	Ground level - 2.2m	10m2	9	Field	ACM
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Sheeting	Side panels to back door landing awning	Good, painted (outer side)	2m above ground level	2m2	10	Field	ACM
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Sheeting	Walls and ceiling to dining area (excluding fire place wall)	Good, painted or wallpapered	Ground level - 2.4m	70m2	N/A	Assumed	ACM
20/05/2014	Parcel 12	1 McLeod Road	House	ACM	Sheeting	Walls to living room	Good, painted or wallpapered	Ground level - 2.4m	60m2	11	Assumed	ACM
20/05/2014	Parcel 12	1 McLeod Road	Garage	N/A	Sheet (Hardiplank)	Exterior walls to garage	Fair, painted with some minor damage	Ground level - 2.4m	150m2	12	LP12-ACM-01	NAD
20/05/2014	Parcel 12	1 McLeod Road	Unit 1A	ACM	Sheeting	Exterior walls to Unit 1A	Fair - painted but peeling, some damage including corner moulding	Ground level - 3m	150m2	13	Field	ACM
20/05/2014	Parcel 12	1 McLeod Road	Unit 1A	ACM	Zelemite	2 xpower boxes near front door to Unit 1A	Drilled holes	1.6m above ground level	2m2	14	Field	ACM
20/05/2014	Parcel 12	1 McLeod Road	Unit 1A	ACM	Sheeting	Walls and ceiling to bathroom area	Good, painted	Ground level - 2m	30m2	15	Assumed	ACM
20/05/2014	Parcel 12	1 McLeod Road	Unit 1A	PCB	PCB	Fluorescent light in bathroom area	Good	2m above ground level	1	15	Assumed	PCB
20/05/2014	Parcel 12	1 McLeod Road	Unit 1A	ACM	Sheeting	Walls and ceiling to entrance room	Good, painted	Ground level - 2.4m	25m2	16	Field	ACM
20/05/2014	Parcel 12	1 McLeod Road	Unit 1A	ACM	Sheeting	Front panel to the front door (attached to timber frame)	Good, painted	Ground level - 2m	4m2	17	Assumed	ACM
20/05/2014	Parcel 12	1 McLeod Road	Unit 1A	PCB	PCB	Fluorescent light in main living area	Good	2m above ground level	1	18	Assumed	PCB
20/05/2014	Parcel 12	3 McLeod Road	House	ACM	Sheeting (Hardiplank)	Exterior walls to the house	Fair, painted but some damage	At ground level - 3,5m	180m2	19 and 20	Field	ACM
20/05/2014	Parcel 12	3 McLeod Road	House	ACM	Sheeting	Gable end to front of house	Good, painted	3m - 5m above ground level	10m2	19	Assumed	ACM
20/05/2014	Parcel 12	3 McLeod Road	House	ACM	Sheeting	Eaves to house	Good, painted	3m - 5m above ground level	10m2	19	Assumed	ACM
20/05/2014	Parcel 12	3 McLeod Road	Large shed	PCB	PCB	Fluorescent lights - shed is built 2002 but lights appear old	Good	3.5m above ground level	6	21	Assumed	PCB
20/05/2014	Parcel 12	5 McLeod Road	Main House	ACM	Sheeting	Eaves to all sides	Good, painted	2.4m above ground level	30m2	22	Assumed	ACM
20/05/2014	Parcel 12	5 McLeod Road	Main House	ACM	Sheeting	Gable ends under corrugated vinyl veneer	Unknown - protected by veneer	4 - 10m above ground level	80m2	22	Assumed	ACM
20/05/2014	Parcel 12	5 McLeod Road	Main House	ACM	Sheeting	Exterior walls to main house beneath veneer panels (assumed it is on all walls, section of ACM found and field confirmed)	Unknown - protected by veneer	Ground level - 3m	300m2	22	Field	ACM
20/05/2014	Parcel 12	5 McLeod Road	Main House	ACM	Sheeting	Ceiling and walls to front room (with sink)	Good - bottom section of wall with sink is attached to has patterned print, remainder is printed	Ground level - 2.4m	30m2	23	Assumed	ACM
20/05/2014	Parcel 12	5 McLeod Road	Main House	ACM	Sheeting	Walls and ceilling to main bedroom	Good, painted	Ground level - 2.4m	40m2	24	Assumed	ACM
20/05/2014	Parcel 12	5 McLeod Road	Main House	ACM	Sheeting	Patterned walls to bathroom	Good, undamaged with patterned print surface	Ground level to 2m on most walls, to 1.3m on one wall	15m2	25	Assumed	ACM
20/05/2014	Parcel 12	5 McLeod Road	Main House	ACM	Sheeting	Wall and ceiling to living room	Good, painted	Ground level - 3.5m	80m2	26	Assumed	ACM
20/05/2014	Parcel 12	5 McLeod Road	Brick Section	PCB	PCB	Fluorescent lights within brick section (5) and others external (3)	Good	2.4m above ground level	8	27	Assumed	PCB
20/05/2014	Parcel 12	5 McLeod Road	Brick Section	ACM	Sheeting	Infill panels to back outdoor area at rear of garage	Unpainted but not damaged, some behind corrugated iron	Ground level - 2.4m	5m2	28	LP12-ACM-02	ACM
20/05/2014	Parcel 12	5 McLeod Road	Brick Section	ACM	Sheeting	Eaves to all sides of brick section, including back undercover section	Good, painted	2.4m above ground level	40m2	29	Assumed	ACM
20/05/2014	Parcel 12	5 McLeod Road	Brick Section	ACM	Sheeting	Walls of shower room in brick section	Good, patterned print surface	At ground level - 3m	8m2	30	Assumed	ACM
20/05/2014	Parcel 12	5 McLeod Road	Brick Section	ACM	Zelemite	Ceiling to shower and toilet in brick section	Good, painted	3m above ground level	8m2	30	Assumed	ACM
20/05/2014	Parcel 12	5 McLeod Road	Brick Section	ACM	Sheeting	Ceiling to brick section	Unpainted, edges sealed, undamaged	3m above ground level	150m2	27	Refer to LP12-ACM-02	ACM
20/05/2014	Parcel 12	5 McLeod Road	Brick Section	N/A	Sheeting	Infill panels to former garage in brick section	Poor - damaged and unpainted	Ground level - 2m	10m2	31	LP12-ACM-3	NAD
20/05/2014	Parcel 12	5 McLeod Road	Brick Section	ACM	Zelemite	Backing board to power box attached to brick section	Drilled holes	1.6m above ground level	1m2	32	Field	ACM

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