Phase 2 Environmental Site Assessment, Parcel 10

Prepared for:
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 10. Parcel 10 comprises seven rural residential properties focused around Dawes Avenue in the west, with the eastern portion of the site undeveloped land predominantly covered in grasses and other scattered small trees and shrubs. Parcel 10 is accessed from Dawes Avenue, Kurri Kurri and located within the buffer zone and to the south east of the Hydro Aluminium Kurri Kurri Smelter. Parcel 10 is approximately 32 hectares in area.

The objectives of the assessment were to assess the potential for contamination at Parcel 10 based on historical and current landuse and to assess the suitability of Parcel 10 for the purposes of environmental conservation (E2) and low rural residential (R2) landuse.

A Phase 1 Environmental Site Assessment has previously been completed for the Hydro owned lands including Parcel 10 (ENVIRON (22 October 2013) Phase 1 ESA, Hydro Kurri Kurri Aluminium Smelter). The Phase 1 identified that contamination of Parcel 10 may have occurred from dust deposition due to the proximity of the Hydro smelter, disturbance of soil for an unknown development on three lots and dwellings and rural use of seven lots.

To assess for potential contaminants of concern on Parcel 10, a site walkover was completed and surface soil samples were collected from across the parcel. Surface soil samples from across Parcel 10 were analysed for soluble fluoride and were below the preliminary screening level for residential landuse.

Asbestos containing material (ACM) fragments were identified on the ground surface of Lot 453 in a disturbed area at the rear of the Lot, also on Lot 2 and Lot 536 (on a small horse track). A sample of shallow soil from Lot 453 where evidence of a former building footprint (as a rectangular exposed area), also contained asbestos fines at the guideline concentration.

Inert waste materials were observed in a small washout/gully area on Lot 2. These waste materials are not shown to have impacted on surface water quality however do represent an aesthetic impact and should be removed.

A sample from a small soil stockpile on the northern boundary of Lot 2 (with adjoining metal fabrication business), had a zinc concentration slightly in excess of the residential EIL criteria applicable for ecological impacts. This exceedance was not considered to represent ecological risk as the concentration was marginally above the guideline and a healthy grass coverage of the stockpile was observed. No other soil contamination issues were identified at Parcel 10.

Parcel 10 will be suitable for the purposes of environmental conservation (E2) and low rural residential (R2) landuse subject to the completion of the following remedial actions:

- A remedial action plan (RAP) should be prepared to specify remediation and validation procedures to undertake removal of asbestos containing materials identified at Lots 2, 453 and 536 as well as the removal of inert waste materials from Lot 453 and Lot 2 (stockpiles) and Lot 2 infill gully;

- To follow the recommendations for the handling and management of asbestos containing materials, polychlorinated biphenyls, synthetic mineral fibres and lead based paints within the building materials, as outlined in the Hazardous Materials Audit.

ENVIRON consider that Parcel 10 can be made suitable for the proposed rural residential landuse following remediation. A Remedial Action Plan will be completed to assess the remedial options and outline the requirements for remediation and validation.

Hydro has engaged a NSW EPA-accredited Site Auditor to review the investigations completed and the Remedial Action Plan and to complete an interim opinion letter, indicating that the site can be made suitable for the proposed landuse.

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 10. Parcel 10 comprises a number of properties located off Dawes Avenue, Loxford, New South Wales (2326). Parcel 10 location 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 redevelopment and possible divestment of land parcels following the closure of the site in May 2014. A Rezoning Masterplan has been developed that identifies Parcel 10 to comprise land suitable for environmental conservation (E2) and low rural residential (R2) land use.

A Phase 1 Environmental Site Assessment has previously been prepared for all Hydro owned lands and evaluated the potential for contamination. On Parcel 10, these investigations identified the presence of current and former dwellings likely to contain asbestos and unknown developments identified by areas of disturbed land in historical aerial photographs.

It is noted that at the time of the fieldwork, this land parcel was named Employment Land Subarea 10 and as such the soil samples reference this name. Since this time the parcel has been renamed Parcel 10.

The location of Parcel 10 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 10 based on historical and current land use and to assess the suitability of Parcel 10 for the purposes of environmental conservation (E2) and low rural residential (R2) 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 of potential dust deposition from the smelter operations;
  - A site walkover to evaluate other potential locations of buried waste or illegal dumping. and
  - Collection of a surface water sample from a pond in the western part of Parcel 10;

- 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 10 suitable for the proposed land use.

2 Site Description

2.1 Site Location

Parcel 10 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 10 is Dawes Avenue, Loxford, New South Wales, Australia. The location of Parcel 10 is shown in **Figure 1**.

Parcel 10 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 community. The site comprises seven rural residential properties focussed around Dawes Avenue in the west of the Parcel 10, with the eastern portion (Lot 789, **Figure 3**), comprising undeveloped land predominantly covered in grasses, scattered small trees and shrubs. Parcel 10 drains to Swamp Creek, located on the northern and western boundary of the parcel.

Parcel 10 is located within the Cessnock Local Government Area and is zoned RU2 – Rural Landscape under the Cessnock Local Environment Plan 2011.

Parcel 10 is approximately 32 hectares (ha) and comprises the lot numbers and development plans listed in **Table 1** and shown on **Figure 3**:

Table 1: Lot and Development Plans for Parcel 10.

Subarea	Lot/ DP	Area (ha)	Total Area (ha)
Parcel 10	Lot 450 DP755231 Lot 451 DP755231 Lot 453 DP755231 Lot 454 DP755231 Lot 456 DP755231 Lot 536 DP755231 Lot 682 DP755231 Lot 789 DP39701 Lot 2 DP502196	4.2 3.2 3.0 3.6 1.9 1.5 0.2 12.2 2.2	32

Land uses surrounding Parcel 10 are as follows:

- North: Swamp Creek then bushland (to the south of Dickson Road);
- South, south-east and east: A dedicated coal railway line then rural residential land;
- West: Swamp Creek then bushland/rural residential properties

Parcel 10 is located approximately 300m to the south east of the smelter site boundary.

2.2 Site Setting

2.2.1 Topography

Parcel 10 is located to the south of Swamp Creek at approximately 10mAHD in the western and northern Lots and up to 15mAHD in the eastern area of Lot 789.

Topography is generally flat with a slight fall towards Swamp Creek, on the lower floodplain of the creek in the western section of Parcel 10 (rural residential lots to the west and east of Dawes Avenue). Towards the east, (Lots 456 and 789), the slopes become more pronounced as the ground rises south-east towards the South Maitland Railway line.

2.2.2 Regional Geology

According to the review of the regional geology described on the Sydney Basin Geological Sheet, Parcel 10 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 10 associated with surface water bodies. Quaternary sediments which are associated with Swamp Creek (located on the northern boundary of Parcel 10) and the Hunter River consist of gravel, sand, silt and clay.

2.2.3 Site Hydrology

Surface water from Parcel 10 discharges primarily via infiltration and overland flow to Swamp Creek, located on the northern and western site boundary. Swamp Creek discharges into Wentworth Swamp, which in turn discharges to the Hunter River approximately 11km northeast of Parcel 10 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 10 is expected to flow north to Swamp Creek located on the northern and western site boundary.

According to the NSW Office of Environment and Heritage (Natural Resource Atlas), there are 21 licensed groundwater abstractions (bores) located within 2km of Parcel 10. 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 10 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.gov.au/ieo./Hunter/index.htm).

2.3 Site Sensitivity

The sensitivity of Parcel 10 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 on the northern and western boundary of Parcel 10, which discharges to the Hunter River via Wentworth Swamp within the Fishery Creek Catchment, approximately 11km northeast of Parcel 10 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 10 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 26 August 2013 provided the following historical information about Parcel 10:

- Earliest records (aerial photograph in 1951) showed a relatively large development to the west of Dawes Avenue comprising a dwelling and a number of sheds likely used for agricultural purposes.

- Lots 451, 453, 454, 536 and 682 in DP 755231 and Lot 2 in DP502196 were developed for residential landuse between the early 1960s and 1980s when a dwelling on each lot can be observed. Historical aerial photographs indicate none of these dwellings have been demolished;

- Disturbed land was identified on Lots 2, 453 and 456, possibly either for an unknown development or potentially for waste dumping.

- Parcel 10 is located approximately 300m to the south east of the smelter boundary and may be impacted from smelter dust deposition.

The location of the waste disposal area and former dwellings are included in **Figure 3 and 4**.

It was discovered by Hydro in May 2014 that fill had been placed on Lot 2, DP502196 by Loxford Fabrications, a sheet metal fabrication business that is located immediately north of Lot 2, DP502196. The fill was sourced from Lot 10, DP 1082569 at McLeods Road, which is leased by Lend Lease Engineering Pty Ltd.

The fill had been classified as recovered aggregate material under the Protection of the Environment Operations (Waste) Regulation 2005 - General Exemption, Part 6, Clause 51 and 51A, ''The Recovered Aggregate Exemption 2010'. The waste classification report for the fill is presented in **Appendix H**. The fill had been used in the construction of a Storage Pad on Lot 2, DP502196 for use by Loxford Fabrications who lease the land from Hydro. Hydro had not provided permission for the placement of the fill and no development approval had been sought by Loxford Fabrications. As such, Hydro requested that the fill be removed from Lot 2 and this was undertaken on the 27th July 2014 and the site was inspected by Mr Kerry McNaughton (Hydro Environment Officer/Buffer Zone Supervisor). Photographs showing the site following the placement of fill and following the removal of the fill are contained in **Appendix I**.

4 Sampling and Analytical Quality Plan

4.1 Potential Areas and Contaminants of Concern

Based on Parcel 10 historical information as discussed in **Section 3**, the following areas of concern were identified as follows.

- Current dwellings on Lots 2, 451, 453, 536 and 682 that may contain asbestos.
- Possible disturbance of land for unknown development or waste disposal on Lots 2, 453 and 456.
- Smelter dust deposition.
- Illegal dumping.

The placement of fill classified as recovered aggregate was not considered to warrant further investigation on the basis of the materials conformance to the "Recovered Aggregate Exemption (September 2010) as presented in a report prepared by RCA, (RCA 2014), who undertook an investigation of the material in April 2014. The RCA recovered aggregate fill waste classification report is presented as **Appendix H.**

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

- asbestos;
- fluoride;
- Polycyclic Aromatic Hydrocarbons (PAHs);
- heavy metals;
- petroleum hydrocarbons.

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 and subsurface soils only. 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 3.2 ha.

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 10. 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 Heavy Metals, Petroleum Hydrocarbons, PAHs

One sample was collected from a small waste/soil fill stockpile near the boundary of Lot 2 DP502196 and the adjacent property housing a sheet metal fabrication business, (“Loxford Fabrications”), which is not part of the Hydro-owned buffer zone lands.

The sample was collected and analysed to assess the potential for heavy metals, petroleum hydrocarbons and PAHs within the potential fill material.

4.3.3 Asbestos

To assess the potential for asbestos and other illegally dumped wastes at Parcel 10, 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 able to be confidently identified, 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. Representative samples of soils below encountered ACM was also collected and analysed for the presence of asbestos fines and fibres.

To assess for the potential for asbestos associated with the current and former dwellings on Parcel 10, a 10m by 10m grid was established either adjacent the current dwelling ort within the footprint of the former dwelling and a walkover screening survey conducted comprising two passes with a 90º directional change between them, as per NEPM (2013). Any ACM fragments identified during the walkover were collected for analysis.

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

4.3.4 Surface Water

A sample of surface water (SW1) was collected from a pond at the rear of Lot 2 in a subsequent investigation undertaken in March 2014.

The pond had been formed as a washout in the 1955 floods. Following the 2007 floods, inert materials from the post-flood clean-up were placed into the hole. Waste metal and wood/timber materials were visible during the October 2013 site inspection.

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. 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 guidelines adopted for Parcel 10 from the NEPM are as follows:

- HIL A – Health investigation level for residential with gardens and accessible soil (home grown produce <10% intake, no poultry), also includes childcare centres, preschools and primary schools. 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 industrial use.
- HSLs for commercial/industrial use - Health screening levels for soil vapour intrusion from petroleum hydrocarbons are 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;
- EIL for commercial/ industrial use – ecological investigations levels 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 commercial/ industrial use – ecological screening levels 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	210
Lead	300	1100
Nickel	400	180
Zinc	7400	480
Mercury (inorganic)	40	-
Fluoride	Ref Table 6	Ref Table 5
Cyanide (free)	250	-
Carcinogenic PAHs (as BaP TEQ)	3	-
Naphthalene	-	170
Total PAHs	300	-

1 EILs were derived using the NEPM (2013) EIL Calculation Spreadsheet and data from all Hydro owned land averaged for CEC, soil pH and TOC.

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 (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 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'.

2 (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.

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

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

Soil investigation results for the samples taken from a grid formation across Parcel 10 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' 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 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 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 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 concern, such as illegally dumped wastes and fill at Parcel 10.

The entrance to Parcel 10 is south from McLeod Road, across the level crossing at the rail line and on to Dawes Avenue, off which are the properties comprising Parcel 10.

Entrance to the larger eastern Lot 789 is gained from the northern end of the Lot, across the level crossing at the northern end of Bowditch Avenue.

All Lots are existing or former rural residential properties with the exception of Lot 789, a large, undeveloped, bush-covered property, between the rail line and Swamp Creek.

The summary of the findings of the walkover inspection for each Lot is presented in **Table 8**.

A total of seven, 10 by 10 m walkovers for ACM were conducted on Lots 453, 2, 682, 536, 451 and 454. These are denoted with a 'Q' on **Figure 4**. Where ACM was identified samples were collected for laboratory identification, sample numbers ID13, ID15, ID16, ID18. The location of the walkover grids were selected based on either, proximity to former or existing structures which may have contained ACM building materials, or where it was suspected that structures may have existed.

Table 7 summarizes the results of the walkover.

Table 7: Results of Parcel 10 ACM Walkover Grids

Walkover	Location	Justification	Results
Q1	Lot 453	Adjacent to structure/ACM visible on surface	Broken ACM fragments scattered over surface
Q2	Lot 2	Adjacent to existing structure	No ACM encountered
Q3	Lot 2	ACM visible on surface	Small amount of ACM fragments (<50g) scattered over surface.
Q4	Lot 682	Adjacent to existing structure	No ACM encountered
Q5	Lot 536	ACM visible on surface	ACM fragments (150g) scattered over surface of exposed sand.
Q6	Lot 451	Adjacent to existing structure	No ACM encountered
Q7	Lot 454	Adjacent to existing structure	No ACM encountered

Table 8 Walkover Site Inspection Observations

Lot	Area	Location	Description	Observations
Lot 453	3 ha	South-western Parcel 10 Area on western side of Dawes Avenue	Semi rectangular residential lot with house and sheds on Dawes Ave and flat open area to the west slight slope down to Swamp Creek at rear.	A disturbed area in mid-south area of the Lot suspected former building footprint ACM visible on the surface. In north west corner a fragment of ACM was identified on the ground surface. Northern side of house and shed ACM fragments were identified on the surface (10x10m walkover). Some small stockpiles of topsoil/vegetation with some construction debris were present at rear (west) of Lot.
Lot 2	2.2 ha	Western Parcel 10 area –western side of Dawes	Battleaxe block with and old garage on Dawes (not occupied). Loxford Fabrications (not Hydro-owned) immediately to north side. Rear of lot is open, flat and developed as an informal motorcycle track, Slight lope to Swamp Creek on western boundary	House and shed had visible ACM construction, some in poor condition and broken on ground around structures. Small stockpile (<5m^3) of soil on northern boundary (sampled). ACM fragment found 70m to rear of house. Pond with inert waste (metal, timber) apparent on north-west boundary (surface water sample collected).
Lot 451	3.21 ha	Western Parcel 10 – western side of Dawes Ave	Rectangular block, old house on Dawes (eastern end) – unoccupied, Some mature trees and grass covered parklands.	No evidence of fill or ACM observed.
Lot 450	4.2 ha	North-western Parcel 10 on the north-western end of Dawes Ave	Open treed and grassed parklands – no structures	No evidence of fill or ACM observed
Lot 454	3.6 ha	Northern Parcel 10 on the north-eastern end/side of Dawes Ave	North-south rectangular block, narrowing towards the north with Swamp Creek on north and eastern boundary. Two-storey brick residence at the southern end	No evidence of fill or ACM observed
Lot 456	1.9 ha	North-eastern Parcel 10, to east	Lot is a largely bush-covered	No evidence of fill or ACM observed

Table 8 Walkover Site Inspection Observations

Lot	Area	Location	Description	Observations
		of Dawes Ave.	paddock associated with the residence on Lot 454. Slopes from south to north towards Swamp Creek.	
Lot 536	1.5 ha	Mid-south Parcel 10, eastern side of Dawes Ave, immediately north of the rail line.	Block extending east towards bush-covered area. Sheds and assorted equipment for former business located in south-west of Lot in cleared area. western end of Lot fenced off into small paddocks. Residence is in separate Lot (see below)	Small horse track (sand-covered) had fragments of ACM visible across the surface. Small wastes piles/rubbish in areas across the Lot including tyres (around horse track).
Lot 682	0.2 ha	Mid-south Parcel 10, east corner of Dawes Ave and rail line	House block associated with Lot 536. A house on southern end with yard	No evidence of fill or ACM observed.
Lot 789	12.2 ha	Eastern and north-eastern end of Parcel 10 between Rail line to south and south-east and Swamp Creek to north-west and west.	Mainly vacant bush-covered land, sloping towards Swamp Creek	No evidence of fill or ACM observed.

Photographs are included in **Appendix B**. Field Information Sheets are included in **Appendix C**.

The buildings across Parcel 10 were the subject of a Hazardous Materials Audit, a copy of which is attached in **Appendix G**. The audit found asbestos containing materials in the houses and sheds on 1 Dawes Avenue (Lot 536), 2 Dawes Avenue (Lot 453), 4 Dawes Avenue (Lot 2) and 8 Dawes Avenue (Lot 451).

6.2 Soil Investigations

Ten surface soil samples (SF1 – SF10) were collected from across Parcel 10 at a rate of one sample per 3.2 ha as shown in **Figures 3** and **4** to assess the potential for fluoride in soil from dust deposition from the Hydro Aluminium Kurri Kurri Smelter. The soil samples were collected by trowel from an approximate depth of 0.0-0.05m.

Four additional surface soil samples were collected from near surface soils (S12, S14, S17 and S19), to assess for the presence of asbestos fines in soil near where ACM had been identified (ACM identification samples ID11, ID13, ID16, ID18). This sampling was targeted sampling, completed on an area of environmental concern identified during the site walkover. The soil samples were collected by trowel from an approximate depth of 0.05-0.1m.

One soil sample, (S15), was also collected from a small fill stockpile near the northern boundary of Lot 2, identified during the site walkover. Sample S15 was analysed for petroleum hydrocarbons, polycyclic aromatic hydrocarbons, heavy metals (arsenic, cadmium, chromium, copper, nickel, lead, zinc and mercury) and asbestos fines. This sample was collected from within the soil stockpile by trowel.

A generalised lithology of the surface soils encountered at Parcel 10 is as follows:

- Topsoil: Sand and Silty Sands cream and brown, dry.

6.3 Soil Results

A summary of the soil results is presented in **Table 9**. Laboratory tables are included in **Appendix D** and laboratory reports are included in **Appendix E**.

Table 9: Summary of Soil Results

Analyte	No. of Samples	Maximum Concentration (mg/kg)	No. exceeding Site Criteria	Criteria Exceeded (mg/kg)
Fluoride	10	16	0	-
Arsenic	1	<5	0	-
Cadmium	1	<1	0	-
Chromium	1	13	0	-
Copper	1	20	0	-
Lead	1	11	0	-
Nickel	1	286	0	-
Zinc	1	617	1	>EIL
Mercury	1	<0.1	0	-
BaP	1	<0.5	0	-

Table 9: Summary of Soil Results				
Analyte	**No. of Samples**	**Maximum Concentration (mg/kg)**	**No. exceeding Site Criteria**	**Criteria Exceeded (mg/kg)**
BaP TEQ	1	<0.5	0	-
Total PAHs	1	<9	0	-
Benzene	1	<0.2	0	-
Toluene	1	<0.5	0	-
Ethyl benzene	1	<0.5	0	-
Xylene	1	<0.5	0	-
TRH C6-C10	1	<10	0	-
TRH >C10-C16	1	<50	0	-
TRH >C16-C34	1	<100	0	-
TRH >C34-C40	1	<100	0	-
Asbestos (ID)	9	Chrysotile, crocidolite and amosite	6	Presence
Asbestos (fines – AF and FA <7mm)	5	0.001%	1	0.001%

The results of surface soil sampling for fluoride demonstrate that surface soils at Parcel 10 have not been impacted by stack particulate fallout from the Hydro Aluminium Smelter.

The results from the stockpile sample indicate that stockpiled soil/fill has not been impacted by petroleum hydrocarbons or polycyclic aromatic hydrocarbons. The stockpile sample slightly exceeded the EIL for zinc, likely due to the presence of metal waste within the fill material. This soil impact is considered to be localised.

ACM was found at locations on Lots 453, 2 and 536. The presence of asbestos was confirmed by laboratory analysis of the fragments taken from these three lots.

Asbestos fines were found at the guideline criteria within the surface soil profile in Lot 453 (sample S12 in a disturbed area in mid-south area of the Lot). No asbestos fines were identified in soils at other locations.

6.4 Surface Water Results

One surface water sample was collected from the pond at the rear (west) of Lot 2.

All analytes were either below detection limits or below the adopted guideline criteria.

A summary table of the analytical results is presented in **Appendix D** and the laboratory report is presented in **Appendix E**.

6.5 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 10 consists of a large lot of predominantly undisturbed bushland in the east and north-east areas, with the balance (in the western and north-western area), comprising rural residential lots, each side of Dawes Avenue, and bounded by Swamp Creek on the west, and north.

Parcel 10 is located in the near south-east portion of the Buffer Zone of the Hydro Aluminium Kurri Kurri Smelter, approximately 300m from the plant site.

The rural/residential lots off Dawes Avenue are occupied by structures including houses and sheds with evidence of a former structure, (footprint), on the western end of Lot 453 (see **Figure 4)**. This comprised a rectangular area with exposed sandy soil on the surface, where ACM fragments were noted and collected for asbestos identification, including a sample for asbestos fines quantification analysis.

The remainder of Parcel 10, (Lot 789), has remained undeveloped bushland and no evidence of development was identified during the site walkover.

Buildings in Parcel 10 were assessed in a Hazardous Materials Audit, which identified asbestos containing building materials in some dwellings (1, 2, 4 and 8 Dawes Avenue). The potential for the presence of synthetic mineral fibre (SMF) in some roof spaces, PCBs in some old fluorescent lights and coverage by lead-based paints was also noted. Refer to **Appendix G**.

Parcel 10 has not been affected by dust deposition of fluoride from the Hydro Aluminium Kurri Kurri Smelter, with fluoride concentrations in surface soils below the preliminary screening level for residential land use. It is noted that there is currently no source of aerial fluoride emissions, as the smelter has ceased operation.

The identification of ACM fragments on the surface in Lots 2, 453 and 536 is considered to be consistent with past demolition practices from ACM-containing structures on these areas.

Some small soil stockpiles were identified on Lot 453 and Lot 2, mainly comprising natural materials and vegetation, with some demolition materials (concrete, metal) in the Lot 2 pile. Testing for a wider suite of analytes on soil within the Lot 2 stockpiles identified a localised zinc concentration slightly above the residential EIL guideline. Other analytes were found to be low and below guidelines. The presence of zinc above the EIL criteria is not considered an ecological risk, however the presence of foreign materials within the stockpile represent an aesthetic impact and warrant removal.

Concentrations of potential contaminants of concern were not identified at levels that are likely to impact on surface water or groundwater. Surface water sampling of one water body on site identified low and below detection limit concentrations.

7.2 Waste Characterisation and Disposal

Consistent with the NSW EPA, *Waste Classification Guidelines* the ACM fragments observed across Lots 2, 453 and 536 are classified as Asbestos Waste. The ACM fragments

should be collected by an appropriately licenced contractor and appropriately managed or disposed.

Inert waste materials at Lot 2 and Lot 453 are classified as Solid Waste. If soils are disposed with waste materials, further waste classification for the soil component is required.

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 10. Parcel 10 comprises seven rural residential properties focused around Dawes Avenue in the west, with the eastern portion of the site undeveloped land predominantly covered in grasses and other scattered small trees and shrubs. Parcel 10 is accessed from Dawes Avenue, Kurri Kurri and located within the buffer zone and to the south east of the Hydro Aluminium Kurri Kurri Smelter. Parcel 10 is approximately 32 hectares in area.

The objectives of the assessment were to assess the potential for contamination at Parcel 10 based on historical and current landuse and to assess the suitability of Parcel 10 for the purposes of environmental conservation (E2) and low rural residential (R2) landuse.

A Phase 1 Environmental Site Assessment has previously been completed for the Hydro owned lands including Parcel 10 (ENVIRON (22 October 2013) Phase 1 ESA, Hydro Kurri Kurri Aluminium Smelter). The Phase 1 identified that contamination of Parcel 10 may have occurred from dust deposition due to the proximity of the Hydro smelter, disturbance of soil for an unknown development on three lots and dwellings and rural use of seven lots.

To assess for potential contaminants of concern on Parcel 10, a site walkover was completed and surface soil samples were collected from across the parcel. Surface soil samples from across Parcel 10 were analysed for soluble fluoride and were below the preliminary screening level for residential landuse.

Asbestos containing material (ACM) fragments were identified on the ground surface of Lot 453 in a disturbed area at the rear of the Lot, also on Lot 2 and Lot 536 (on a small horse track). A sample of shallow soil from Lot 453 where evidence of a former building footprint (as a rectangular exposed area), also contained asbestos fines at the guideline concentration.

Inert waste materials were observed in a small washout/gully area on Lot 2. These waste materials are not shown to have impacted on surface water quality however do represent an aesthetic impact and should be removed.

A sample from a small soil stockpile on the northern boundary of Lot 2 (with adjoining metal fabrication business), had a zinc concentration slightly in excess of the residential EIL criteria applicable for ecological impacts. This exceedance was not considered to represent ecological risk as the concentration was marginally above the guideline and a healthy grass coverage of the stockpile was observed. No other soil contamination issues were identified at Parcel 10.

Parcel 10 will be suitable for the purposes of environmental conservation (E2) and low rural residential (R2) landuse subject to the completion of the following remedial actions:

- A remedial action plan (RAP) should be prepared to specify remediation and validation procedures to undertake removal of asbestos containing materials identified at Lots 2, 453 and 536 as well as the removal of inert waste materials from Lot 453 and Lot 2 (stockpiles) and Lot 2 infill gully;

- To follow the recommendations for the handling and management of asbestos containing materials, polychlorinated biphenyls, synthetic mineral fibres and lead based paints within the building materials, as outlined in the Hazardous Materials Audit.

ENVIRON consider that Parcel 10 can be made suitable for the proposed rural residential landuse following remediation. A Remedial Action Plan will be completed to assess the remedial options and outline the requirements for remediation and validation.

Hydro has engaged a NSW EPA-accredited Site Auditor to review the investigations completed and the Remedial Action Plan and to complete an interim opinion letter, indicating that the site can be made suitable for the proposed land use.

9 References

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;

NEPC (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 (2014) Waste Classification Guidelines.

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 10. 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 10 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.

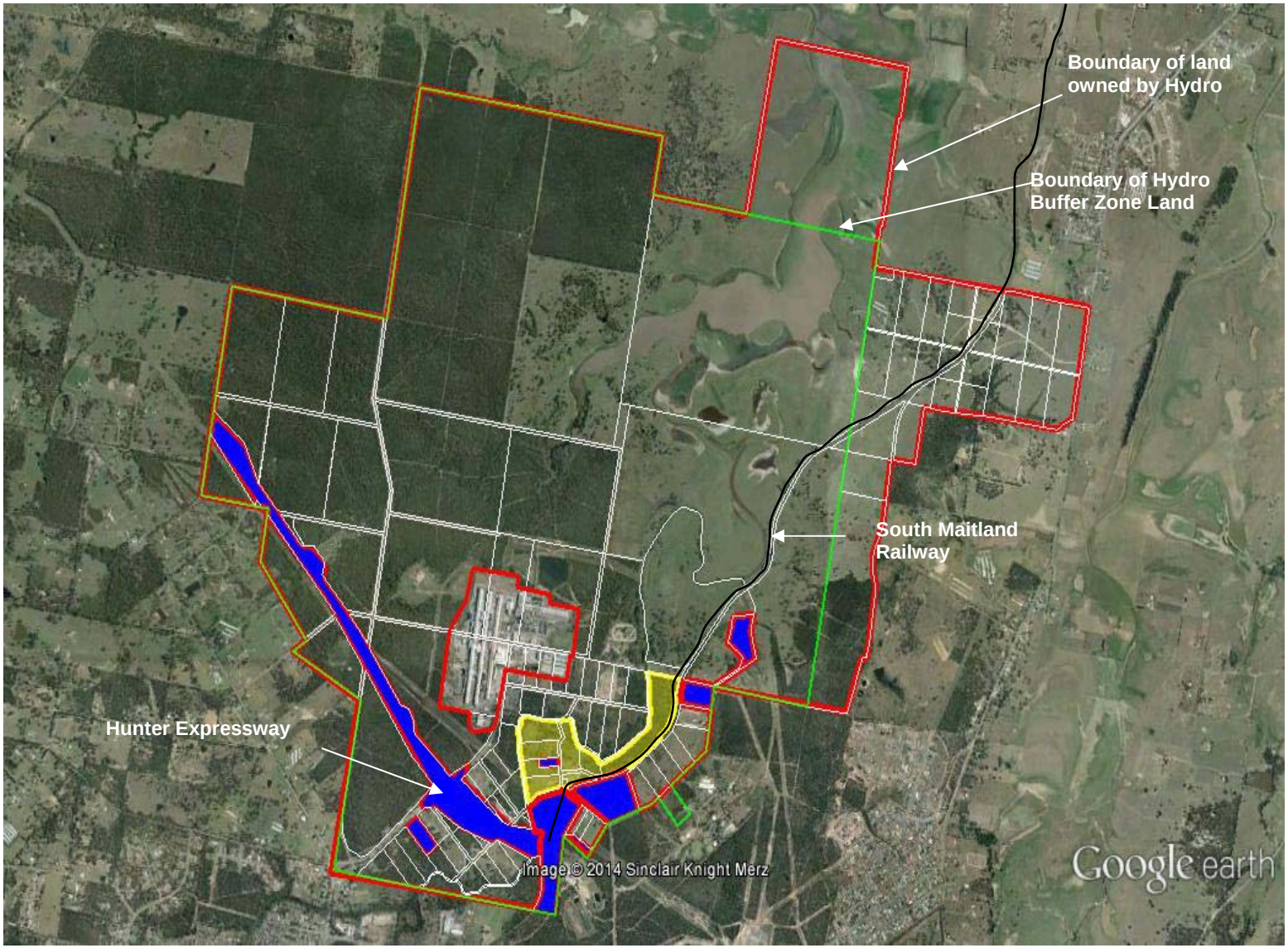
ENVIRON did not independently verify all of the written or oral information provided to ENVIRON during the course of this investigation. While ENVIRON has no reason to doubt the accuracy of the information provided to it, the report is complete and accurate only to the extent that the information provided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



Approximate Location of Smelter

Approximate Location of Buffer

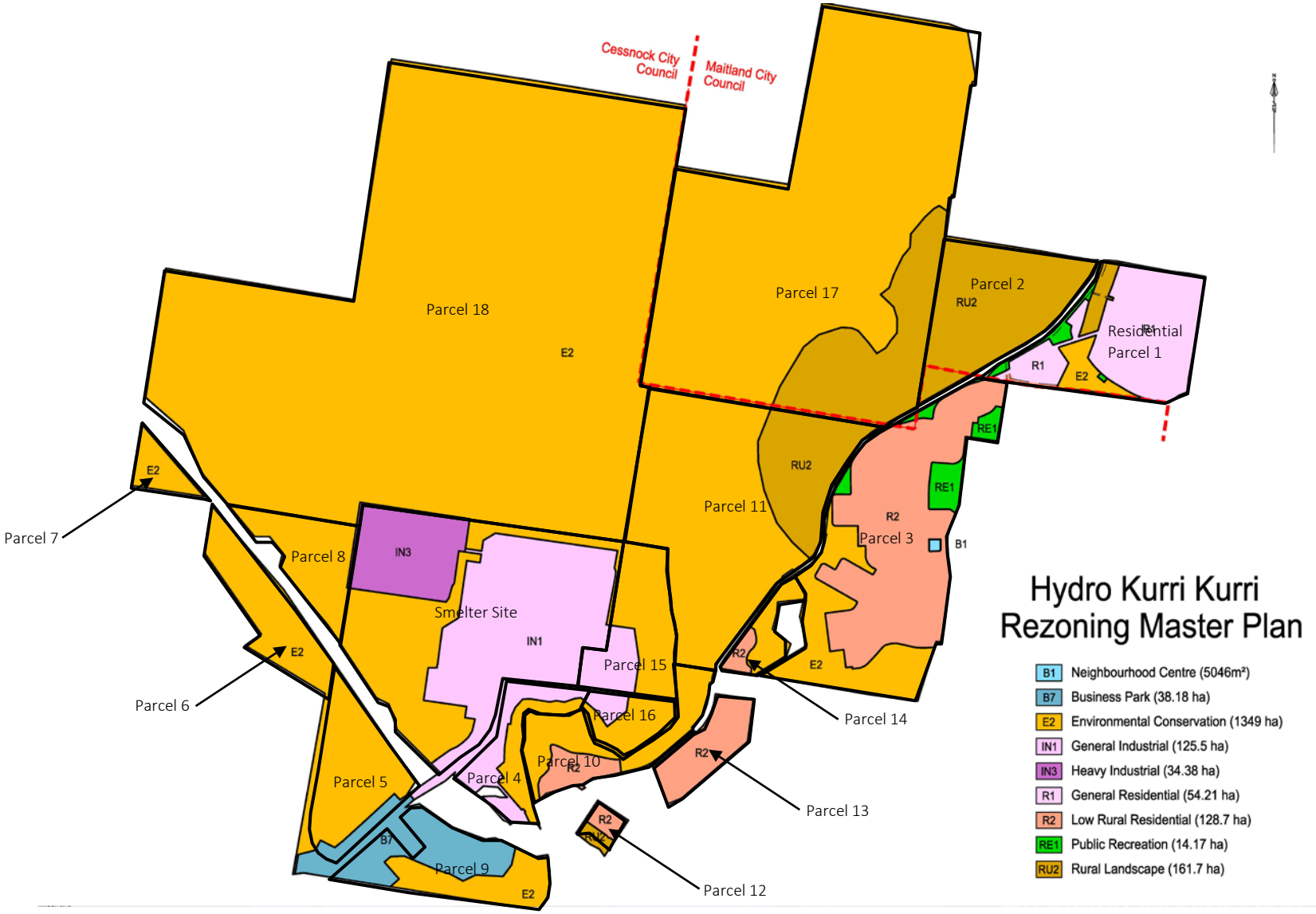
Land not owned by Hydro

Employment Parcel 10

N

Hydro Aluminium Kurri Kurri – Phase 2 Environmental Site Assessment | Site Location

ENVIRON | JOB NO: AS130348 | DATE: November 2014 | 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

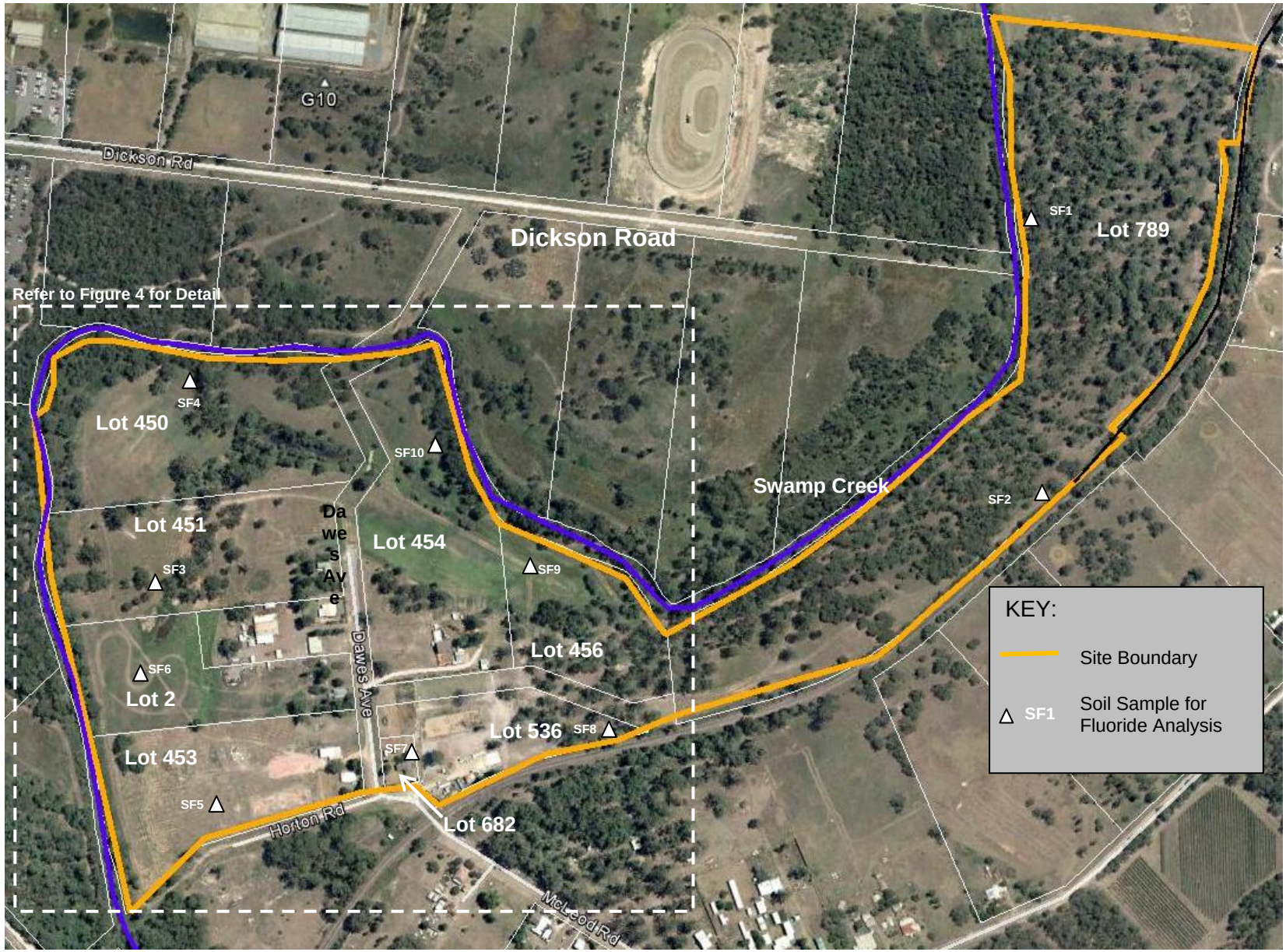
Land Parcels and Proposed Land Zoning

ENVIRON

JOB NO: AS 130348

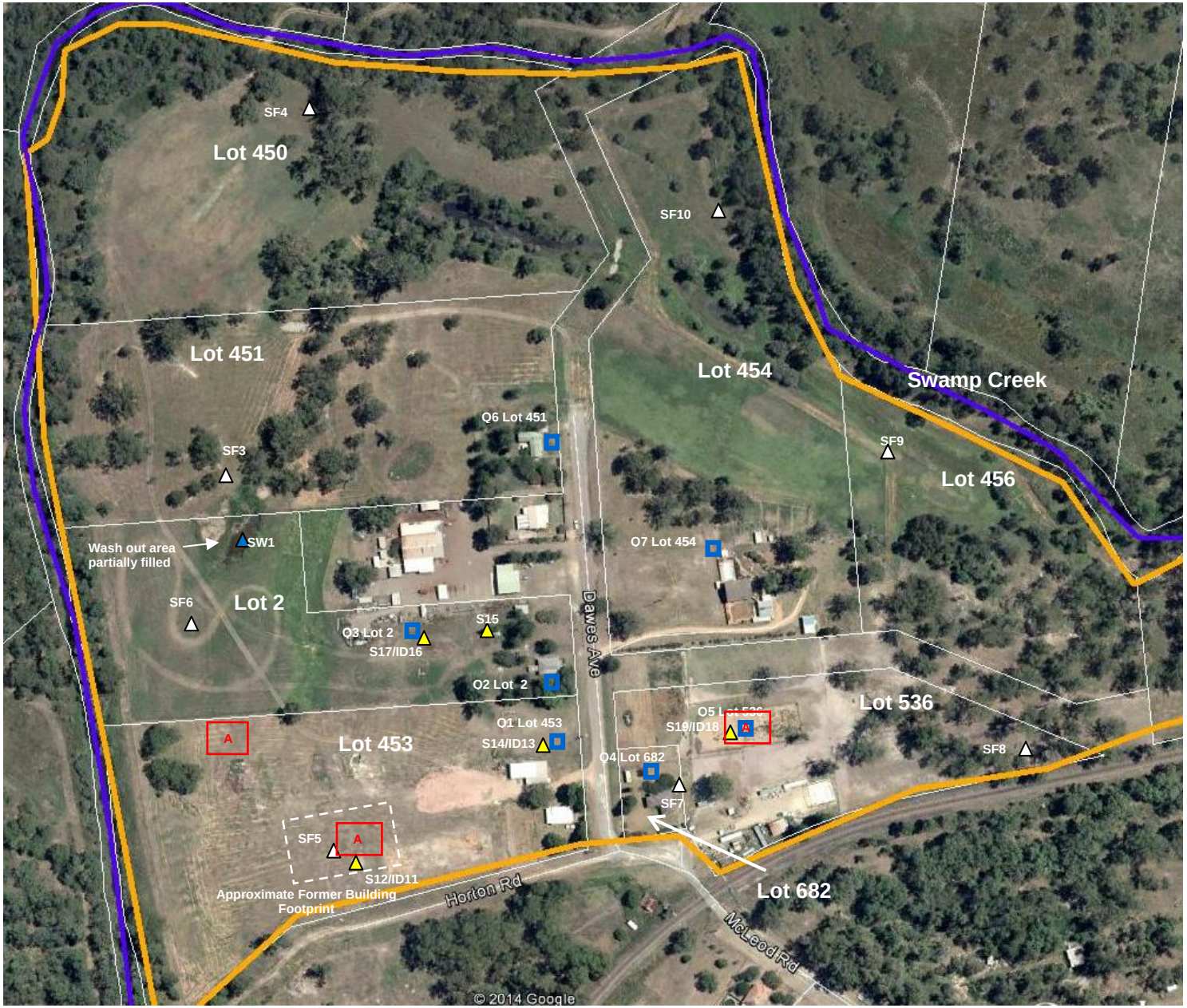
DATE: March 2015

FIGURE 2



Hydro Aluminium Kurri Kurri – Phase 2 Environmental Site Assessment Parcel 10	Parcel 10 – Site Layout and Fluoride Sampling Locations

ENVIRON | JOB NO: AS130348 | DATE: November 2014 | FIGURE 3



Hydro Aluminium Kurri Kurri – Phase 2 Environmental Site Assessment Parcel 10	Parcel 10 –Soil Sampling Locations – Dawes Ave Lots

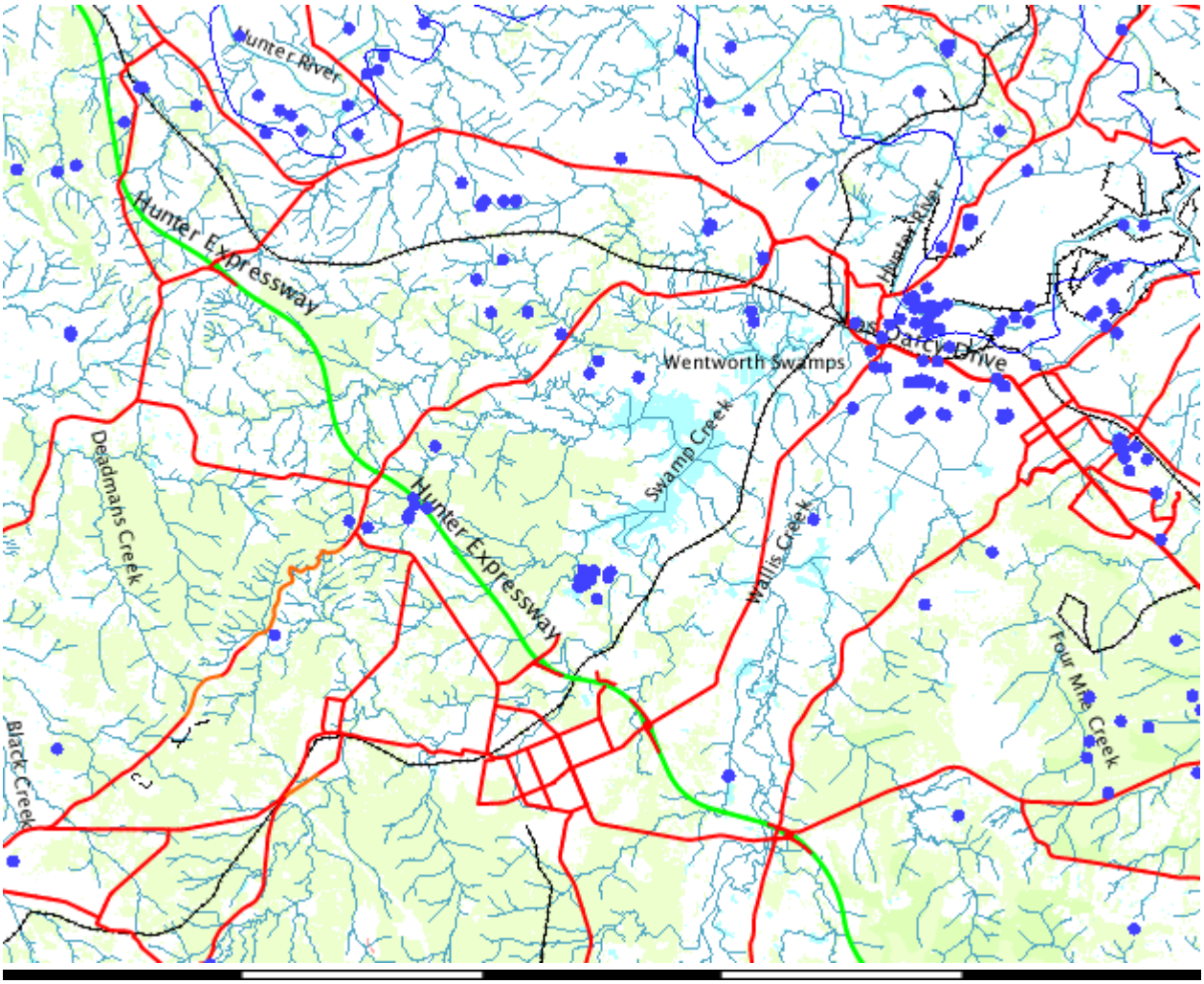
ENVIRON | JOB NO: AS130348 | DATE: June 2014 | FIGURE 4

Appendix A

Surrounding Groundwater Bores

Registered groundwater bores in the vicinity of the site

Map created with NSW Natural Resource Atlas - http://www.nratlas.nsw.gov.au
Tuesday, April 29, 2014



0 24 Km

Legend

Symbol	Layer	Custodian
	Cities and large towns	
Cowra	Populated places	
	Towns	
	Groundwater Bores	
	Catchment Management Authority boundaries	
	Major rivers	
Primary/arterial road Motorway/freeway Railway Runway Contour Background	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
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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	
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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
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LONGITUDE	151 29' 4"
GS-MAP	

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

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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)

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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

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INTENDED-PURPOSES	MONITORING BORE
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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	
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EASTING	358234.00
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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

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OWNER-TYPE	(Unknown)
COMMENCE-DATE	
COMPLETION-DATE	
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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	
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EASTING	358152.00
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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

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AUTHORISED-PURPOSES	
INTENDED-PURPOSES	MONITORING BORE
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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

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 Lot 453 residence looking north along Dawes Ave.

Photo 2: Photograph of disturbed area on Lot 453 looking west towards Swamp Creek stockpiles of gravel (foreground) and mulch (background).

Photo 3: Photograph close-up of ACM on Lot 453 (location ID11/S12).

Photo 4: Photograph north of Lot 453 residence (ACM fragments identified)

Photo 5: Photograph of soil stockpile north side of Lot 2.

Photo 6: Photograph of pond with metal/timber waste – rear of Lot 2.

Photo 7: Photograph of horse track Lot 536, looking east.

Photo 8: Photograph of ground surface on horse track on Lot 536 showing ACM fragments.

Photo 9: Photograph of sheds and waste piles southern side of Lot 536

Photo 10: Photograph rear (eastern) area of Lot 536 looking west.

Photo 11: Photograph of residence on Lot 682, looking north

Photo 12: Photograph of Lot 451, looking north-west.

Appendix C

Field Investigation Sheets

Site Walkover Checklist

1 x F
w/o
AS/W/O.

Project No.: AS130348	**Date and Time:** 5/11/13
Land Parcel: EMP10	**Weather:**
Lot and DP: LOT 2	**Environ Personnel:**

Site Description

Topography	Mostly flat - slopes to west (creek) at rear.
Surface Geology	Alluvials.
Fill evident?	
Hummocky ground?	
Structures on site?	House/shed on Road.
Location of structures	
Building materials used in structures	Timber/iron (ACM in eaves?) - House / ACM in rear lean-to & shed.
Asbestos debris on site?	Some ACM frags around rear of house.
Location of asbestos debris?	"Corona" of ACM frags around shed.
Volume of asbestos debris?	

GPS Locations of Interest

Point of Interest	Easting	Northing
Q2 10x10 (adj. to LOT 2) - no ACM.	151.48450	32.79659.
Small soil s/pile on N boundary.	151.48407	32.79623
Q3 10x10 ACM w/o - ~ 50g ACM frag.	151.48362	32.79634

Description of Photographs Taken

165-167 - Dawes Ave frontage.
168 - rear lean-to of house.
169-170 - small shed/garage w/inspection pit (bricks/old battery)
171-174 - from rear of house block looking W → N.
175-177 - N of house block - shed on Dawes on N boundary.
178 - small soil s/pile ~ 3m³ (silty SAND; grey - steel/rubber fill.
179. " " " ~2m³. in centre East.

Miscellaneous Field Comments

L-shaped block house on front w/shed.
"Water hole" - in NW area - iron/timber dumped on W bank also concrete. excavated hole?
Bike track in W site.

photos 180-181 "waterhole" in NW area. from E-looking W.
182-183 " " " " W " E.
184-186 from W. boundary Pan N → E → S.

ENVIRON

1×F
1× W/O.

Site Walkover Checklist

Project No.:	AS130268	**Date and Time:**	
Land Parcel:	EMP10	**Weather:**	Ocast / cool.
Lot and DP:	LOT 450	**Environ Personnel:**	SC

Site Description	
Topography	Flat - slopes at creek edge.
Surface Geology	Alluvial.
Fill evident?	No
Hummocky ground?	No
Structures on site?	—
Location of structures	—
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

Description of Photographs Taken

130 - 132 From SE corner N → W.
133 - 136 From NW " S → E.

Miscellaneous Field Comments

Flat paddock, trees, grassed, marshy area on eastern side. Bounded on W, N by Swamp Ck. (creek crossing in mid-north area).

Site Walkover Checklist

1rF w/o

Project No.:	AS130348	**Date and Time:**	5/11/13
Land Parcel:	EMP10	**Weather:**	O'cast cool
Lot and DP:	Lot 451	**Environ Personnel:**	SC

Site Description

Topography	Flat with slope to Swamp Ck on W. boundary.
Surface Geology	Alluvials.
Fill evident?	No
Hummocky ground?	No
Structures on site?	House at front. (on Dawes).
Location of structures	
Building materials used in structures	Timber / iron ACM in eaves?
Asbestos debris on site?	
Location of asbestos debris?	
Volume of asbestos debris?	

GPS locations of Interest

Point of Interest	Easting	Northing
QL 10 x 10 - No ACM in soil.	151.48457.	32.79528

Description of Photographs Taken

123 - 126 from NE cor (Dawes Ave) Pan NW-S.
127 - 129 " SW cor (Creek). Pan E - NE - N.

Miscellaneous Field Comments

Flat block, grassed, with a few trees & ephemeral water courses.
Small house

Site Walkover Checklist

1 x F
W/O
A W/O.

Project No.:	AS130348	**Date and Time:**	5/11/13
Land Parcel:	EMP10	**Weather:**	Fine mild
Lot and DP:	LOT 453	**Environ Personnel:**	SC

Site Description

Topography	Flat Paddock. - slopes at rear (W) to ck.
Surface Geology	Alluvials /
Fill evident?	small stockpiles aggregate.
Hummocky ground?	no
Structures on site?	houses at front.
Location of structures	
Building materials used in structures	
Asbestos debris on site?	old bldg F/print - centre/rear of site.
Location of asbestos debris?	ACM (?) on surface. 20 - 30mm frags
Volume of asbestos debris?	too much + pickup - over ~ 70 x 30m?

GPS Locations of Interest

Point of Interest	Easting	Northing
ACM on surface (curved roofing ACM).	151.48311	32.79729
s/pile excavated material at rear of site (<2m3)	151.48249.	32.79695
	151.48254	32.79665
isolated Fibro/ACM? frags on NW area Q1:	151.48444	32.79685.

Description of Photographs Taken

141 – 143 SE cnr Pan N→W
144 – 147 around house/shed - machinery/vehicle storage -
148 – 149 aggregate & mulch s/piles shed - concrete floor
150 – ACM (?) on surface on exposed soil at rear of site (too much to pick up).
151-153 from SW area - across old bldg F/print.
154-155 Concr/steel debris at.
156 s/pile of excavated material
158-158 - small sand s/piles
159 – constr. debris.
160-161 - Q1 showing ACM.

Miscellaneous Field Comment

Flat, grassed paddock. - house at front
small s/pile at rear of site - excavated material (no other debris)
& smaller piles of sand - rear of site under trees with
some demolition debris - concr/bricks/clay pipes.
Q1 (10x10): immediately N. of house/shed ~ 80g of ACM (ID 13).
frags appear scattered over this area.

Photos 162-165 from NE cnr S→W.

Site Walkover Checklist

IXF
W/O
AW/O.

Project No.:	AS130348	**Date and Time:**	
Land Parcel:	EMP10	**Weather:**	
Lot and DP:	LOT 454	**Environ Personnel:**	SC

Site Description

Topography	Slopes north to lower terraces of Swamp CK.
Surface Geology	Alluvials.
Fill evident?	
Hummocky ground?	
Structures on site?	House / sheds
Location of structures	House - brick/tile 2st. sheds - Aluminium
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
Q7 - 10x10m - no ACM.	151.48533	32'79550-

Description of Photographs Taken

-133 - 140 from NW side looking SE => N (Pan)
218 - 223 from SE car N - NW - W.
224 Pond in Mid-N. area.
225 - 229 From N site Pan S-E-N.
230 - 234 " SE Area on Dawes. Pan - SEN

Miscellaneous Field Comments

Site Walkover Checklist [IKF W/O AW/O.

Project No.:	AS130348	**Date and Time:**	
Land Parcel:	EMP 10	**Weather:**	
Lot and DP:	LOT 456	**Environ Personnel:**	

Site Description

Topography	Slopes to North. (toward Creek.
Surface Geology	Alluvials.
Fill evident?	No
Hummocky ground?	No
Structures on site?	No
Location of structures	–
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
Q6 10x10 - no ACM.	151.48648	32.79614

Description of Photographs Taken

213 - 216 From NE cnr Pan NW -> S.

217 - 217 " NW " S -> E.

Miscellaneous Field Comments

Mainly (75% - tree-covered) remainder grassed.

1xF
w/o
Aw/0.

Site Walkover Checklist

Project No.: AS130348	**Date and Time:**
Land Parcel: EMP10 -	**Weather:**
Lot and DP: Lot ~~5~~36	**Environ Personnel:**

Site Description

Topography	Flat, sl slope to NW
Surface Geology	Alluvials.
Fill evident?	
Hummocky ground?	
Structures on site?	Sheds, Containers
Location of structures	
Building materials used in structures	Steel /Aluminium.
Asbestos debris on site?	on horse track - Q5. - fragments exposed around track area -
Location of asbestos debris?	around S & E of large Aluminium shed.
Volume of asbestos debris?	

GPS Locations of Interest

Point of Interest	Easting	Northing
Q5 10x10m some small ACM ~25g	151.48559	32.79681.

Description of Photographs Taken

195-199. From NE cnr house Walk S->E->N.
200-201 - yellow ground glass on surface ~ 30m east of House.
202-206 - from shed area Pan ~~W-S-E~~ W-S-E
207-209 - Eastern area - oil drums on ground (20L).
210-212 - From E. cnr looking S -> W.

Miscellaneous Field Comments

around shed area (SW area). car bodies, metal scrap, elec. engines, 1000L Bulk Containers Water ?
- Eastern area trees/grass - covered 20L oil drums (~4).

Site Walkover Checklist

1xF
w/o
AW/o.

Project No.:	AS130348	**Date and Time:**	
Land Parcel:	EMP10.	**Weather:**	
Lot and DP:	LOT 682 (House)	**Environ Personnel:**	

Site Description

Topography	Slope sl. to NW
Surface Geology	Alluvial.
Fill evident?	NO
Hummocky ground?	–
Structures on site?	House. Fibro/tile. S/S.
Location of structures	
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
Q/A 10 X 10 - no ACM.	151.48502.	32.79685

Description of Photographs taken

188 - 191 From South of house. NE → NW.
192 - 194 " NW cnr (on Dawes) S → E.
195 - 199 From

Miscellaneous Field Comments

east of house - "ground glass" spread on surface (approx 2m)

Site Walkover Checklist

Project No.:	AS130328	**Date and Time:**	5 NOV 13
Land Parcel:	EMP10	**Weather:**	cool, o'cast, showers.
Lot and DP:	LOT 789.	**Environ Personnel:**	SC.

Site Description

Topography	Slopes west towards Swamp CK (steeper to west).
Surface Geology	Alluvial Terraces.
Fill evident?	No
Hummocky ground?	No
Structures on site?	No
Location of structures	No
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

Description of Photographs Taken

19,20,21,22 – From South end NE – W.

Miscellaneous Field Comments

Large bush-covered site sloping from rail line in E to lower terraces on Western border of Swamp CK.

Appendix D

Results Tables

TABLE A: Soil Analytical Results - Grid Sampling

Sample Depth: 0.01m - 0.02m
Sampling Date: 5/11/13
Laboratory PQL: 0.5 mg/kg
Site Specific HIL - Fluoride: 440 mg/kg

Sample Identification	Soluble Fluoride mg/kg (1:5 soil:water)
EMP-10-SF1	6
EMP-10-SF2	2
EMP-10-SF3	16
EMP-10-SF4	7
EMP-10-SF5	1
EMP-10-SF6	4
EMP-10-SF7	5
EMP-10-SF8	4
EMP-10-SF9	12
EMP-10-SF10	6

cell shaded grey where investigation criteria exceeded

TABLE B: Soil Analytical Results

Sample Identification	PQL	Guideline					EMP10-ID11	EMP10-S12	EMP10-ID13	EMP10-S14	EMP10-S15	EMP10-ID16	EMP10-S17	EMP10-ID18	EMP10-S19
							Lot 453	Lot 453	Lot 453	Lot 453	Lot 2	Lot 2	Lot 2	Lot 536	Lot 536
Date		HIL 'A' [A]	HSL 'A' Sand 0m to 1m	EIL Residential [B]	ESL Residential (Coarse Soil)	Mgt Limits Residential	6/11/2013	6/11/2013	6/11/2013	6/11/2013	6/11/2013	6/11/2013	6/11/2013	6/11/2013	6/11/2013
Sample Profile															
Sample collected by							SC	SC	SC	SC	SC	SC	SC	SC	SC
Asbestos															
Asbestos Identification							Yes	Yes	Yes	No	No	Yes	No	Yes	No
Asbestos Type							Ch + Am + Cr	Ch + Am	Ch + Am + Cr	-	-	Ch + Cr	-	Ch + Cr	-
Asbestos Quantification															
Weight Used for % Calculation							-	1.58	-	1.7	245	-	1.24	-	1.63
Asbestos Containing Materia							-	2.5	-	<0.1	<0.1	-	<0.1	-	<0.1
Fibrous Asbestos							-	0.007	-	<0.002	<0.002	-	<0.002	-	<0.002
Asbestos Containing Material (as 15% Asbestos in ACM >7mm)		0.05%					-	0.02	-	<0.01	<0.01	-	<0.01	-	<0.01
Asbestos Fines and Fibrous Asbestos (<7mm)		0.001%					-	0.001	-	<0.001	<0.001	-	<0.001	-	<0.001
Trace Asbestos Detected								No	-	No	No	-	No	-	No
Metals															
Arsenic	5	100		100			-	-	-	-	<5	-	-	-	-
Cadmium	1	20					-	-	-	-	<1	-	-	-	-
Chromium	2	100		410			-	-	-	-	13	-	-	-	-
Copper	5	6000		170			-	-	-	-	20	-	-	-	-
Nickel	5	400		100			-	-	-	-	11	-	-	-	-
Lead	2	300		1100			-	-	-	-	286	-	-	-	-
Zinc	5	7400		410			-	-	-	-	**617**	-	-	-	-
Mercury	0.1	10					-	-	-	-	<0.1	-	-	-	-
Polycyclic Aromatic Hydrocarbons (PAH)															
Naphthalene	0.1			170			-	-	-	-	<0.5	-	-	-	-
Acenaphthylene	0.1						-	-	-	-	<0.5	-	-	-	-
Acenaphthene	0.1						-	-	-	-	<0.5	-	-	-	-
Fluorene	0.1						-	-	-	-	<0.5	-	-	-	-
Phenanthrene	0.1						-	-	-	-	<0.5	-	-	-	-
Anthracene	0.1						-	-	-	-	<0.5	-	-	-	-
Fluoranthene	0.1						-	-	-	-	<0.5	-	-	-	-
Pyrene	0.1						-	-	-	-	<0.5	-	-	-	-
Benz(a)anthracene	0.1						-	-	-	-	<0.5	-	-	-	-
Chrysene	0.1						-	-	-	-	<0.5	-	-	-	-
Benzo(b)&(k)fluoranthene	0.2						-	-	-	-	<0.5	-	-	-	-
Benzo(a) pyrene	0.05				0.7		-	-	-	-	<0.5	-	-	-	-
Indeno(1,2,3-c,d)pyrene	0.1						-	-	-	-	<0.5	-	-	-	-
Dibenz(a,h)anthracene	0.1						-	-	-	-	<0.5	-	-	-	-
Benzo(g,h,i)perylene	0.1						-	-	-	-	<0.5	-	-	-	-
Benzo(a)pyrene TEQ	0.5	3					-	-	-	-	<0.5	-	-	-	-
Total +ve	--	300					-	-	-	-	<0.5	-	-	-	-
Total Recoverable Hydrocarbons (TRH) - NEPM (2013)															
TRH C6 - C10	25		45		180	700	-	-	-	-	<10	-	-	-	-
vTPH C6 - C10 less BTEX	25		45		-	-	-	-	-	-	<10	-	-	-	-
TRH >C10-C16	50		110		120	1000	-	-	-	-	<50	-	-	-	-
TRH >C16-C34	100		NL		300	2500	-	-	-	-	130	-	-	-	-
TRH >C34-C40	100		NL		2800	10,000	-	-	-	-	<100	-	-	-	-
BTEX															
Benzene	0.2		0.5		50		-	-	-	-	<0.2	-	-	-	-
Toluene	0.5		160		85		-	-	-	-	<0.5	-	-	-	-
Ethylbenzene	1		35		70		-	-	-	-	<1	-	-	-	-
m+p-xylene	2		40		105		-	-	-	-	<2	-	-	-	-
o-Xylene	1		40				-	-	-	-	<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 concentration.

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.

NB Asbestos quantification in soil is based on a gravimetric analysis of asbestos fibres and fibre bundles

TABLE C Surface Water Analytical Results

Sample Identification	PQL	Guideline			P10 SW1
Date		95% Fresh [A]	Irrigation	Stock	19/3/13
Sample Appearance					clear, sl. turbid
Sample collected by					SC
Field Parameters					
pH	0.01				8.8
Electrical Conductivity (µS/cm)	1				845
Redox Potential (mV)	0.1				234
Total Recoverable Hydrocarbons (TRH)					
TRH C6-C9	10				<20
TRH C10-C14	50				<50
TRH C15-C28	100				<100
TRH C29-C36	100				<100
TRH C10-C36	250				<250
Total Recoverable Hydrocarbons (TRH) NEPM (2013)					
TRH C6 - C10	10				<20
vTPH C6 - C10 less BTEX (F1)	10				<20
TRH >C10-C16	50				<100
TRH >C16-C34	100				<100
TRH >C34-C40	100				<100
C10 - C16 Fraction minus Naphthale	100				<100
BTEX					
Benzene	1	950			<1
Toluene	1				<2
Ethylbenzene	1				<2
m+p-xylene	2	200			<2
o-xylene	1	350			<2
Polycyclic Aromatic Hydrocarbons					
Naphthalene	1	16			<0.1
Acenaphthylene	1				<0.1
Acenaphthene	1				<0.1
Fluorene	1				<0.1
Phenanthrene	1	*0.6*			<0.1
Anthracene	1	*0.01*			<0.1
Fluoranthene	1	*1*			<0.1
Pyrene	1				<0.1
Benz(a)anthracene	1				<0.1
Chrysene	1				<0.1
Benzo(b)fluoranthene	1				<0.1
Benzo(k)fluoranthene	1				<0.1
Benzo(a)pyrene	0.5	0.1			<0.05
Indeno(1.2.3.cd)pyrene	1				<0.1
Dibenz(a.h)anthracene	1				<0.1
Benzo(g.h.i)perylene	1				<0.1
Sum of polycyclic aromatic hydrocar	0.5				<0.05
Benzo(a)pyrene TEQ (zero)	0.5				<0.05
Dissolved Metals (mg/L)					
Arsenic	0.001	0.013	0.1	0.2	0.001
Cadmium	0.0001	0.0084*	0.01	0.01	<0.0001
Chromium	0.001	0.001	0.1	1	0.002
Copper	0.001	0.00546*	1	0.5	<0.001
Mercury	0.0001	0.0006	0.002	0.002	<0.0001
Nickel	0.001	0.0429*	0.2	1	0.001
Lead	0.001	0.02584*	2	0.1	<0.001
Zinc	0.005	0.0312*	0.2	20	<0.005
Organochlorine Pesticides					
Aldrin	0.01	0.001			<0.010
alpha-BHC	0.01				<0.010
beta-BHC	0.01				<0.010
delta-BHC	0.01				<0.010
4.4`-DDD	0.01				<0.010
4.4`-DDE	0.01	0.03			<0.010
4.4`-DDT	0.01	0.01			<0.010
Sum of DDD + DDE + DDT	0.01				<0.010
Dieldrin	0.01	0.01			<0.010
alpha-Endosulfan	0.01				<0.010
beta-Endosulfan	0.01				<0.010
Endosulfan sulfate	0.01	0.2			<0.010
Endosulfan (sum)	0.01				<0.010
Endrin	0.01	0.02			<0.010
Endrin aldehyde	0.01				<0.010
Endrin ketone	0.01				<0.010
Heptachlor	0.005				<0.005
Heptachlor epoxide	0.01	0.09			<0.010
Hexachlorobenzene (HCB)	0.01				<0.010
gamma-BHC	0.01				<0.010
Methoxychlor	0.01				<0.010
cis-Chlordane	0.01				<0.010
trans-Chlordane	0.01				<0.010
Total Chlordane (sum)	0.01	0.08			<0.010
Oxychlordane	0.01				<0.010
Organophosphorus Pesticides					
Bromophos-ethyl	0.1				<0.10
Carbophenothion	0.1				<0.10
Chlorfenvinphos (Z)	0.1				<0.10
Chlorpyrifos	0.05	0.01			<0.05
Chlorpyrifos-methyl	0.1				<0.10
Demeton-S-methyl	0.1				<0.10
Diazinon	0.1	0.01			<0.10
Dichlorvos	0.1				<0.10
Dimethoate	0.1	0.15			<0.10
Ethion	0.1				<0.10
Fenamiphos	0.1				<0.10
Fenthion	0.1	0.2			<0.10
Malathion	0.1	0.05			<0.10
Azinphos Methyl	0.1				<0.10
Monocrotophos	0.1				<0.10
Parathion	0.1				<0.10
Parathion-methyl	0.1				<0.10
Pirimphos-ethyl	0.1				<0.10
Prothiofos	0.1				<0.10

All values are inµg/L unless otherwise indicated

PQL = Practical Quantitation Limit.

[A] ANZECC 2000 95% Protection Level for Receiving Water Type

[B] Preliminary Site Specific Screening Level protective of Human Health (ENVIRON 2013).

* Hardness Modified Trigger Values for Cd, Cu, Ni, Pb, Zn based on hardness of Swamp Creek (from previous invesitgations)

ANZECC arsenic guideline based on As (V) for fresh water, the lowest of presented guidelines.

ANZECC guidelines for chromium are based on Cr (VI)

ANZECC guidelines for mercury are based on inorganic mercury.

Results shaded grey are in excess of the primary acceptance criteria: ANZECC 95%

ND not determined due to insufficient background data

NST not sufficiently toxic

Guidelines in *Italics* are indicative interim working levels (low reliability tigger values)

TABLE D: Soil Quality Assurance/ Quality Control Results						
Sample Identification	SF2	QA1		SF10	QA2	
Sample Depth (m)	0.01-0.02			0.01-0.02		
Duplicate Type	Intralaboratory		RPD %	Intralaboratory		RPD %
Sample Profile	Fill soil matrix			Fill soil matrix		
Sample collected by	SC			SC		
Fluoride						
Soluble Fluoride	2	2	0.0	6	6	0.0

Note all units in mg/kg

BOLD identifies where RPD results exceed criteria

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

0.001%

Appendix E

Laboratory Reports

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1324308**	Page	: 1 of 10
Amendment	: **1**		
Client	: **ENVIRON AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR STEVE CADMAN	Contact	: Client Services
Address	: PO BOX 560 NORTH SYDNEY NSW, AUSTRALIA 2060	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: scadman@environcorp.com	E-mail	: sydney@alsglobal.com
Telephone	: +61 02 99548114	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: HYDRO BUFFER ZONE	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: AS130348		
C-O-C number	: ----	Date Samples Received	: 08-NOV-2013
Sampler	: STEVE CADMAN	Issue Date	: 18-FEB-2014
Site	: ----		
		No. of samples received	: 22
Quote number	: SY/446/12	No. of samples analysed	: 22

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
- Surrogate Control Limits

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.**
- **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.

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
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Christopher Owler	Team Leader - Asbestos	Newcastle - Asbestos
Pabi Subba	Senior Organic Chemist	Sydney Organics

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	EMP-10-SF1	EMP-10-SF2	EMP-10-SF3	EMP-10-SF4	EMP-10-SF5
			Client sampling date / time	05-NOV-2013 15:00	05-NOV-2013 15:00	05-NOV-2013 15:00	06-NOV-2013 15:00	06-NOV-2013 15:00
Compound	CAS Number	LOR	Unit	ES1324308-001	ES1324308-002	ES1324308-003	ES1324308-004	ES1324308-005
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	**6.4**	**1.8**	**2.1**	**4.4**	<1.0
EK040S: Fluoride Soluble								
Fluoride	16984-48-8	1	mg/kg	**6**	**2**	**16**	**7**	**1**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	EMP-10-SF6	EMP-10-SF7	EMP-10-SF8	EMP-10-SF9	EMP-10-SF10
			Client sampling date / time	06-NOV-2013 15:00	06-NOV-2013 15:00	06-NOV-2013 15:00	06-NOV-2013 15:00	06-NOV-2013 15:00
Compound	CAS Number	LOR	Unit	ES1324308-006	ES1324308-007	ES1324308-008	ES1324308-009	ES1324308-010
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	**3.3**	**1.6**	**3.9**	**12.6**	**3.8**
EK040S: Fluoride Soluble								
Fluoride	16984-48-8	1	mg/kg	**4**	**5**	**4**	**12**	**6**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	EMP10-QA1	EMP10-QA2	EMP10-ID11	EMP10-S12	EMP10-ID13
			Client sampling date / time	05-NOV-2013 15:00	06-NOV-2013 15:00	06-NOV-2013 15:00	06-NOV-2013 15:00	06-NOV-2013 15:00
Compound	CAS Number	LOR	Unit	ES1324308-011	ES1324308-012	ES1324308-013	ES1324308-014	ES1324308-015
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	2.8	4.0	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples								
Asbestos Detected	1332-21-4	0.1	g/kg	----	----	Yes	Yes	Yes
Asbestos Type	1332-21-4	-	--	----	----	Ch + Am + Cr	Ch + Am	Ch + Am + Cr
Sample weight (dry)	----	0.01	g	----	----	129	1580	200
APPROVED IDENTIFIER:	----	-	--	----	----	C.OWLER	C.OWLER	C.OWLER
EA200Q: Asbestos Quantification (non-NATA)								
Weight Used for % Calculation	----	0.0001	kg	----	----	----	1.58	----
Asbestos Containing Material	1332-21-4	0.1	g	----	----	----	2.5	----
Fibrous Asbestos	----	0.002	g	----	----	----	0.007	----
Asbestos Containing Material (as 15% Asbestos in ACM >7mm)	1332-21-4	0.01	%	----	----	----	0.02	----
Asbestos Fines and Fibrous Asbestos (<7mm)	1332-21-4	0.001	%	----	----	----	0.001	----
Trace Asbestos Detected	----	5	Fibres	----	----	----	No	----
EK040S: Fluoride Soluble								
Fluoride	16984-48-8	1	mg/kg	2	6	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	Client sample ID	EMP10-S14	EMP10-S15	EMP10-ID16	EMP10-S17	EMP10-ID18
				Client sampling date / time	06-NOV-2013 15:00	06-NOV-2013 15:00	06-NOV-2013 15:00	06-NOV-2013 15:00	06-NOV-2013 15:00
					ES1324308-016	ES1324308-017	ES1324308-018	ES1324308-019	ES1324308-020
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1.0	%		----	3.5	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples									
Asbestos Detected	1332-21-4	0.1	g/kg		No	No	Yes	No	Yes
Asbestos Type	1332-21-4	-	--		-	-	Ch + Cr	-	Ch + Cr
Sample weight (dry)	----	0.01	g		1700	245	71.3	1240	4.31
APPROVED IDENTIFIER:	----	-	--		C.OWLER	C.OWLER	C.OWLER	C.OWLER	C.OWLER
EA200Q: Asbestos Quantification (non-NATA)									
Weight Used for % Calculation	----	0.0001	kg		1.70	245	----	1.24	----
Asbestos Containing Material	1332-21-4	0.1	g		<0.1	<0.1	----	<0.1	----
Fibrous Asbestos	----	0.002	g		<0.002	<0.002	----	<0.002	----
Asbestos Containing Material (as 15% Asbestos in ACM >7mm)	1332-21-4	0.01	%		<0.01	<0.01	----	<0.01	----
Asbestos Fines and Fibrous Asbestos (<7mm)	1332-21-4	0.001	%		<0.001	<0.001	----	<0.001	----
Trace Asbestos Detected	----	5	Fibres		No	No	----	No	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		----	<5	----	----	----
Cadmium	7440-43-9	1	mg/kg		----	<1	----	----	----
Chromium	7440-47-3	2	mg/kg		----	13	----	----	----
Copper	7440-50-8	5	mg/kg		----	20	----	----	----
Lead	7439-92-1	5	mg/kg		----	286	----	----	----
Nickel	7440-02-0	2	mg/kg		----	11	----	----	----
Zinc	7440-66-6	5	mg/kg		----	617	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		----	<0.1	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		----	<0.5	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		----	<0.5	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg		----	<0.5	----	----	----
Fluorene	86-73-7	0.5	mg/kg		----	<0.5	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		----	<0.5	----	----	----
Anthracene	120-12-7	0.5	mg/kg		----	<0.5	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		----	<0.5	----	----	----
Pyrene	129-00-0	0.5	mg/kg		----	<0.5	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	EMP10-S14	EMP10-S15	EMP10-ID16	EMP10-S17	EMP10-ID18
			Client sampling date / time	06-NOV-2013 15:00	06-NOV-2013 15:00	06-NOV-2013 15:00	06-NOV-2013 15:00	06-NOV-2013 15:00
Compound	CAS Number	LOR	Unit	ES1324308-016	ES1324308-017	ES1324308-018	ES1324308-019	ES1324308-020
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	<0.5	----	----	----
Chrysene	218-01-9	0.5	mg/kg	----	<0.5	----	----	----
Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	----	<0.5	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	----	<0.5	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	----	<0.5	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	----	<0.5	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	----	<0.5	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	----	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	----	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	----	**0.6**	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	----	**1.2**	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	----	<10	----	----	----
C10 - C14 Fraction	----	50	mg/kg	----	<50	----	----	----
C15 - C28 Fraction	----	100	mg/kg	----	<100	----	----	----
C29 - C36 Fraction	----	100	mg/kg	----	<100	----	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013								
C6 - C10 Fraction	C6_C10	10	mg/kg	----	<10	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	<10	----	----	----
>C10 - C16 Fraction	>C10_C16	50	mg/kg	----	<50	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	----	**130**	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	----	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	**130**	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	<50	----	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	----	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg	----	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	----	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	----	<0.5	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	EMP10-S14	EMP10-S15	EMP10-ID16	EMP10-S17	EMP10-ID18
				Client sampling date / time	06-NOV-2013 15:00	06-NOV-2013 15:00	06-NOV-2013 15:00	06-NOV-2013 15:00	06-NOV-2013 15:00
Compound	CAS Number	LOR	Unit		ES1324308-016	ES1324308-017	ES1324308-018	ES1324308-019	ES1324308-020
EP080: BTEXN - Continued									
^ **Total Xylenes**	1330-20-7	0.5	mg/kg		----	<0.5	----	----	----
^ **Sum of BTEX**	----	0.2	mg/kg		----	<0.2	----	----	----
Naphthalene	91-20-3	1	mg/kg		----	<1	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.1	%		----	**85.9**	----	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%		----	**92.3**	----	----	----
2.4.6-Tribromophenol	118-79-6	0.1	%		----	**88.4**	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.1	%		----	**90.0**	----	----	----
Anthracene-d10	1719-06-8	0.1	%		----	**83.0**	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%		----	**85.8**	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		----	**130**	----	----	----
Toluene-D8	2037-26-5	0.1	%		----	**106**	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%		----	**90.8**	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	EMP10-S19	EMP2-ID10	----	----	----
			Client sampling date / time	06-NOV-2013 15:00	31-OCT-2013 15:00	----	----	----
Compound	CAS Number	LOR	Unit	ES1324308-021	ES1324308-022	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples								
Asbestos Detected	1332-21-4	0.1	g/kg	**No**	**Yes**	----	----	----
Asbestos Type	1332-21-4	-	--	**-**	**Ch + Am + Cr**	----	----	----
Sample weight (dry)	----	0.01	g	**1630**	**26.2**	----	----	----
APPROVED IDENTIFIER:	----	-	--	**C.OWLER**	**C.OWLER**	----	----	----
EA200Q: Asbestos Quantification (non-NATA)								
Weight Used for % Calculation	----	0.0001	kg	**1.63**	----	----	----	----
Asbestos Containing Material	1332-21-4	0.1	g	<0.1	----	----	----	----
Fibrous Asbestos	----	0.002	g	<0.002	----	----	----	----
Asbestos Containing Material (as 15% Asbestos in ACM >7mm)	1332-21-4	0.01	%	<0.01	----	----	----	----
Asbestos Fines and Fibrous Asbestos (<7mm)	1332-21-4	0.001	%	<0.001	----	----	----	----
Trace Asbestos Detected	----	5	Fibres	**No**	----	----	----	----

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	EMP10-ID11 - 06-NOV-2013 15:00	Several pieces of bonded asbestos cement sheeting approx 45 x 35 x 5mm
EA200: Description	EMP10-S12 - 06-NOV-2013 15:00	Pale grey-brown clay soil with several pieces of bonded asbestos cement sheeting approx 27 x 17 x 6mm plus some small fragments of degraded and friable asbestos fibre board approx 4 x 3 x 2mm and one small friable asbestos fibre bundle approx 4 x 2 x 1mm
EA200: Description	EMP10-ID13 - 06-NOV-2013 15:00	Several pieces of bonded asbestos cement sheeting approx 70 x 50 x 5mm
EA200: Description	EMP10-S14 - 06-NOV-2013 15:00	Pale grey-brown soil with some coal and quartz grains plus plenty of vegetation
EA200: Description	EMP10-S15 - 06-NOV-2013 15:00	Mid brown clay soil with some vegetation
EA200: Description	EMP10-ID16 - 06-NOV-2013 15:00	Several pieces of bonded asbestos cement sheeting approx 55 x 45 x 5mm
EA200: Description	EMP10-S17 - 06-NOV-2013 15:00	Mid brown clay soil with some vegetation
EA200: Description	EMP10-ID18 - 06-NOV-2013 15:00	Several pieces of degraded and friable asbestos cement sheeting approx 25 x 15 x 5mm
EA200: Description	EMP10-S19 - 06-NOV-2013 15:00	Pale grey sandy soil with some vegetation
EA200: Description	EMP2-ID10 - 31-OCT-2013 15:00	Several pieces of bonded asbestos cement sheeting approx 35 x 25 x 5mm

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
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	: **ES1324308**	Page	: 1 of 9
Client	: **ENVIRON AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR STEVE CADMAN	Contact	: Client Services
Address	: PO BOX 560 NORTH SYDNEY NSW, AUSTRALIA 2060	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: scadman@environcorp.com	E-mail	: sydney@alsglobal.com
Telephone	: +61 02 99548114	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: HYDRO BUFFER ZONE	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 08-NOV-2013
Sampler	: STEVE CADMAN	Issue Date	: 18-NOV-2013
Order number	: AS130348		
		No. of samples received	: 22
Quote number	: SY/446/12	No. of samples analysed	: 22

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

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

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
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Christopher Owler	Team Leader - Asbestos	Newcastle - Asbestos
Pabi Subba	Senior Organic Chemist	Sydney Organics

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: 3154227)									
ES1324308-001	EMP-10-SF1	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	6.4	6.4	0.0	No Limit
ES1324308-012	EMP10-QA2	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	4.0	4.4	9.1	No Limit
EG005T: Total Metals by ICP-AES (QC Lot: 3155654)									
ES1324261-002	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	28	34	17.0	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	110	103	7.1	0% - 20%
		EG005T: Arsenic	7440-38-2	5	mg/kg	7	8	17.8	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	23	27	17.1	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	10	10	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	54	54	0.0	0% - 50%
ES1324309-003	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	11	11	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	2	3	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	8	6	38.6	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	6	6	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	10	8	24.7	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	17	18	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3155655)									
ES1324261-002	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES1324309-003	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EK040S: Fluoride Soluble (QC Lot: 3154259)									
ES1324140-019	Anonymous	EK040S: Fluoride	16984-48-8	1	mg/kg	4	8	59.4	No Limit
ES1324308-005	EMP-10-SF5	EK040S: Fluoride	16984-48-8	1	mg/kg	1	1	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3152170)									
ES1324138-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	0.6	1.0	43.6	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	1.7	2.3	33.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	0.6	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	2.6	3.5	31.3	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	2.5	3.5	32.8	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	1.1	1.6	36.4	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	1.2	1.7	34.8	No Limit
		EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	2.0	2.7	28.8	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: 3152170) - continued									
ES1324138-001	Anonymous	EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	0.5	0.8	39.2	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	1.2	1.6	32.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	0.8	1.1	29.3	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	1.0	1.3	26.7	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	15.2	21.7	# 35.2	0% - 20%
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	1.7	2.2	30.1	No Limit
ES1324138-011	Anonymous	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	0.8	<0.5	45.8	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	1.2	1.0	13.7	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	1.1	1.0	12.7	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	0.6	0.6	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	4.2	2.6	47.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3152169)									
ES1324138-001	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	850	1090	24.9	0% - 50%
		EP071: C29 - C36 Fraction	----	100	mg/kg	530	700	27.6	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
ES1324138-011	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	200	170	20.3	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	270	230	16.2	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3155624)									
ES1324235-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
ES1324436-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QC Lot: 3152169)									
ES1324138-001	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	1190	1560	26.8	0% - 50%
		EP071: >C34 - C40 Fraction	----	100	mg/kg	350	410	15.2	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 (%)*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QC Lot: 3152169) - continued									
ES1324138-001	Anonymous	EP071: >C10 - C16 Fraction	>C10_C16	50	mg/kg	<50	<50	0.0	No Limit
ES1324138-011	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	380	310	19.6	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	220	190	18.2	No Limit
		EP071: >C10 - C16 Fraction	>C10_C16	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QC Lot: 3155624)									
ES1324235-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
ES1324436-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080: BTEXN (QC Lot: 3155624)									
ES1324235-001	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
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
ES1324436-001	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
		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: 3155654)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	115	87	129
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	108	80	122
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	115	71	133
EG005T: Copper	7440-50-8	5	mg/kg	<5	32.0 mg/kg	114	86	128
EG005T: Lead	7439-92-1	5	mg/kg	<5	40.0 mg/kg	108	81	123
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55.0 mg/kg	118	84	130
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	114	81	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3155655)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	81.3	66	112
EK040S: Fluoride Soluble (QCLot: 3154259)								
EK040S: Fluoride	16984-48-8	1.0	mg/kg	<1	25.0 mg/kg	79.8	69	117
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3152170)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	4 mg/kg	87.0	80	124
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	4 mg/kg	91.7	77	123
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	4 mg/kg	91.0	79	123
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	4 mg/kg	94.4	77	123
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	4 mg/kg	95.2	79	123
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	4 mg/kg	94.7	79	123
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	4 mg/kg	98.2	79	123
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	4 mg/kg	101	79	125
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	4 mg/kg	94.7	73	121
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	4 mg/kg	94.6	81	123
EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	4 mg/kg	96.1	70	118
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	4 mg/kg	96.6	77	123
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	4 mg/kg	92.0	76	122
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	4 mg/kg	80.5	71	113
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	4 mg/kg	80.9	71.7	113
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	4 mg/kg	75.5	72.4	114
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3152169)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	101	71	131
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	97.3	74	138
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	83.9	64	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3155624)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	113	68.4	128

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
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3152169)								
EP071: >C10 - C16 Fraction	>C10_C16	50	mg/kg	<50	250 mg/kg	95.4	70	130
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	94.5	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----
		50	mg/kg	----	150 mg/kg	64.1	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3155624)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	111	68.4	128
EP080: BTEXN (QCLot: 3155624)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	# 119	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	105	62	128
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	87.6	58	118
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	87.6	60	120
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	87.5	60	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	88.3	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: 3155654)							
ES1324261-002	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	115	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	105	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	120	70	130
		EG005T: Copper	7440-50-8	125 mg/kg	118	70	130
		EG005T: Lead	7439-92-1	125 mg/kg	108	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	89.8	70	130
		EG005T: Zinc	7440-66-6	125 mg/kg	101	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3155655)							
ES1324261-002	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	96.1	70	130
EK040S: Fluoride Soluble (QCLot: 3154259)							
ES1324140-019	Anonymous	EK040S: Fluoride	16984-48-8	25.0 mg/kg	86.4	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3152170)							
ES1324138-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	82.1	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	109	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
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3152169)							
ES1324138-001	Anonymous	EP071: C10 - C14 Fraction	----	640 mg/kg	82.9	73	137
		EP071: C15 - C28 Fraction	----	3140 mg/kg	89.4	53	131
		EP071: C29 - C36 Fraction	----	2860 mg/kg	71.1	52	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3155624)							
ES1324235-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	97.3	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3152169)							
ES1324138-001	Anonymous	EP071: >C10 - C16 Fraction	>C10_C16	850 mg/kg	106	73	137
		EP071: >C16 - C34 Fraction	----	4800 mg/kg	79.5	53	131
		EP071: >C34 - C40 Fraction	----	2400 mg/kg	57.8	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3155624)							
ES1324235-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	94.2	70	130
EP080: BTEXN (QCLot: 3155624)							
ES1324235-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	74.7	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	90.8	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	79.8	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	80.2	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	84.1	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	# 69.5	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: 3152169)										
ES1324138-001	Anonymous	EP071: C10 - C14 Fraction	----	640 mg/kg	82.9	----	73	137	----	----
		EP071: C15 - C28 Fraction	----	3140 mg/kg	89.4	----	53	131	----	----
		EP071: C29 - C36 Fraction	----	2860 mg/kg	71.1	----	52	132	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3152169)										
ES1324138-001	Anonymous	EP071: >C10 - C16 Fraction	>C10_C16	850 mg/kg	106	----	73	137	----	----
		EP071: >C16 - C34 Fraction	----	4800 mg/kg	79.5	----	53	131	----	----
		EP071: >C34 - C40 Fraction	----	2400 mg/kg	57.8	----	52	132	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3152170)										
ES1324138-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	82.1	----	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
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3152170) - continued										
ES1324138-001	Anonymous	EP075(SIM): Pyrene	129-00-0	10 mg/kg	109	----	70	130	----	----
EK040S: Fluoride Soluble (QCLot: 3154259)										
ES1324140-019	Anonymous	EK040S: Fluoride	16984-48-8	25.0 mg/kg	86.4	----	70	130	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3155624)										
ES1324235-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	97.3	----	70	130	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3155624)										
ES1324235-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	94.2	----	70	130	----	----
EP080: BTEXN (QCLot: 3155624)										
ES1324235-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	74.7	----	70	130	----	----
		EP080: Toluene	108-88-3	2.5 mg/kg	90.8	----	70	130	----	----
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	79.8	----	70	130	----	----
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	80.2	----	70	130	----	----
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	84.1	----	70	130	----	----
		EP080: Naphthalene	91-20-3	2.5 mg/kg	# 69.5	----	70	130	----	----
EG005T: Total Metals by ICP-AES (QCLot: 3155654)										
ES1324261-002	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	115	----	70	130	----	----
		EG005T: Cadmium	7440-43-9	50 mg/kg	105	----	70	130	----	----
		EG005T: Chromium	7440-47-3	50 mg/kg	120	----	70	130	----	----
		EG005T: Copper	7440-50-8	125 mg/kg	118	----	70	130	----	----
		EG005T: Lead	7439-92-1	125 mg/kg	108	----	70	130	----	----
		EG005T: Nickel	7440-02-0	50 mg/kg	89.8	----	70	130	----	----
		EG005T: Zinc	7440-66-6	125 mg/kg	101	----	70	130	----	----
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3155655)										
ES1324261-002	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	96.1	----	70	130	----	----

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **ES1324308**	Page	: 1 of 6
Client	: ENVIRON AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MR STEVE CADMAN	Contact	: Client Services
Address	: PO BOX 560 NORTH SYDNEY NSW, AUSTRALIA 2060	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: scadman@environcorp.com	E-mail	: sydney@alsglobal.com
Telephone	: +61 02 99548114	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: HYDRO BUFFER ZONE	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 08-NOV-2013
Sampler	: STEVE CADMAN	Issue Date	: 18-NOV-2013
Order number	: AS130348		
		No. of samples received	: 22
Quote number	: SY/446/12	No. of samples analysed	: 22

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							
Snap Lock Bag (EA055-103)							
EMP-10-SF1, EMP-10-SF2, EMP-10-SF3, EMP10-QA1	**05-NOV-2013**	**----**	----	----	**12-NOV-2013**	19-NOV-2013	✓
Snap Lock Bag (EA055-103)							
EMP-10-SF4, EMP-10-SF5, EMP-10-SF6, EMP-10-SF7, EMP-10-SF8, EMP-10-SF9, EMP-10-SF10, EMP10-QA2	**06-NOV-2013**	**----**	----	----	**12-NOV-2013**	20-NOV-2013	✓
Soil Glass Jar - Unpreserved (EA055-103)							
EMP10-S15	**06-NOV-2013**	**----**	----	----	**12-NOV-2013**	20-NOV-2013	✓
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples							
Snap Lock Bag (EA200)							
EMP10-ID11, EMP10-S12, EMP10-ID13, EMP10-S14, EMP10-S15, EMP10-ID16, EMP10-S17, EMP10-ID18, EMP10-S19	**06-NOV-2013**	**---**	05-MAY-2014	----	**16-NOV-2013**	15-MAY-2014	✓
Snap Lock Bag (EA200)							
EMP2-ID10	**31-OCT-2013**	**---**	29-APR-2014	----	**16-NOV-2013**	15-MAY-2014	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
EMP10-S15	**06-NOV-2013**	**13-NOV-2013**	05-MAY-2014	✓	**13-NOV-2013**	05-MAY-2014	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
EMP10-S15	**06-NOV-2013**	**13-NOV-2013**	04-DEC-2013	✓	**14-NOV-2013**	04-DEC-2013	✓

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
EK040: Fluoride							
Snap Lock Bag (EK040S)							
EMP-10-SF1, EMP-10-SF2, EMP-10-SF3, EMP10-QA1	**05-NOV-2013**	**12-NOV-2013**	12-NOV-2013	✓	**14-NOV-2013**	10-DEC-2013	✓
Snap Lock Bag (EK040S)							
EMP-10-SF4, EMP-10-SF5, EMP-10-SF6, EMP-10-SF7, EMP-10-SF8, EMP-10-SF9, EMP-10-SF10, EMP10-QA2	**06-NOV-2013**	**12-NOV-2013**	13-NOV-2013	✓	**14-NOV-2013**	10-DEC-2013	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013							
Soil Glass Jar - Unpreserved (EP071)							
EMP10-S15	**06-NOV-2013**	**13-NOV-2013**	20-NOV-2013	✓	**14-NOV-2013**	23-DEC-2013	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM))							
EMP10-S15	**06-NOV-2013**	**13-NOV-2013**	20-NOV-2013	✓	**14-NOV-2013**	23-DEC-2013	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
EMP10-S15	**06-NOV-2013**	**13-NOV-2013**	20-NOV-2013	✓	**14-NOV-2013**	20-NOV-2013	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013							
Soil Glass Jar - Unpreserved (EP080)							
EMP10-S15	**06-NOV-2013**	**13-NOV-2013**	20-NOV-2013	✓	**14-NOV-2013**	20-NOV-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	17	**11.8**	**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
PAH/Phenols (SIM)	EP075(SIM)	2	20	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	2	17	**11.8**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	2	18	**11.1**	**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	14	**14.3**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Fluoride - Soluble	EK040S	1	17	**5.9**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (SIM)	EP075(SIM)	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	17	**5.9**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	18	**5.6**	**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	14	**7.1**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Fluoride - Soluble	EK040S	1	17	**5.9**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (SIM)	EP075(SIM)	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	17	**5.9**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	18	**5.6**	**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	14	**7.1**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Fluoride - Soluble	EK040S	1	17	**5.9**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (SIM)	EP075(SIM)	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	17	**5.9**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	18	**5.6**	**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	14	**7.1**	**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
Asbestos - Quantitative Analysis	* EA200Q	SOIL	Asbestos Materials Content with Confirmation of Identification by AS 4964 - 2004 Asbestos
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)
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.
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
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.
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 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

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	ES1324138-001	Anonymous	**Sum of polycyclic aromatic hydrocarbons**	----	35.2 %	0-20%	**RPD exceeds LOR based limits**
Laboratory Control Spike (LCS) Recoveries							
EP080: BTEXN	3765113-002	----	**Benzene**	71-43-2	119 %	62-116%	**Recovery greater than upper control limit**
Matrix Spike (MS) Recoveries							
EP080: BTEXN	ES1324235-001	Anonymous	**Naphthalene**	91-20-3	69.5 %	70-130%	**Recovery less than lower data quality objective**

- **For all matrices, no Method Blank value 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.**

1/2

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

CLIENT: Environ Australia	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 PROJECT NO.:	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: 4962 5444		OF: 1 (2) 3 4 5 6 7	Other comment:
SAMPLER: Steve Cadman SAMPLER MOBILE: 0423 583 538	RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:
COC Emailed to ALS? (YES / NO) EDD FORMAT (or default):	DATE/TIME: 8/11/13	DATE/TIME: 8/11/13 1120	DATE/TIME: 8/11/13 1702
Email Reports to (will default to PM if no other addresses are listed): scadman@environcorp.com			RECEIVED BY: Sep
Email Invoice to (will default to PM if no other addresses are listed): scadman@environcorp.com			DATE/TIME: 8/11/13 1910

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Asbestos or CT

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	Soluble Fluoride								Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	EMP10-SF1	5/11/2013	S	Pulp Bag	1	✓								
	EMP10-SF2	5/11/2013	S	Pulp Bag	1	✓								
	EMP10-SF3	5/11/2013	S	Pulp Bag	1	✓								
	EMP10-SF4	6/11/2013	S	Pulp Bag	1	✓								
	EMP10-SF5	6/11/2013	S	Pulp Bag	1	✓								
	EMP10-SF6	6/11/2013	S	Pulp Bag	1	✓								
	EMP10-SF7	6/11/2013	S	Pulp Bag	1	✓								
	EMP10-SF8	6/11/2013	S	Pulp Bag	1	✓								
	EMP10-SF9	6/11/2013	S	Pulp Bag	1	✓								
	EMP10-SF10	6/11/2013	S	Pulp Bag	1	✓								
	EMP10-QA1	5/11/2013	S	Pulp Bag	1	✓								
	EMP10-QA2	6/11/2013	S	Pulp Bag	1	✓								
				TOTAL	12									

Environmental Division
Sydney
Work Order
ES1324308

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.

CERTIFICATE OF ANALYSIS

Work Order	: **ES1405848**	Page	: 1 of 7
Client	: **ENVIRON AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: STEVE CADMAN	Contact	: Client Services
Address	: Eastpoint Complex | Suite 19B, Level 2 50 Glebe Road | PO Box 435 | The Junction NSW 2291	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: scadman@environcorp.com	E-mail	: sydney@alsglobal.com
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: AS130348 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	: 20-MAR-2014
Sampler	: KW/SC	Issue Date	: 28-MAR-2014
Site	: ----		
		No. of samples received	: 1
Quote number	: SY/433/13	No. of samples analysed	: 1

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

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

- **Total PAH reported as the sum of Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benz(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene and Benzo(g,h,i)perylene.**

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
Alison Graham	Supervisor - Inorganic	Newcastle - Inorganics
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Sanjeshni Jyoti Mala	Senior Chemist Volatile	Sydney Organics

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	P10 SW1	----	----	----	----
			Client sampling date / time	19-MAR-2014 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1405848-001	----	----	----	----
EA005: pH								
pH Value	----	0.01	pH Unit	**8.08**	----	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**845**	----	----	----	----
EA075: Redox Potential								
Redox Potential	----	0.1	mV	**234**	----	----	----	----
pH Redox	----	0.01	pH Unit	**7.6**	----	----	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	1	µg/L	**1**	----	----	----	----
Cadmium	7440-43-9	0.1	µg/L	<0.1	----	----	----	----
Chromium	7440-47-3	1	µg/L	**2**	----	----	----	----
Copper	7440-50-8	1	µg/L	<1	----	----	----	----
Nickel	7440-02-0	1	µg/L	**1**	----	----	----	----
Lead	7439-92-1	1	µg/L	<1	----	----	----	----
Zinc	7440-66-6	5	µg/L	**5**	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	µg/L	<0.1	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L	<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L	<20	----	----	----	----
>C10 - C16 Fraction	>C10_C16	100	µg/L	<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L	<100	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L	<100	----	----	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	P10 SW1	----	----	----	----
			Client sampling date / time	19-MAR-2014 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1405848-001	----	----	----	----
EP080: BTEXN - Continued								
Toluene	108-88-3	2	µg/L	<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----
^ **Total Xylenes**	1330-20-7	2	µg/L	<2	----	----	----	----
^ **Sum of BTEX**	----	1	µg/L	<1	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	----	----
EP130A: Organophosphorus Pesticides (Ultra-trace)								
Bromophos-ethyl	4824-78-6	0.10	µg/L	<0.10	----	----	----	----
Carbophenothion	786-19-6	0.10	µg/L	<0.10	----	----	----	----
Chlorfenvinphos (Z)	18708-87-7	0.10	µg/L	<0.10	----	----	----	----
Chlorpyrifos	2921-88-2	0.05	µg/L	<0.05	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.10	µg/L	<0.10	----	----	----	----
Demeton-S-methyl	919-86-8	0.10	µg/L	<0.10	----	----	----	----
Diazinon	333-41-5	0.10	µg/L	<0.10	----	----	----	----
Dichlorvos	62-73-7	0.10	µg/L	<0.10	----	----	----	----
Dimethoate	60-51-5	0.10	µg/L	<0.10	----	----	----	----
Ethion	563-12-2	0.10	µg/L	<0.10	----	----	----	----
Fenamiphos	22224-92-6	0.10	µg/L	<0.10	----	----	----	----
Fenthion	55-38-9	0.10	µg/L	<0.10	----	----	----	----
Malathion	121-75-5	0.10	µg/L	<0.10	----	----	----	----
Azinphos Methyl	86-50-0	0.10	µg/L	<0.10	----	----	----	----
Monocrotophos	6923-22-4	0.10	µg/L	<0.10	----	----	----	----
Parathion	56-38-2	0.10	µg/L	<0.10	----	----	----	----
Parathion-methyl	298-00-0	0.10	µg/L	<0.10	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.10	µg/L	<0.10	----	----	----	----
Prothiofos	34643-46-4	0.10	µg/L	<0.10	----	----	----	----
EP131A: Organochlorine Pesticides								
Aldrin	309-00-2	0.010	µg/L	<0.010	----	----	----	----
alpha-BHC	319-84-6	0.010	µg/L	<0.010	----	----	----	----
beta-BHC	319-85-7	0.010	µg/L	<0.010	----	----	----	----
delta-BHC	319-86-8	0.010	µg/L	<0.010	----	----	----	----
4.4`-DDD	72-54-8	0.010	µg/L	<0.010	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	P10 SW1	----	----	----	----
				Client sampling date / time	19-MAR-2014 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1405848-001	----	----	----	----
EP131A: Organochlorine Pesticides - Continued									
4.4`-DDE	72-55-9	0.010	µg/L		<0.010	----	----	----	----
4.4`-DDT	50-29-3	0.010	µg/L		<0.010	----	----	----	----
^ Sum of DDD + DDE + DDT	----	0.010	µg/L		<0.010	----	----	----	----
Dieldrin	60-57-1	0.010	µg/L		<0.010	----	----	----	----
alpha-Endosulfan	959-98-8	0.010	µg/L		<0.010	----	----	----	----
beta-Endosulfan	33213-65-9	0.010	µg/L		<0.010	----	----	----	----
Endosulfan sulfate	1031-07-8	0.010	µg/L		<0.010	----	----	----	----
^ Endosulfan (sum)	115-29-7	0.010	µg/L		<0.010	----	----	----	----
Endrin	72-20-8	0.010	µg/L		<0.010	----	----	----	----
Endrin aldehyde	7421-93-4	0.010	µg/L		<0.010	----	----	----	----
Endrin ketone	53494-70-5	0.010	µg/L		<0.010	----	----	----	----
Heptachlor	76-44-8	0.005	µg/L		<0.005	----	----	----	----
Heptachlor epoxide	1024-57-3	0.010	µg/L		<0.010	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.010	µg/L		<0.010	----	----	----	----
gamma-BHC	58-89-9	0.010	µg/L		<0.010	----	----	----	----
Methoxychlor	72-43-5	0.010	µg/L		<0.010	----	----	----	----
cis-Chlordane	5103-71-9	0.010	µg/L		<0.010	----	----	----	----
trans-Chlordane	5103-74-2	0.010	µg/L		<0.010	----	----	----	----
^ Total Chlordane (sum)	----	0.010	µg/L		<0.010	----	----	----	----
Oxychlordane	27304-13-8	0.010	µg/L		<0.010	----	----	----	----
EP132B: Polynuclear Aromatic Hydrocarbons									
3-Methylcholanthrene	56-49-5	0.1	µg/L		<0.1	----	----	----	----
2-Methylnaphthalene	91-57-6	0.1	µg/L		<0.1	----	----	----	----
7.12-Dimethylbenz(a)anthracene	57-97-6	0.1	µg/L		<0.1	----	----	----	----
Acenaphthene	83-32-9	0.1	µg/L		<0.1	----	----	----	----
Acenaphthylene	208-96-8	0.1	µg/L		<0.1	----	----	----	----
Anthracene	120-12-7	0.1	µg/L		<0.1	----	----	----	----
Benz(a)anthracene	56-55-3	0.1	µg/L		<0.1	----	----	----	----
Benzo(a)pyrene	50-32-8	0.05	µg/L		<0.05	----	----	----	----
Benzo(b)fluoranthene	205-99-2	0.1	µg/L		<0.1	----	----	----	----
Benzo(e)pyrene	192-97-2	0.1	µg/L		<0.1	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.1	µg/L		<0.1	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.1	µg/L		<0.1	----	----	----	----
Chrysene	218-01-9	0.1	µg/L		<0.1	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	P10 SW1	----	----	----	----
				Client sampling date / time	19-MAR-2014 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1405848-001	----	----	----	----
EP132B: Polynuclear Aromatic Hydrocarbons - Continued									
Coronene	191-07-1	0.1	µg/L		<0.1	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.1	µg/L		<0.1	----	----	----	----
Fluoranthene	206-44-0	0.1	µg/L		<0.1	----	----	----	----
Fluorene	86-73-7	0.1	µg/L		<0.1	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.1	µg/L		<0.1	----	----	----	----
N-2-Fluorenyl Acetamide	53-96-3	0.1	µg/L		<0.1	----	----	----	----
Naphthalene	91-20-3	0.1	µg/L		<0.1	----	----	----	----
Perylene	198-55-0	0.1	µg/L		<0.1	----	----	----	----
Phenanthrene	85-01-8	0.1	µg/L		<0.1	----	----	----	----
Pyrene	129-00-0	0.1	µg/L		<0.1	----	----	----	----
^ Sum of PAHs	----	0.05	µg/L		<0.05	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.05	µg/L		<0.05	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		**97.1**	----	----	----	----
Toluene-D8	2037-26-5	0.1	%		**92.0**	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%		**86.3**	----	----	----	----
EP130S: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.1	%		**70.8**	----	----	----	----
EP131S: OC Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.1	%		**81.9**	----	----	----	----
EP132T: Base/Neutral Extractable Surrogates									
2-Fluorobiphenyl	321-60-8	0.1	%		**78.5**	----	----	----	----
Anthracene-d10	1719-06-8	0.1	%		**70.1**	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%		**76.6**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	Recovery Limits (%) High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP130S: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	32	136.4
EP131S: OC Pesticide Surrogate			
Dibromo-DDE	21655-73-2	13.9	166
EP132T: Base/Neutral Extractable Surrogates			
2-Fluorobiphenyl	321-60-8	43	135
Anthracene-d10	1719-06-8	48	138
4-Terphenyl-d14	1718-51-0	48	144

QUALITY CONTROL REPORT

Work Order	: **ES1405848**	Page	: 1 of 9
Client	: **ENVIRON AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: STEVE CADMAN	Contact	: Client Services
Address	: Eastpoint Complex | Suite 19B, Level 2 50 Glebe Road | PO Box 435 | The Junction NSW 2291	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: scadman@environcorp.com	E-mail	: sydney@alsglobal.com
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: AS130348 HYDRO BUFFER ZONE INVESTIGATION	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 20-MAR-2014
Sampler	: KW/SC	Issue Date	: 28-MAR-2014
Order number	: AS130348		
		No. of samples received	: 1
Quote number	: SY/433/13	No. of samples analysed	: 1

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

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

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
Alison Graham	Supervisor - Inorganic	Newcastle - Inorganics
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Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Sanjeshni Jyoti Mala	Senior Chemist Volatile	Sydney Organics

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: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005: pH (QC Lot: 3351497)									
EN1400946-001	Anonymous	EA005: pH Value	----	0.01	pH Unit	7.68	7.69	0.1	0% - 20%
EN1400956-001	Anonymous	EA005: pH Value	----	0.01	pH Unit	8.19	8.22	0.4	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 3352172)									
ES1405863-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	5160	5100	1.0	0% - 20%
ES1405863-002	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	10500	10500	0.1	0% - 20%
EA075: Redox Potential (QC Lot: 3352152)									
ES1405848-001	P10 SW1	EA075: Redox Potential	----	0.1	mV	234	234	0.0	0% - 20%
		EA075: pH Redox	----	0.01	pH Unit	7.6	7.6	0.0	0% - 20%
ES1406102-013	Anonymous	EA075: Redox Potential	----	0.1	mV	152	152	0.0	0% - 20%
		EA075: pH Redox	----	0.01	pH Unit	7.2	7.2	0.0	0% - 20%
EG020T: Total Metals by ICP-MS (QC Lot: 3354507)									
ES1405848-001	P10 SW1	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.001	0.002	50.4	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.002	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.001	0.002	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.005	<0.005	0.0	No Limit
ES1406048-006	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.006	0.008	26.6	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.001	0.002	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.003	100	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.002	0.003	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3351283)									
ES1405848-001	P10 SW1	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
ES1405963-007	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3354735)									
ES1405940-007	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
ES1405950-003	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	30	40	40.7	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QC Lot: 3354735)									
ES1405940-007	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
ES1405950-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	30	50	40.5	No Limit
EP080: BTEXN (QC Lot: 3354735)									

Sub-Matrix: **WATER**

				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: 3354735) - continued									
ES1405940-007	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
ES1405950-003	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	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: **WATER**

				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
EA010P: Conductivity by PC Titrator (QCLot: 3352172)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	104	95	113
EA075: Redox Potential (QCLot: 3352152)								
EA075: Redox Potential	----	0.1	mV	----	86 mV	99.6	95	112
EG020T: Total Metals by ICP-MS (QCLot: 3354507)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	102	79	121
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	104	82	114
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.8	83	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	100	83	117
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	109	85	115
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.9	83	117
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	91.6	76	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3351283)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.010 mg/L	107	77	115
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3351634)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	102	59	129
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	95.1	71	131
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	97.3	62	120
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3354735)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	91.4	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3351634)								
EP071: >C10 - C16 Fraction	>C10_C16	100	µg/L	<100	2500 µg/L	90.0	58.9	131
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	96.2	73.9	138
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
		50	µg/L	----	1500 µg/L	99.3	67	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3354735)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	92.4	75	127
EP080: BTEXN (QCLot: 3354735)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	116	70	124
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	90.7	65	129
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	98.8	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	93.1	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	101	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	107	70	124

Sub-Matrix: **WATER**

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
EP130A: Organophosphorus Pesticides (Ultra-trace) (QCLot: 3354543)								
EP130: Bromophos-ethyl	4824-78-6	0.10	µg/L	<0.10	1.0 µg/L	76.4	53	127
EP130: Carbophenothion	786-19-6	0.10	µg/L	<0.10	1.0 µg/L	97.4	61	127
EP130: Chlorfenvinphos (Z)	18708-87-7	0.10	µg/L	<0.10	1.0 µg/L	77.2	64	136
EP130: Chlorpyrifos	2921-88-2	0.05	µg/L	<0.05	1.0 µg/L	75.8	54	134
EP130: Chlorpyrifos-methyl	5598-13-0	0.10	µg/L	<0.10	1.0 µg/L	103	55	127
EP130: Demeton-S-methyl	919-86-8	0.10	µg/L	<0.10	1.0 µg/L	80.4	47	137
EP130: Diazinon	333-41-5	0.10	µg/L	<0.10	1.0 µg/L	97.8	60	116
EP130: Dichlorvos	62-73-7	0.10	µg/L	<0.10	1.0 µg/L	75.2	43	121
EP130: Dimethoate	60-51-5	0.10	µg/L	<0.10	1.0 µg/L	93.9	58	128
EP130: Ethion	563-12-2	0.10	µg/L	<0.10	1.0 µg/L	70.1	59	125
EP130: Fenamiphos	22224-92-6	0.10	µg/L	<0.10	1.0 µg/L	70.9	51	137
EP130: Fenthion	55-38-9	0.10	µg/L	<0.10	1.0 µg/L	87.2	56	132
EP130: Malathion	121-75-5	0.10	µg/L	<0.10	1.0 µg/L	88.7	65	137
EP130: Azinphos Methyl	86-50-0	0.10	µg/L	<0.10	1.0 µg/L	74.8	41	149
EP130: Monocrotophos	6923-22-4	0.10	µg/L	<0.10	1.0 µg/L	18.2	12.1	86.3
EP130: Parathion	56-38-2	0.10	µg/L	<0.10	1.0 µg/L	88.5	61	139
EP130: Parathion-methyl	298-00-0	0.10	µg/L	<0.10	1.0 µg/L	101	57	139
EP130: Pirimphos-ethyl	23505-41-1	0.10	µg/L	<0.10	1.0 µg/L	75.6	52	128
EP130: Prothiofos	34643-46-4	0.10	µg/L	<0.10	1.0 µg/L	72.0	56	128
EP131A: Organochlorine Pesticides (QCLot: 3354542)								
EP131A: Aldrin	309-00-2	0.001	µg/L	----	0.1 µg/L	103	34	150
		0.01	µg/L	<0.010	----	----	----	----
EP131A: alpha-BHC	319-84-6	0.001	µg/L	----	0.1 µg/L	96.9	27.2	161
		0.01	µg/L	<0.010	----	----	----	----
EP131A: beta-BHC	319-85-7	0.001	µg/L	----	0.1 µg/L	105	28.6	149
		0.01	µg/L	<0.010	----	----	----	----
EP131A: delta-BHC	319-86-8	0.001	µg/L	----	0.1 µg/L	94.8	36	150
		0.01	µg/L	<0.010	----	----	----	----
EP131A: 4.4`-DDD	72-54-8	0.001	µg/L	----	0.1 µg/L	125	36	156
		0.01	µg/L	<0.010	----	----	----	----
EP131A: 4.4`-DDE	72-55-9	0.001	µg/L	----	0.1 µg/L	88.1	30.4	124
		0.01	µg/L	<0.010	----	----	----	----
EP131A: 4.4`-DDT	50-29-3	0.001	µg/L	----	0.1 µg/L	104	29.5	165
		0.01	µg/L	<0.010	----	----	----	----
EP131A: Dieldrin	60-57-1	0.001	µg/L	----	0.1 µg/L	95.0	28.1	142
		0.01	µg/L	<0.010	----	----	----	----
EP131A: alpha-Endosulfan	959-98-8	0.001	µg/L	----	0.1 µg/L	90.1	34	144
		0.01	µg/L	<0.010	----	----	----	----
EP131A: beta-Endosulfan	33213-65-9	0.001	µg/L	----	0.1 µg/L	101	31.6	140
		0.01	µg/L	<0.010	----	----	----	----

Sub-Matrix: **WATER**

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
EP131A: Organochlorine Pesticides (QCLot: 3354542) - continued								
EP131A: Endosulfan sulfate	1031-07-8	0.001	µg/L	----	0.1 µg/L	96.2	35	163
		0.01	µg/L	<0.010	----	----	----	----
EP131A: Endrin	72-20-8	0.001	µg/L	----	0.1 µg/L	124	21.5	165
		0.01	µg/L	<0.010	----	----	----	----
EP131A: Endosulfan (sum)	115-29-7	0.01	µg/L	<0.010	----	----	----	----
EP131A: Endrin aldehyde	7421-93-4	0.001	µg/L	----	0.1 µg/L	69.7	22.7	123
		0.01	µg/L	<0.010	----	----	----	----
EP131A: Endrin ketone	53494-70-5	0.001	µg/L	----	0.1 µg/L	61.6	16.3	146
		0.01	µg/L	<0.010	----	----	----	----
EP131A: Heptachlor	76-44-8	0.001	µg/L	----	0.1 µg/L	139	33	165
		0.005	µg/L	<0.005	----	----	----	----
EP131A: Heptachlor epoxide	1024-57-3	0.001	µg/L	----	0.1 µg/L	92.2	33	149
		0.01	µg/L	<0.010	----	----	----	----
EP131A: Hexachlorobenzene (HCB)	118-74-1	0.001	µg/L	----	0.1 µg/L	88.9	23.6	150
		0.01	µg/L	<0.010	----	----	----	----
EP131A: gamma-BHC	58-89-9	0.001	µg/L	----	0.1 µg/L	85.5	28.7	153
		0.01	µg/L	<0.010	----	----	----	----
EP131A: Methoxychlor	72-43-5	0.001	µg/L	----	0.1 µg/L	81.4	29.5	166
		0.01	µg/L	<0.010	----	----	----	----
EP131A: cis-Chlordane	5103-71-9	0.001	µg/L	----	0.1 µg/L	101	27	139
		0.01	µg/L	<0.010	----	----	----	----
EP131A: trans-Chlordane	5103-74-2	0.001	µg/L	----	0.1 µg/L	63.0	31.2	135
		0.01	µg/L	<0.010	----	----	----	----
EP131A: Total Chlordane (sum)	----	0.01	µg/L	<0.010	----	----	----	----
EP131A: Sum of DDD + DDE + DDT	----	0.01	µg/L	<0.010	----	----	----	----
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 3354549)								
EP132: 3-Methylcholanthrene	56-49-5	0.10	µg/L	<0.1	2 µg/L	71.9	60	120
EP132: 2-Methylnaphthalene	91-57-6	0.10	µg/L	<0.1	2 µg/L	88.7	59	123
EP132: 7.12-Dimethylbenz(a)anthracene	57-97-6	0.10	µg/L	<0.1	2 µg/L	121	12.3	156
EP132: Acenaphthene	83-32-9	0.10	µg/L	<0.1	2 µg/L	95.8	64	122
EP132: Acenaphthylene	208-96-8	0.10	µg/L	<0.1	2 µg/L	89.6	62	124
EP132: Anthracene	120-12-7	0.10	µg/L	<0.1	2 µg/L	82.7	66	124
EP132: Benz(a)anthracene	56-55-3	0.10	µg/L	<0.1	2 µg/L	98.2	64	130
EP132: Benzo(a)pyrene	50-32-8	0.05	µg/L	<0.05	2 µg/L	86.6	64	126
EP132: Benzo(b)fluoranthene	205-99-2	0.10	µg/L	<0.1	2 µg/L	106	62	126
EP132: Benzo(e)pyrene	192-97-2	0.10	µg/L	<0.1	2 µg/L	109	62	126
EP132: Benzo(g.h.i)perylene	191-24-2	0.10	µg/L	<0.1	2 µg/L	98.3	56	126
EP132: Benzo(k)fluoranthene	207-08-9	0.10	µg/L	<0.1	2 µg/L	101	63	127
EP132: Chrysene	218-01-9	0.10	µg/L	<0.1	2 µg/L	97.9	64	128
EP132: Coronene	191-07-1	0.10	µg/L	<0.1	2 µg/L	118	35	133

Sub-Matrix: **WATER**

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
EP132B: Polynuclear Aromatic Hydrocarbons (QCLot: 3354549) - continued								
EP132: Dibenz(a.h)anthracene	53-70-3	0.10	µg/L	<0.1	2 µg/L	96.6	58	128
EP132: Fluoranthene	206-44-0	0.10	µg/L	<0.1	2 µg/L	99.8	65	127
EP132: Fluorene	86-73-7	0.10	µg/L	<0.1	2 µg/L	100	64	124
EP132: Indeno(1.2.3.cd)pyrene	193-39-5	0.10	µg/L	<0.1	2 µg/L	93.2	57	127
EP132: N-2-Fluorenyl Acetamide	53-96-3	0.10	µg/L	<0.1	2 µg/L	105	53.6	131
EP132: Naphthalene	91-20-3	0.10	µg/L	<0.1	2 µg/L	62.9	60	124
EP132: Perylene	198-55-0	0.10	µg/L	<0.1	2 µg/L	105	64	124
EP132: Phenanthrene	85-01-8	0.10	µg/L	<0.1	2 µg/L	103	65	125
EP132: Pyrene	129-00-0	0.10	µg/L	<0.1	2 µg/L	102	66	128

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: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG020T: Total Metals by ICP-MS (QCLot: 3354507)							
ES1405879-016	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	99.4	70	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	107	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	110	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	95.5	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	128	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	104	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	91.0	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3351283)							
ES1405949-001	Anonymous	EG035T: Mercury	7439-97-6	0.010 mg/L	86.5	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3354735)							
ES1405940-007	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	123	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3354735)							
ES1405940-007	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	128	70	130
EP080: BTEXN (QCLot: 3354735)							
ES1405940-007	Anonymous	EP080: Benzene	71-43-2	25 µg/L	112	70	130
		EP080: Toluene	108-88-3	25 µg/L	102	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	107	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	103	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	112	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080: BTEXN (QCLot: 3354735) - continued							
ES1405940-007	Anonymous	EP080: Naphthalene	91-20-3	25 µg/L	116	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: **WATER**

				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
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3351283)										
ES1405949-001	Anonymous	EG035T: Mercury	7439-97-6	0.010 mg/L	86.5	----	70	130	----	----
EG020T: Total Metals by ICP-MS (QCLot: 3354507)										
ES1405879-016	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	99.4	----	70	130	----	----
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	107	----	70	130	----	----
		EG020A-T: Chromium	7440-47-3	1 mg/L	110	----	70	130	----	----
		EG020A-T: Copper	7440-50-8	1 mg/L	95.5	----	70	130	----	----
		EG020A-T: Lead	7439-92-1	1 mg/L	128	----	70	130	----	----
		EG020A-T: Nickel	7440-02-0	1 mg/L	104	----	70	130	----	----
		EG020A-T: Zinc	7440-66-6	1 mg/L	91.0	----	70	130	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3354735)										
ES1405940-007	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	123	----	70	130	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3354735)										
ES1405940-007	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	128	----	70	130	----	----
EP080: BTEXN (QCLot: 3354735)										
ES1405940-007	Anonymous	EP080: Benzene	71-43-2	25 µg/L	112	----	70	130	----	----
		EP080: Toluene	108-88-3	25 µg/L	102	----	70	130	----	----
		EP080: Ethylbenzene	100-41-4	25 µg/L	107	----	70	130	----	----
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	103	----	70	130	----	----
		EP080: ortho-Xylene	95-47-6	25 µg/L	112	----	70	130	----	----
		EP080: Naphthalene	91-20-3	25 µg/L	116	----	70	130	----	----

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **ES1405848**	Page	: 1 of 6
Client	: ENVIRON AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: STEVE CADMAN	Contact	: Client Services
Address	: Eastpoint Complex | Suite 19B, Level 2 50 Glebe Road | PO Box 435 | The Junction NSW 2291	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: scadman@environcorp.com	E-mail	: sydney@alsglobal.com
Telephone	: ----	Telephone	: +61-2-8784 8555
Facsimile	: ----	Facsimile	: +61-2-8784 8500
Project	: AS130348 HYDRO BUFFER ZONE INVESTIGATION	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 20-MAR-2014
Sampler	: KW/SC	Issue Date	: 28-MAR-2014
Order number	: AS130348		
		No. of samples received	: 1
Quote number	: SY/433/13	No. of samples analysed	: 1

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: **WATER**

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
EA005: pH							
Clear Plastic Bottle - Natural (EA005)							
P10 SW1	**19-MAR-2014**	**----**	----	----	**19-MAR-2014**	19-MAR-2014	✓
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P)							
P10 SW1	**19-MAR-2014**	**---**	16-APR-2014	----	**21-MAR-2014**	16-APR-2014	✓
EA075: Redox Potential							
Clear Plastic Bottle - Natural (EA075)							
P10 SW1	**19-MAR-2014**	**----**	----	----	**21-MAR-2014**	19-MAR-2014	×
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unspecified (EG020A-T)							
P10 SW1	**19-MAR-2014**	**24-MAR-2014**	15-SEP-2014	✓	**25-MAR-2014**	15-SEP-2014	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unspecified (EG035T)							
P10 SW1	**19-MAR-2014**	**----**	----	----	**21-MAR-2014**	16-APR-2014	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
P10 SW1	**19-MAR-2014**	**25-MAR-2014**	26-MAR-2014	✓	**26-MAR-2014**	04-MAY-2014	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
P10 SW1	**19-MAR-2014**	**24-MAR-2014**	02-APR-2014	✓	**24-MAR-2014**	02-APR-2014	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080)							
P10 SW1	**19-MAR-2014**	**24-MAR-2014**	02-APR-2014	✓	**24-MAR-2014**	02-APR-2014	✓
EP130A: Organophosphorus Pesticides (Ultra-trace)							
Amber Glass Bottle - Unpreserved (EP130)							
P10 SW1	**19-MAR-2014**	**24-MAR-2014**	26-MAR-2014	✓	**26-MAR-2014**	03-MAY-2014	✓
EP131A: Organochlorine Pesticides							
Amber Glass Bottle - Unpreserved (EP131A)							
P10 SW1	**19-MAR-2014**	**24-MAR-2014**	26-MAR-2014	✓	**26-MAR-2014**	03-MAY-2014	✓
EP132B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP132)							
P10 SW1	**19-MAR-2014**	**25-MAR-2014**	26-MAR-2014	✓	**26-MAR-2014**	04-MAY-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: **WATER**

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)							
Conductivity by PC Titrator	EA010-P	2	19	**10.5**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
pH	EA005	2	20	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Redox Potential	EA075	2	12	**16.7**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	2	20	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	2	16	**12.5**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	2	20	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Conductivity by PC Titrator	EA010-P	1	19	**5.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Organochlorine Pesticides (Ultra-trace)	EP131A	1	4	**25.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	1	2	**50.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Redox Potential	EA075	3	12	**25.0**	**15.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Semivolatile Compounds by GCMS(SIM - Ultra-trace)	EP132	1	2	**50.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	16	**6.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	18	**5.6**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Conductivity by PC Titrator	EA010-P	1	19	**5.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Organochlorine Pesticides (Ultra-trace)	EP131A	1	4	**25.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Organophosphorus Pesticides (Ultra-trace)	EP130	1	2	**50.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Semivolatile Compounds by GCMS(SIM - Ultra-trace)	EP132	1	2	**50.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	16	**6.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	18	**5.6**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Total Mercury by FIMS	EG035T	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	16	**6.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	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
pH	EA005	WATER	APHA 21st ed. 4500 H+ B. pH of water samples is determined by ISE either manually or by automated pH meter. This method is compliant with NEPM (2013) Schedule B(3)
Conductivity by PC Titrator	EA010-P	WATER	APHA 21st ed., 2510 B This procedure determines conductivity by automated ISE. This method is compliant with NEPM (2013) Schedule B(3)
Redox Potential	EA075	WATER	In House (Ion selective electrode)
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Mercury by FIMS	EG035T	WATER	AS 3550, APHA 21st ed. 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The 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)
TPH - Semivolatile Fraction	EP071	WATER	USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with NEPM (2013) Schedule B(3)
TPH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with NEPM (2013) Schedule B(3)
Organophosphorus Pesticides (Ultra-trace)	EP130	WATER	USEPA Method 3640 (GPC cleanup), 8141 (GC/FPD - Capillary Column) This method is compliant with NEPM (2013) Schedule B(3)
Organochlorine Pesticides (Ultra-trace)	EP131A	WATER	USEPA Method 3640 (GPC cleanup),3620 (Florisil), 8081/8082 (GC/uECD/uECD). This method is compliant with NEPM (2013) Schedule B(3)
Semivolatile Compounds by GCMS(SIM - Ultra-trace)	EP132	WATER	USEPA 3640 (GPC Cleanup), 8270 GCMS Capiliary column, SIM mode. This method is compliant with NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Digestion for Total Recoverable Metals	EN25	WATER	USEPA SW846-3005 Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.

Preparation Methods	Method	Matrix	Method Descriptions
Sep. Funnel Extraction /Acetylation of Phenolic Compounds	ORG14-AC	WATER	USEPA 3510 (Extraction)/ In-house (Acetylation): A 1L sample is extracted into dichloromethane and concentrated to 1 mL with echange into cyclohexane. Phenolic compounds are reacted with acetic anhydride to yield phenyl acetates suitable for ultra-trace analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Sep. Funnel Extraction of Liquids (Ultra-trace pesticides.)	ORG14-UTP	WATER	USEPA 3510 Samples are extracted into dichloromethane, concentrated and exchanged into an apporpriate solvent for GPC and florisil cleanup as required. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.

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.

Matrix: **WATER**

Method	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA075: Redox Potential						
Clear Plastic Bottle - Natural						
P10 SW1	----	----	----	21-MAR-2014	19-MAR-2014	**2**

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 10.

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 10 appear to includes dwellings, sheds and possible disturbance of land. These uses of Parcel 10 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 10 consistent with site observations?
- Has Parcel 10 been impacted by fluoride from dust deposition from the Hydro smelter?
- Has Parcel 10 been impacted by other contaminants from historical site use?
- Is Parcel 10 suitable for environmental conservation and low rural residential landuse?

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

The inputs required to make the above decisions are 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 10, as shown on Figure 1.

Vertical boundaries – as areas of concern at Parcel 10 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 10 for environmental conservation and low rural residential landuse, then an assessment of the suitability of Parcel 10 for environmental conservation and low rural residential 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 10 for environmental conservation and low rural residential 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 10.

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 design, which is included in Section 4.3. 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 B and C 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 B: QA/QC – Sampling and Analysis Methodology Assessment

Sampling Methodology	Methodology
Sampling Pattern and Locations	Surface soil sampling was undertaken around the edges of Parcel 10 to assess the impact of particulate fallout from Hydro Aluminium Smelter. One targeted sample was also collected from a small soil stockpile
Sampling Density	Ten soil samples were collected from an approximate grid across open areas of Parcel 10 which is approximately 35 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.
Sample depths	Surface soil samples were collected from a grid across the entire of Parcel 10 from surface soils. Soil samples from the stockpile were collected from 0.05m to 0.1m from within the stockpile.
Sample Collection Method	Surface soil samples across Parcel 10 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. Soil samples were collected into laboratory supplied, acid rinsed glass jars.
Decontamination Procedures	Surface soil samples across Parcel 10 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 sample collection and was brushed clean between sample locations.

Table B: QA/QC – Sampling and Analysis Methodology Assessment	
Sampling Methodology	**Methodology**
Sample handling and containers	All soil samples were placed into laboratory-supplied glass jars. Soil and water 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	No field equipment requiring calibration was used.
Sampling Logs	The lithology of surface soil samples was documented on the field information sheets, which are included in Appendix C.

Table C: QA/QC – Field and Lab Quality Assurance and Quality Control	
Field and Lab QA/QC	**ENVIRON Comments**
Field quality control samples	Intra-laboratory duplicate soil samples were analysed at a ratio of 1:10 for TPH, BTEX and PAHs analysed for the grid samples across the entire of Parcel 10. No rinsate blank samples were collected.
Field quality control results	Intra-laboratory duplicate results are presented in Table C. There were no RPD exceedences for the intra-laboratory duplicates collected for this assessment.
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 10 assessment criteria. PQLs for the surface water analytes were below Parcel 10 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

Table C: QA/QC – Field and Lab Quality Assurance and Quality Control	
Field and Lab QA/QC	**ENVIRON Comments**
	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 Audit

Hazardous Materials Audit
Parcel 10

Prepared for:
Hydro Aluminium Kurri Kurri Pty Limited

Prepared by:
ENVIRON Australia Pty Ltd

Date:
April 2015

Project Number:
AS130348

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VERSION CONTROL RECORD

Document File Name	**Date Issued**	**Version**	**Author**	**Reviewer**
Hydro Parcel 10 Draft Hazardous Materials Audit	20/04/15	Final	S Taylor	F Robinson

Contents

Acronyms and Abbreviations

ACM:	Asbestos containing material
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 10, 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 Parcel 10.

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 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 (LBP) 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 11 November 2013, 26 November 2013, 20 May 2014 and 26 March 2015 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 build 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 eight 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.

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 was visually identified during the surveys. The presence of lead-based paint and PCB were 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 contain hazardous materials, the locations and the reasons for 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 are 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 10				
1 Dawes Avenue	House	Brick Cement sheeting Timber Concrete Corrugated iron	Pre-1990	Ceiling and wall cavity
	Small shed	Concrete Corrugated iron Metal	Pre-1990	
	Large shed	Concrete Corrugated iron Metal	Post-1990	Shed interior
2 Dawes Avenue	House	Brick Cement sheeting Timber Concrete Corrugated iron	Pre-1990	Ceiling and wall cavity
	Shed	Corrugated Iron	Pre-1990	
4 Dawes Avenue	House	Cement sheeting (flat and corrugated) Timber Corrugated iron Brick Concrete	Pre-1990	Ceiling and wall cavity
	Garage	Cement sheeting (flat and corrugated) Timber Concrete	Pre-1990	

Table 1: Hazardous Materials Audit Building Details				
Property	**Building Type/s**	**Main Construction Materials**	**Estimated Pre or Post 1990 construction**	**Any Inaccessible Areas**
	Laundry	Cement sheeting (flat and corrugated) Timber Concrete Corrugated iron	Pre-1990	Ceiling and wall cavity
8 Dawes Avenue	House (including attached car awning)	Cement sheeting (flat and hardiplank) Timber Corrugated iron	Pre-1990	Ceiling and wall cavity
10 Dawes Avenue	House	Brick Timber Cement sheeting Plasterboard Concrete Tile roof	Pre-1990 (likely late 1980's)	Wall and ceiling cavity
	Shed	Brick Timber Cement sheeting Concrete Corrugated iron	Pre-1990 (likely late 1980's)	
	2 x Garages/ Carports	Timber Cement sheeting Concrete Corrugated iron	Post-1990	

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 Dawes Avenue: at various locations to the exterior and interior of the house.
- 2 Dawes Avenue: at various locations to the exterior and interior of the house.
- 4 Dawes Avenue: at various locations to the exterior and interior of the house, the adjoining shed, and the garage, as well as fragments in the soils around the house.
- 8 Dawes Avenue: at various locations to the exterior and interior of the house, as well as fragments in soils below the carport.

None were found at 10 Dawes Avenue.

Two samples were collected for laboratory analysis at 10 Dawes Avenue. The results confirmed asbestos was not present. Two samples were taken at 2 Dawes Avenue that confirmed the presence of asbestos.

The laboratory certificates are presented in Appendix C.

3.3 Synthetic Mineral Fibre Materials

SMF was observed at one location (potentially used in the large shed at 1 Dawes Avenue). However, the wall and ceiling cavities of some buildings could not be accessed, and there is potential that SMF was used as insulation to wall and ceiling cavities.

3.4 Polychlorinated Biphenyls

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

3.5 Lead Based Paint

Due to the expected age of most structures at 1, 2, 4 and 8 Dawes Avenue, lead based paint is likely to be 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:

- 4 Dawes Avenue (unoccupied) appeared to have a rabbit infestation beneath the house and parts of the yard, with numerous burrows present and rabbits observed.
- A number of large epoxy paint thinner containers and other containers (as well as various other wastes) were stored near the large shed at 1 Dawes Avenue without appropriate bunding or containment.

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 replaced. 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 confirmation of the presence of PCB and the subsequent 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 10

Appendix A

Photographs

Photo 1: Example of ACM sheeting (and damage) to exterior walls of 1 Dawes Avenue

Photo 2: ACM powerboard at 1 Dawes Avenue (note labelled as containing asbestos)

Photo 3: Example of ACM sheeting eaves and exterior walls to 1 Dawes Avenue

Photo 4: ACM sheeting to underside of awning to front door landing at 1 Dawes Avenue

Photo 5: Walls and ceiling to laundry at 1 Dawes Avenue

Photo 6: Part of the ACM sheeting of wall between second window and back door at 1 Dawes Avenue.

Photo 7: Section of the ACM sheeting walls to bathroom at 1 Dawes Avenue. Note mostly in good condition, some paint worn immediately above bath.

Photo 8: ACM sheeting walls to toilet. Holes have been drilled into wall behind toilet.

Photo 9: ACM backing board to power board in small shed at 1 Dawes Avenue

Photo 10: One of the fluorescent lights in the small shed at 1 Dawes Avenue

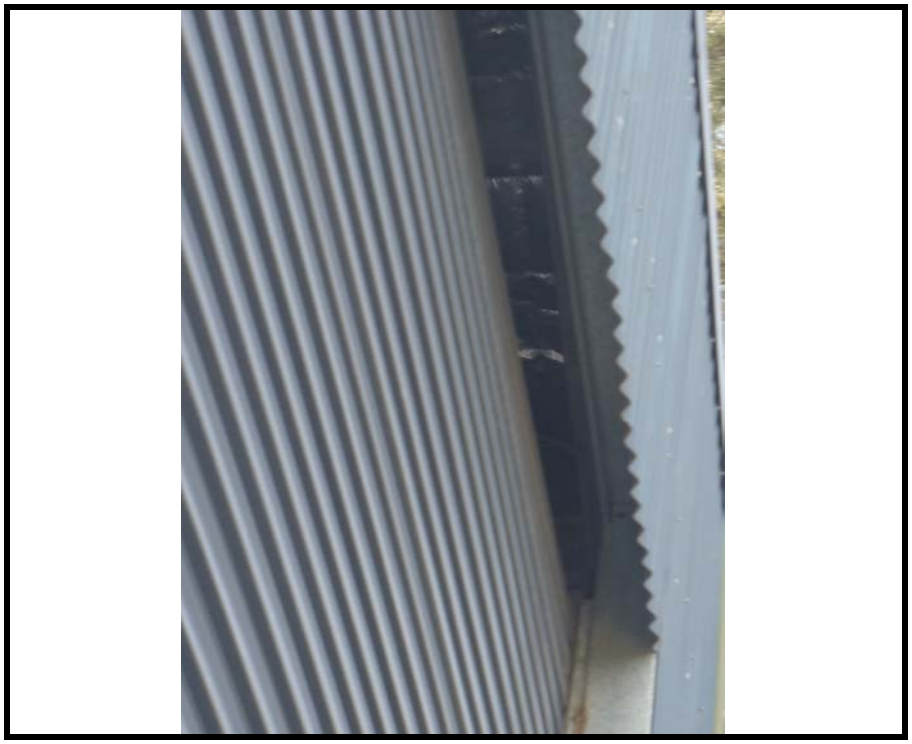


Photo 11: The metallic sheeting that is potentially lining SMF insulation to the roof of the large shed at 1 Dawes Avenue.

Photo 12: ACM sheeting lining the underside and side wall to the front awning of 2 Dawes Avenue

Photo 13: ACM sheeting used as flooring to the front awning of 2 Dawes Avenue

Photo 14: ACM sheeting used in eaves to 2 Dawes Avenue

Photo 15: ACM sheeting used in eaves to 2 Dawes Avenue

Photo 16: ACM sheeting used as infill panels below house at 2 Dawes Avenue (note: only this small section behind the tap)

Photo 17: Underside to undercover area at the rear of 2 Dawes Avenue.

Photo 18: ACM sheeting used in place of weatherboard sheeting at southeast side corner of 2 Dawes Avenue

Photo 19: An example of the ACM sheeting used in interior walls within 2 Dawes Avenue

Photo 20: ACM zelemite backing board to power box at 2 Dawes Avenue

Photo 21: The ACM sheeting gable end at 4 Dawes Avenue

Photo 22: ACM zelemite backing board to power box at 4 Dawes Avenue

Photo 23: ACM corrugated sheeting used on garage at 4 Dawes Avenue

Photo 24: ACM sheeting wall lining used on the garage at 4 Dawes Avenue

Photo 25: Exterior wall lining (including edge strips) to laundry/ shed at the rear of the house at 4 Dawes Avenue.

Photo 26: Interior wall lining to laundry/ shed at the rear of the house at 4 Dawes Avenue.

Photo 27: Walls and ceiling to the toilet/ shower room at 4 Dawes Avenue.

Photo 28: An example of the walls and ceiling in the back room of the house at 4 Dawes Avenue.

Photo 29: Part of the bathroom at 4 Dawes Avenue. Tiles (including those damaged on the bath) are attached to ACM sheeting.

Photo 30: An example of the ACM sheeting in the lounge room and bedroom of 4 Dawes Avenue.

Photo 31: Some of the fragments on the ground near the house at 4 Dawes Avenue

Photo 32: A photo showing the ACM zelemite board to the power box, some of the ACM sheeting boards and the ACM sheeting on the underside of the awning at 8 Dawes Avenue.

Photo 33: An example of the ACM sheeting boards used on the exterior of 8 Dawes Avenue.

Photo 34: A photo showing a section of the eaves to 8 Dawes Avenue, including the small section that is masonite (the remainder is ACM)..

Photo 35: Section of ACM wall lining (lower section) to bathroom.

Appendix B

Hazardous Materials Register

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).

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/ Type of ABM
20/05/2014	Parcel 10	1 Dawes Avenue	House	ACM	Sheeting	Exterior walls to all sides (inc corner and edge moulding)	Most is fair, painted but some sections damaged with holes	Ground level - 3m height	200m2	1 and 3	Field	ACM
20/05/2014	Parcel 10	1 Dawes Avenue	House	ACM	Zelemite	Backing board to power box	Drilled holes	In box, 1.7m height	1m2	2	Not required - labelled as containing asbestos	ACM
20/05/2014	Parcel 10	1 Dawes Avenue	House	ACM	Sheeting	Eaves to all sides	Good, painted	3m above ground level	50m2	3	Assumed	ACM
20/05/2014	Parcel 10	1 Dawes Avenue	House	ACM	Sheeting	Underside to front landing awning	Good, painted	2m above ground level	2m2	4	Assumed	ACM
20/05/2014	Parcel 10	1 Dawes Avenue	House	ACM	Sheeting	Walls and ceiling to laundry and shower	Good, painted	Ground level - 2.4m high	20m2	5	Assumed	ACM
20/05/2014	Parcel 10	1 Dawes Avenue	House	ACM	Sheeting	Walls to kitchen between doorway and 2nd window	Good, painted	Ground level - 2.4m high	15m2	6	Assumed	ACM
20/05/2014	Parcel 10	1 Dawes Avenue	House	ACM	Sheeting	Walls and ceiling to bathroom	Fair - mostly painted, some worn paint and some cracks	Ground level - 2.4m high	15m2	7	Assumed	ACM
20/05/2014	Parcel 10	1 Dawes Avenue	House	ACM	Sheeting	Walls and ceiling to toilet room	Fair, painted but drilled holes	Ground level - 2.4m high	10m2	8	Field	ACM
20/05/2014	Parcel 10	1 Dawes Avenue	Small Shed	ACM	Zelemite	Powerboard in box inside the shed	Fair - drilled holes have been sealed	1.5m above ground level	1m2	9	Field	ACM
20/05/2014	Parcel 10	1 Dawes Avenue	Small Shed	PCB	PCB	Fluorescent lights in shed	Good	4m above ground level	1	10	Assumed	PCB
20/05/2014	Parcel 10	1 Dawes Avenue	Large Shed	SMF	Insulation	Insulation to underside of roof (potential)	Only a small seciton visible, metallic lining visible appeared in good condition	6m above ground level	300m2	11	Field	SMF
26/11/2013	Parcel 10	2 Dawes Avenue	House	ACM	Sheet	Underside to awning of front verandah	Good, painted with no damage	Within reach	20m2	12	Field	ACM
26/11/2013	Parcel 10	2 Dawes Avenue	House	ACM	Sheet	Side wall to front verandah	Good, minimal damage	Within reach	5m2	12	Field	ACM
26/11/2013	Parcel 10	2 Dawes Avenue	House	ACM	Sheet (thick)	Floor to front verandah	Fair: unpainted, minor damage and surface worn	Ground level	20m2	13	Field	ACM
26/11/2013	Parcel 10	2 Dawes Avenue	House	ACM	Sheet	Eaves to all sides (including upper level)	Good, painted and no damage	Minimum 3m above ground level	60m2	14 and 15	2D-ADM-02	ACM
26/11/2013	Parcel 10	2 Dawes Avenue	House	ACM	Sheet	Infill panels near tap, west side exterior	Poor, damaged	Ground level	1m2	16	Field	ACM
26/11/2013	Parcel 10	2 Dawes Avenue	House	ACM	Sheet	Underside to back undercover area	Underside to rear undercover area	Approx 2.4m above ground level	40m2	17	2D-ACM-01	ACM
26/11/2013	Parcel 10	2 Dawes Avenue	House	ACM	Sheet	Infill to lower section SE corner side of house	Good, painted with minor damage	Ground level	3m2	18	Field	ACM
26/11/2013	Parcel 10	2 Dawes Avenue	House	ACM	Sheet	Walls to kitchen (excluding fireplace/ oven)	Painted, some damage	From floor to ceiling	100m2	19	Field	ACM
26/11/2013	Parcel 10	2 Dawes Avenue	House	ACM	Sheet	All internal walls (except brick near fire place)	Painted, minor damage	From floor to ceiling	500m2	19	Field	ACM
26/11/2013	Parcel 10	2 Dawes Avenue	House	ACM	Zelemite	Electrical board	Good, but holes drilled into sheet	1.5m above ground level	1m2	20	Field	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	House	ACM	Sheet	Gable end at front of house	Fair, undamaged but worn paint	4m above ground level	15m2	21	Assumed	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	House	ACM	Zelemite	Electrical board on front verandah	Good, but holes drilled into sheet	1.5m above ground level	1m2	22	Field	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	House	ACM	Sheet	Eaves to all sides (including upper level)	Good, painted with minor damage	4m above ground level	30m2	21	Field	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	Garage	ACM	Corrugated	Corrugated roof to garage	Poor: Some damage, not painted and susceptible to damage from overhanging tee	2.2m above ground level	30m2	23	Field	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	Garage	ACM	Sheet	Most wall panels to the garage	Poor: worn paint and extensive damage		40m2	24	Field	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	Shed	ACM	Sheet	Exterior wall panels to back shed/ outhouse. Includes the edge stripping to the panels	Poor: worn paint and damaged	Ground level	80m2	25	Field	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	Shed	ACM	Sheet	Interior walls to shed	Poor: worn paint and damaged	Ground level	80m2	26	Field	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	House	ACM	Sheet	Former toilet/ shower walls and ceiling	Walls with patterned finish (flowers), fair condition, ceiling painted	Ground level	60m2	27	Field	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	House	ACM	Sheet	Backroom to house walls and ceiling	Good, painted	Ground level	150m2	28	Field	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	House	ACM	Sheet	Bathroom walls and ceiling	Poor: damaged, some tiled and wallpapered	Ground level	70m2	29	Field	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	House	ACM	Sheet	Walls and ceiling to lounge room and bedrooms	Fair - poor: painted, some damage. Some sheeting is behind a chipboard veneer in living areas	Ground level, some behind chipboard	4000m2	30	Field	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	Yard	ACM	Sheet	Fragments in yard	Scattered in yard, greatest density near buildings	On ground	N/A	31	Field	ACM
11/11/2013	Parcel 10	8 Dawes Avenue	House	ACM	Zelemite	Powerboard on front verandah to the house	Good, except for where holes have been drilled	1.5m above ground level	0.5m2	32	Field	ACM
11/11/2013	Parcel 10	8 Dawes Avenue	House	ACM	Sheet	Exterior panelling	Painted, minor damage and mould	From ground level to roof	200m2	32 and 33	Field	ACM
11/11/2013	Parcel 10	8 Dawes Avenue	House	ACM	Sheet	Eaves to front and back, plus front awning but excluding a small section to the south of front board (masonite)	Good, painted	Approx 2.4m above ground level	30m2	32 and 34	8D-ACM-1	ACM
11/11/2013	Parcel 10	8 Dawes Avenue	House	ACM	Sheet	Fragments in soil under car awning	Includes corrugated sheeting fragments	Ground level	N/A	N/A	Field	ACM
26/11/2013	Parcel 10	8 Dawes Avenue	House	ACM	Sheet	Bathroom walls (lower section)	Patterned sheeting to lower 1.8m, in good condition.	Ground level	20m2	35	Field	ACM
26/11/2013	Parcel 10	10 Dawes Avenue	House	ACM	Sheet	Exterior walls to tall garage	Extensive damage: due to building age unlikely to be ACM	At ground level	N/A	N/A	EMP10-ACM-05	Not ACM

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/ Type of ABM
26/11/2013	Parcel 10	10 Dawes Avenue	Carport	ACM	Sheet	Upper panelling to carport - appears older than exterior walls to tall garage	Generally good: due to building age unlikely to be ACM	2m above ground level	N/A	N/A	EMP10-ACM-06	Not ACM
26/11/2013	Parcel 10	10 Dawes Avenue	Garage	ACM	Board panelling	Exterior walls to garage	Generally good: due to building age unlikely to be ACM	At ground level	N/A	N/A	Refer to EMP10-ACM-05	Not ACM
26/11/2013	Parcel 10	10 Dawes Avenue	Garage	ACM	Sheet	Exterior walls to garage	Generally good: due to building age unlikely to be ACM	At ground level	N/A	N/A	Refer to EMP10-ACM-05	Not ACM
26/11/2013	Parcel 10	10 Dawes Avenue	House	ACM	Sheet	Downstairs laundry and bathroom	Generally good: due to building age unlikely to be ACM	At ground level	N/A	N/A	N/A	Assumed not ACM
26/11/2013	Parcel 10	10 Dawes Avenue	House	ACM	Sheet	Upstairs bathroom	Generally good: due to building age unlikely to be ACM	At ground level	N/A	N/A	N/A	Assumed not ACM

Appendix C

Laboratory Certificates

Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EN1400842**	Page	: 1 of 3
Client	: **ENVIRON**	Laboratory	: Environmental Division Newcastle
Contact	: FIONA ROBINSON	Contact	: Peter Keyte
Address	: PO Box 435 THE JUNCTION NSW 2291	Address	: 5/585 Maitland Road Mayfield West NSW Australia 2304
E-mail	: frobinson@environcorp.com	E-mail	: peter.keyte@als.com.au
Telephone	: +61 02 4962 5444	Telephone	: 61-2-4968-9433
Facsimile	: +61 02 4962 5888	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	: 13-MAR-2014
Sampler	: SHAUN TAYLOR	Issue Date	: 20-MAR-2014
Site	: ----		
		No. of samples received	: 3
Quote number	: SY/433/13	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	EMP10-ACM-05	EMP10-ACM-06	EMP10-ACM-07	----	----
			Client sampling date / time	04-MAR-2014 00:00	04-MAR-2014 00:00	04-MAR-2014 00:00	----	----
Compound	CAS Number	LOR	Unit	EN1400842-001	EN1400842-002	EN1400842-003	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples								
Asbestos Detected	1332-21-4	0.1	g/kg	**No**	**No**	**Yes**	----	----
Asbestos Type	1332-21-4	-	--	**-**	**-**	**Ch**	----	----
Sample weight (dry)	----	0.01	g	**6.90**	**14.6**	**4.10**	----	----
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	EMP10-ACM-05 - 04-MAR-2014 00:00	One piece of organic fibre board approximately 50 x 30 x 4mm
EA200: Description	EMP10-ACM-06 - 04-MAR-2014 00:00	Several pieces of organic fibre board approximately 25 x 20 x 4mm
EA200: Description	EMP10-ACM-07 - 04-MAR-2014 00:00	Several pieces of organic fibre board approximately 40 x 25 x 3mm plus one small piece of degraded and friable asbestos cement sheeting approximately 5 x 5 x 2mm

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EN1511008**	Page	: 1 of 2
Client	: **ENVIRON AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Newcastle
Contact	: FIONA ROBINSON	Contact	: Peter Keyte
Address	: Eastpoint Complex | Suite 19B, Level 2 50 Glebe Road PO Box 435 THE JUNCTION NSW 2291	Address	: 5/585 Maitland Road Mayfield West NSW Australia 2304
E-mail	: frobinson@environcorp.com.au	E-mail	: peter.keyte@alsglobal.com
Telephone	: +61 02 49344354	Telephone	: +61 2 4014 2500
Facsimile	: +61 02 49344359	Facsimile	: +61 2 4967 7382
Project	: AS130328 - Hydro Alumium Buffer Zone	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----	Date Samples Received	: 26-Mar-2015 13:12
C-O-C number	: ----	Date Analysis Commenced	: 30-Mar-2015
Sampler	: SHAUN TAYLOR	Issue Date	: 30-Mar-2015 19:50
Site	: ----		
		No. of samples received	: 4
Quote number	: ----	No. of samples analysed	: 4

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

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*
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.

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
ø = ALS is not NATA accredited for these tests.

Analytical Results

Sub-Matrix: **SOLID** (Matrix: **SOLID**)				Client sample ID	**2D/ACM/1**	**2D/ACM/2**	**8D/ACM/1**	**22B/ACM/01**	**----**
				Client sampling date / time	26-Mar-2015 12:00	26-Mar-2015 12:00	26-Mar-2015 12:00	26-Mar-2015 12:00	----
Compound	*CAS Number*	*LOR*	*Unit*		**EN1511008-001**	**EN1511008-002**	**EN1511008-003**	**EN1511008-004**	**--------**
					Result	Result	Result	Result	Result
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples									
Asbestos Detected	1332-21-4	0.1	g/kg		**Yes**	**Yes**	**Yes**	**Yes**	**----**
Asbestos Type	1332-21-4	-	--		**Ch**	**Ch**	**Ch**	**Ch**	**----**
Sample weight (dry)	----	0.01	g		**1.49**	**0.56**	**0.64**	**6.30**	**----**
APPROVED IDENTIFIER:	----	-	--		**C.OWLER**	**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	2D/ACM/1 - 26-Mar-2015 12:00:00	Several pieces of friable asbestos fibre board approximately 20 x 20 x 4mm
EA200: Description	2D/ACM/2 - 26-Mar-2015 12:00:00	Several pieces of friable asbestos fibre board approximately 20 x 5 x 4mm
EA200: Description	8D/ACM/1 - 26-Mar-2015 12:00:00	Several pieces of friable asbestos fibre board approximately 10 x 10 x 4mm
EA200: Description	22B/ACM/01 - 26-Mar-2015 12:00:00	One piece of friable asbestos cement sheeting approximately 40 x 35 x 4mm

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/ Type of ABM
20/05/2014	Parcel 10	1 Dawes Avenue	House	ACM	Sheeting	Exterior walls to all sides (inc corner and edge moulding)	Most is fair, painted but some sections damaged with holes	Ground level - 3m height	200m2	1 and 3	Field	ACM
20/05/2014	Parcel 10	1 Dawes Avenue	House	ACM	Zelemite	Backing board to power box	Drilled holes	In box, 1.7m height	1m2	2	Not required - labelled as containing asbestos	ACM
20/05/2014	Parcel 10	1 Dawes Avenue	House	ACM	Sheeting	Eaves to all sides	Good, painted	3m above ground level	50m2	3	Assumed	ACM
20/05/2014	Parcel 10	1 Dawes Avenue	House	ACM	Sheeting	Underside to front landing awning	Good, painted	2m above ground level	2m2	4	Assumed	ACM
20/05/2014	Parcel 10	1 Dawes Avenue	House	ACM	Sheeting	Walls and ceiling to laundry and shower	Good, painted	Ground level - 2.4m high	20m2	5	Assumed	ACM
20/05/2014	Parcel 10	1 Dawes Avenue	House	ACM	Sheeting	Walls to kitchen between doorway and 2nd window	Good, painted	Ground level - 2.4m high	15m2	6	Assumed	ACM
20/05/2014	Parcel 10	1 Dawes Avenue	House	ACM	Sheeting	Walls and ceiling to bathroom	Fair - mostly painted, some worn paint and some cracks	Ground level - 2.4m high	15m2	7	Assumed	ACM
20/05/2014	Parcel 10	1 Dawes Avenue	House	ACM	Sheeting	Walls and ceiling to toilet room	Fair, painted but drilled holes	Ground level - 2.4m high	10m2	8	Field	ACM
20/05/2014	Parcel 10	1 Dawes Avenue	Small Shed	ACM	Zelemite	Powerboard in box inside the shed	Fair - drilled holes have been sealed	1.5m above ground level	1m2	9	Field	ACM
20/05/2014	Parcel 10	1 Dawes Avenue	Small Shed	PCB	PCB	Fluorescent lights in shed	Good	4m above ground level	1	10	Assumed	PCB
20/05/2014	Parcel 10	1 Dawes Avenue	Large Shed	SMF	Insulation	Insulation to underside of roof (potential)	Only a small seciton visible, metallic lining visible appeared in good condition	6m above ground level	300m2	11	Field	SMF
26/11/2013	Parcel 10	2 Dawes Avenue	House	ACM	Sheet	Underside to awning of front verandah	Good, painted with no damage	Within reach	20m2	12	Field	ACM
26/11/2013	Parcel 10	2 Dawes Avenue	House	ACM	Sheet	Side wall to front verandah	Good, minimal damage	Within reach	5m2	12	Field	ACM
26/11/2013	Parcel 10	2 Dawes Avenue	House	ACM	Sheet (thick)	Floor to front verandah	Fair: unpainted, minor damage and surface worn	Ground level	20m2	13	Field	ACM
26/11/2013	Parcel 10	2 Dawes Avenue	House	ACM	Sheet	Eaves to all sides (including upper level)	Good, painted and no damage	Minimum 3m above ground level	60m2	14 and 15	2D-ADM-02	ACM
26/11/2013	Parcel 10	2 Dawes Avenue	House	ACM	Sheet	Infill panels near tap, west side exterior	Poor, damaged	Ground level	1m2	16	Field	ACM
26/11/2013	Parcel 10	2 Dawes Avenue	House	ACM	Sheet	Underside to back undercover area	Underside to rear undercover area	Approx 2.4m above ground level	40m2	17	2D-ACM-01	ACM
26/11/2013	Parcel 10	2 Dawes Avenue	House	ACM	Sheet	Infill to lower section SE corner side of house	Good, painted with minor damage	Ground level	3m2	18	Field	ACM
26/11/2013	Parcel 10	2 Dawes Avenue	House	ACM	Sheet	Walls to kitchen (excluding fireplace/ oven)	Painted, some damage	From floor to ceiling	100m2	19	Field	ACM
26/11/2013	Parcel 10	2 Dawes Avenue	House	ACM	Sheet	All internal walls (except brick near fire place)	Painted, minor damage	From floor to ceiling	500m2	19	Field	ACM
26/11/2013	Parcel 10	2 Dawes Avenue	House	ACM	Zelemite	Electrical board	Good, but holes drilled into sheet	1.5m above ground level	1m2	20	Field	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	House	ACM	Sheet	Gable end at front of house	Fair, undamaged but worn paint	4m above ground level	15m2	21	Assumed	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	House	ACM	Zelemite	Electrical board on front verandah	Good, but holes drilled into sheet	1.5m above ground level	1m2	22	Field	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	House	ACM	Sheet	Eaves to all sides (including upper level)	Good, painted with minor damage	4m above ground level	30m2	21	Field	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	Garage	ACM	Corrugated	Corrugated roof to garage	Poor: Some damage, not painted and susceptible to damage from overhanging tee	2.2m above ground level	30m2	23	Field	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	Garage	ACM	Sheet	Most wall panels to the garage	Poor: worn paint and extensive damage		40m2	24	Field	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	Shed	ACM	Sheet	Exterior wall panels to back shed/ outhouse. Includes the edge stripping to the panels	Poor: worn paint and damaged	Ground level	80m2	25	Field	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	Shed	ACM	Sheet	Interior walls to shed	Poor: worn paint and damaged	Ground level	80m2	26	Field	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	House	ACM	Sheet	Former toilet/ shower walls and ceiling	Walls with patterned finish (flowers), fair condition, ceiling painted	Ground level	60m2	27	Field	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	House	ACM	Sheet	Backroom to house walls and ceiling	Good, painted	Ground level	150m2	28	Field	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	House	ACM	Sheet	Bathroom walls and ceiling	Poor: damaged, some tiled and wallpapered	Ground level	70m2	29	Field	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	House	ACM	Sheet	Walls and ceiling to lounge room and bedrooms	Fair - poor: painted, some damage. Some sheeting is behind a chipboard veneer in living areas	Ground level, some behind chipboard	4000m2	30	Field	ACM
26/11/2013	Parcel 10	4 Dawes Avenue	Yard	ACM	Sheet	Fragments in yard	Scattered in yard, greatest density near buildings	On ground	N/A	31	Field	ACM
11/11/2013	Parcel 10	8 Dawes Avenue	House	ACM	Zelemite	Powerboard on front verandah to the house	Good, except for where holes have been drilled	1.5m above ground level	0.5m2	32	Field	ACM
11/11/2013	Parcel 10	8 Dawes Avenue	House	ACM	Sheet	Exterior panelling	Painted, minor damage and mould	From ground level to roof	200m2	32 and 33	Field	ACM
11/11/2013	Parcel 10	8 Dawes Avenue	House	ACM	Sheet	Eaves to front and back, plus front awning but excluding a small section to the south of front board (masonite)	Good, painted	Approx 2.4m above ground level	30m2	32 and 34	8D-ACM-1	ACM
11/11/2013	Parcel 10	8 Dawes Avenue	House	ACM	Sheet	Fragments in soil under car awning	Includes corrugated sheeting fragments	Ground level	N/A	N/A	Field	ACM
26/11/2013	Parcel 10	8 Dawes Avenue	House	ACM	Sheet	Bathroom walls (lower section)	Patterned sheeting to lower 1.8m, in good condition.	Ground level	20m2	35	Field	ACM
26/11/2013	Parcel 10	10 Dawes Avenue	House	ACM	Sheet	Exterior walls to tall garage	Extensive damage: due to building age unlikely to be ACM	At ground level	N/A	N/A	EMP10-ACM-05	Not ACM

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/ Type of ABM
26/11/2013	Parcel 10	10 Dawes Avenue	Carport	ACM	Sheet	Upper panelling to carport - appears older than exterior walls to tall garage	Generally good: due to building age unlikely to be ACM	2m above ground level	N/A	N/A	EMP10-ACM-06	Not ACM
26/11/2013	Parcel 10	10 Dawes Avenue	Garage	ACM	Board panelling	Exterior walls to garage	Generally good: due to building age unlikely to be ACM	At ground level	N/A	N/A	Refer to EMP10-ACM-05	Not ACM
26/11/2013	Parcel 10	10 Dawes Avenue	Garage	ACM	Sheet	Exterior walls to garage	Generally good: due to building age unlikely to be ACM	At ground level	N/A	N/A	Refer to EMP10-ACM-05	Not ACM
26/11/2013	Parcel 10	10 Dawes Avenue	House	ACM	Sheet	Downstairs laundry and bathroom	Generally good: due to building age unlikely to be ACM	At ground level	N/A	N/A	N/A	Assumed not ACM
26/11/2013	Parcel 10	10 Dawes Avenue	House	ACM	Sheet	Upstairs bathroom	Generally good: due to building age unlikely to be ACM	At ground level	N/A	N/A	N/A	Assumed not ACM

Appendix H

Waste Classification Report for Lot 2, DP502196

RCA ref 10566-502/0

22 April 2014

Lend Lease Engineering Pty Ltd
1051 Old Maitland Road
SAWYERS GULLY NSW 2326

Attention: Michael Curry

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

Geotechnical Engineering
Engineering Geology
Environmental Engineering
Hydrogeology
Construction Materials Testing
Environmental Monitoring
Noise & Vibration
Occupational Hygiene

ASSESSMENT OF RECOVERED AGGREGATE MATERIAL FOR EXEMPTION UNDER HE RECOVERED AGGREGATE EXEMPTION 2010 MCLEODS ROAD, HUNTER EXPRESSWAY

1 INTRODUCTION

RCA Australia (RCA) completed an assessment of potential resource material located at Mcleods Road, Hunter Expressway, NSW, at the request of Michael Curry of Lend Lease Engineering Pty Ltd. This assessment sought to compare two (2) stockpiled materials against the Protection of the Environment Operations (Waste) Regulation 2005 - General Exemption Under Part 6, Clause 51 and 51A, 'The Recovered Aggregate Exemption 2010' (Ref [1]).

The assessment involved the collection and laboratory sampling of twenty (20), five (5) part composite samples from two (2) stockpiled aggregate materials, ten (10) composite samples per stockpile for characterisation purposes.

2 SITE DESCRIPTION AND BACKGROUND INFORMATION

The material which has been characterised during this assessment is located at Mcleods Road, Hunter Expressway, NSW, Lot 10 DP 1082569.

The site consisted of a total of five (5) soil stockpiles in which three (3) were sampled. The location of the stockpiles is shown in **Appendix A** and a description of the stockpiles is shown in **Table 1**.

Table 1 *Stockpile Description*

Stockpile	Description	Location	Approximate size (m^3)
1[1]	Clayey Gravelly Sand, fine/medium grain size, brown/yellow, with concrete, bricks, metals, plastics and some asphalt	South-east corner	50
2	Clayey Gravelly Sand, fine/medium grain size, brown/yellow, with concrete, bricks, metals, plastics and some asphalt	South-east corner	100
3	Sandy Clayey Gravel, red/brown/grey, with red bricks, ceramics, metals, plastics, cloth, wood, large stones and concrete	Southern boundary	545
4[2]	Sandy Clayey Gravel, red/brown/grey, with red bricks, ceramics, metals, plastics, cloth, wood, large stones and concrete	North-west corner	40
5[2]	Clayey Gravelly Sand, fine/medium grain size, brown/yellow, with concrete, bricks, metals, plastics and some asphalt	North-west corner	20

Soil material photographs are shown in **Appendix B**.

The site has been operating as a compound site during the construction of the Hunter Expressway, however is now being decommissioned. The site is approximately 4260m^2 and generally consists of flat vacant land with sparse vegetation along the northern, western and southern boundaries. There is aggregate material on site that has not been stockpiled as it is used as hardstand for vehicles. This material is similar to that of Stockpile 3 and will be considered as a division of Stockpile 3.

3 SITE GUIDELINES

3.1 DECCW, *PROTECTION OF THE ENVIRONMENT OPERATIONS (WASTE) REGULATION 2005*

The Protection of the Environment Operations (Waste) Regulation 2005 (Ref [2]) supports the operation of the *Protection of the Operations Act 1997* (POEO Act). It contains provision for the management, storage, transport, processing, recovery and disposal of

[1] Stockpiles 1 and 2 comprised of similar soil material and due to the small size of the two (2) individual stockpiles and the close proximity of the stockpiles, they were sampled as one (1) stockpiled soil material.

[2] Stockpiles 4 and 5 were not tested, Stockpile 4 will be removed from site as per client details and Stockpile 5 was not requested to be analysed.

waste and assists the Office of Environment and Heritage (OEH) to achieve the objectives of the *POEO Act* and other legislation that it administers.

Under clause 51 and 51A of the Regulation, OEH has the power to exempt a person from certain regulatory requirements that would otherwise apply to the land application of a waste material. These exemptions are known as resource recovery exemptions.

Resource recovery exemptions only apply where the land application of a waste material is a bona fide, fit for purpose, reuse opportunity rather than a means of waste disposal. However, the use of an exempted waste material remains subject to all other relevant environmental regulations (such as planning, air and water), including pollution offences under the *POEO Act 1997*. Adhering to the conditions of an exemption does not provide a defence against offences such as the pollution of land (section 142A) or water (s.120) and special requirements relating to asbestos waste (Clause 42). Generators, processors and consumers who do not fully comply with the conditions of the exemption may face prosecution.

3.1.1 THE RECOVERED AGGREGATE EXEMPTION 2010, SEPTEMBER 2010

The recovered aggregate exemption 2010 (Ref [1]) is a 'general' exemption issued for commonly recovered, high volume and well characterised aggregate materials otherwise classed as waste.

Recovered aggregate is defined by the exemption as:

> *"... material comprising of concrete, brick, ceramics, natural rock and asphalt processed into an engineered material. This does not include refractory bricks or associated refractory materials, or asphalt that contains coal tar."*

Aggregate material which meets the recovered aggregate exemption 2010 is only considered suitable for re-use as:

- road construction material;
- landscaping material; and
- building and construction material.

The sampling, testing and chemical requirements for such material are stipulated in the exemption and are reproduced in **Tables 2** and **3**.

Table 2 *Chemical and Other Material Property Requirements*

Column 1	Column 2	Column 3	Column 4
Chemicals and other attributes	**Maximum average concentration for characterisation**	**Maximum average concentration for routine testing**	**Absolute maximum concentration**
Mercury	0.5	Not required	1
Cadmium	0.5	0.5	1.5
Lead	75	75	150
Arsenic	20	Not required	40
Chromium (total)	60	60	120
Copper	60	60	150
Nickel	40	Not required	80
Zinc	200	200	350
Electrical Conductivity	1.5 dS/m	1.5 dS/m	3 dS/m
Metal	1%	1%	2%
Plaster	0.25%	0.25%	0.5%
Rubber, plastic, paper, cloth, paint, wood and other vegetable matter	0.2%	0.2%	0.3%

All units are in mg/kg dry weight unless otherwise noted.

Table 3 *Sampling and Testing Requirements*

Column 1	Column 2	Column 3
Characterisation frequency	**Routine sampling frequency**	**Once-off sampling frequency**
20 composite samples, by taking 1 composite sample from a different batch, truckload or stockpile. This must be repeated every year.	Five composite samples per 4,000 tonnes or five composite samples per three months.	Ten composite samples per 4,000 tonnes.

3.2 APPROPRIATENESS OF THE GUIDELINES

The contaminant criteria on which the recovered aggregate exemption 2010 guidelines are based strictly affect the investigation concentration used to assess the contamination status of the material. If any contaminant criteria are exceeded for even one sample then the exemption has not been met for the total of the material. In such cases the material can either revert back to waste for disposal to landfill or an application can be made to OEH for a 'specific' exemption.

4 FIELDWORK

An experienced environmental engineer undertook the fieldwork on 7 April 2014. This fieldwork consisted of the following:

- A site inspection, including detailed inspection of the material subject to this assessment.
- The collection of 20 composite samples from two (2) stockpiled soil materials, ten (10) composite samples per stockpile. This complies with the '10 composite samples per 4,000 tonnes' once-off frequency sampling procedure outlined in **Table 3**.
    - Individual samples were collected from across the stockpiled material, sampling at locations which were consistent with the general characteristics of the stockpiled material and/or material which showed visual or olfactory evidence of contamination. Samples were collected from the stockpiled materials between depths of approximately 0.3m and 1.0m below the existing surface using a shovel.
    - Samples were labelled and described in the field for texture, colour, odour and moisture content.
    - Individual samples were generated into composite samples in the field by RCA prior to analytical dispatch.

The collection of soil samples was undertaken in compliance with RCA methodology and comprised of disturbed soil samples collected directly from the stockpiled material using a shovel. These soil collection methods were chosen for the site due to the excavated soil materials.

Field Sheets are shown in **Appendix A**.

5 RESULTS

The results were compared to the recovered aggregate exemption 2010 guidelines contained in **Table 3** and a copy of this comparison is attached as **Appendix C**. Laboratory report sheets are attached as **Appendix D**.

In summary, all results were found to be below the laboratory reporting limits and/or the exemption guidelines.

6 CONCLUSIONS AND RECOMMENDATIONS

RCA conducted an investigation of two (2) soil material types from three (3) stockpiles located at Mcleods Road, Hunter Expressway, at the request of Michael Curry of Lend Lease Pty Ld. This assessment sought to compare stockpiled material against the Protection of the Environment Operations (Waste) Regulation 2005 - General Exemption Under Part 6, Clause 51 and 51A, ''The Recovered Aggregate Exemption 2010' (Ref [1]).

Based on the reported results and subsequent comparison to the exemption guidelines, the material from the three (3) stockpiles analysed can be classified as recovered aggregate material. Therefore in accordance with the exemption this material can be applied to land for road making activities, building, landscaping and construction works.

The material RCA has classified as Recovered Aggregate **includes**:

- Stockpiled material allocated in this report as stockpiles 1, 2, 3 and the small amount of material remaining for the hardstand access for material removal.

This classification **does not** include:

- stockpiles allocated in this report as Stockpiles 4 and 5.

7 LIMITATIONS

This report has been prepared for Lend Lease Engineering Pty Ltd in accordance with an agreement with RCA. The services performed by RCA have been conducted in a manner consistent with that generally exercised by members of its profession and consulting practice.

This report has been prepared for the sole use of Lend Lease Engineering Pty Ltd. The report may not contain sufficient information for purposes of other uses or for parties other than Lend Lease Engineering Pty Ltd. This report shall only be presented in full and may not be used to support objectives other than those stated in the report without written permission from RCA.

The information in this report is considered accurate at the date of issue with regard to the current conditions of the site. Conditions can vary across any site that cannot be explicitly defined by investigation.

Environmental conditions including contaminant concentrations can change in a limited period of time. This should be considered if the report is used following a significant period of time after the date of issue.

Yours faithfully

RCA AUSTRALIA

John Gilbert
Environmental Engineer

Matthew Clark
Associate Environmental Scientist

REFERENCES

[1] DECCW, *Protection of the Environment Operations (Waste) Regulation 2005 - General Exemption Under Part 6, Clause 51 and 51A, The Recovered Aggregate Exemption 2010*, September 2010.

[2] NSW Government, *Protection of the Environment Operations (Waste) Regulation 2005,* September 2005.

GLOSSARY

DECCW	Department of Environment, Climate Change and Water
DLWC	Department of Land and Water Conservation.
EPA	Environmental Protection Agency
In-Situ	In place, without excavation.
kg	kilogram, 1000 gram.
µg	microgram, 1/1000 milligram.
mg	milligram, 1/1000 gram.
OEH	Office of Environmental and Heritage (formerly DECCW).
POEO Act	*Protection of the Environment Operations Act 1997.*
Chemical Compounds	
PAH	Polycyclic Aromatic Hydrocarbons. Multi-ring compounds found in fuels, oils and creosote. These are also common combustion products.
TCH	Total Chlorinated Hydrocarbons.
TPH	Total Petroleum Hydrocarbons.

Appendix A

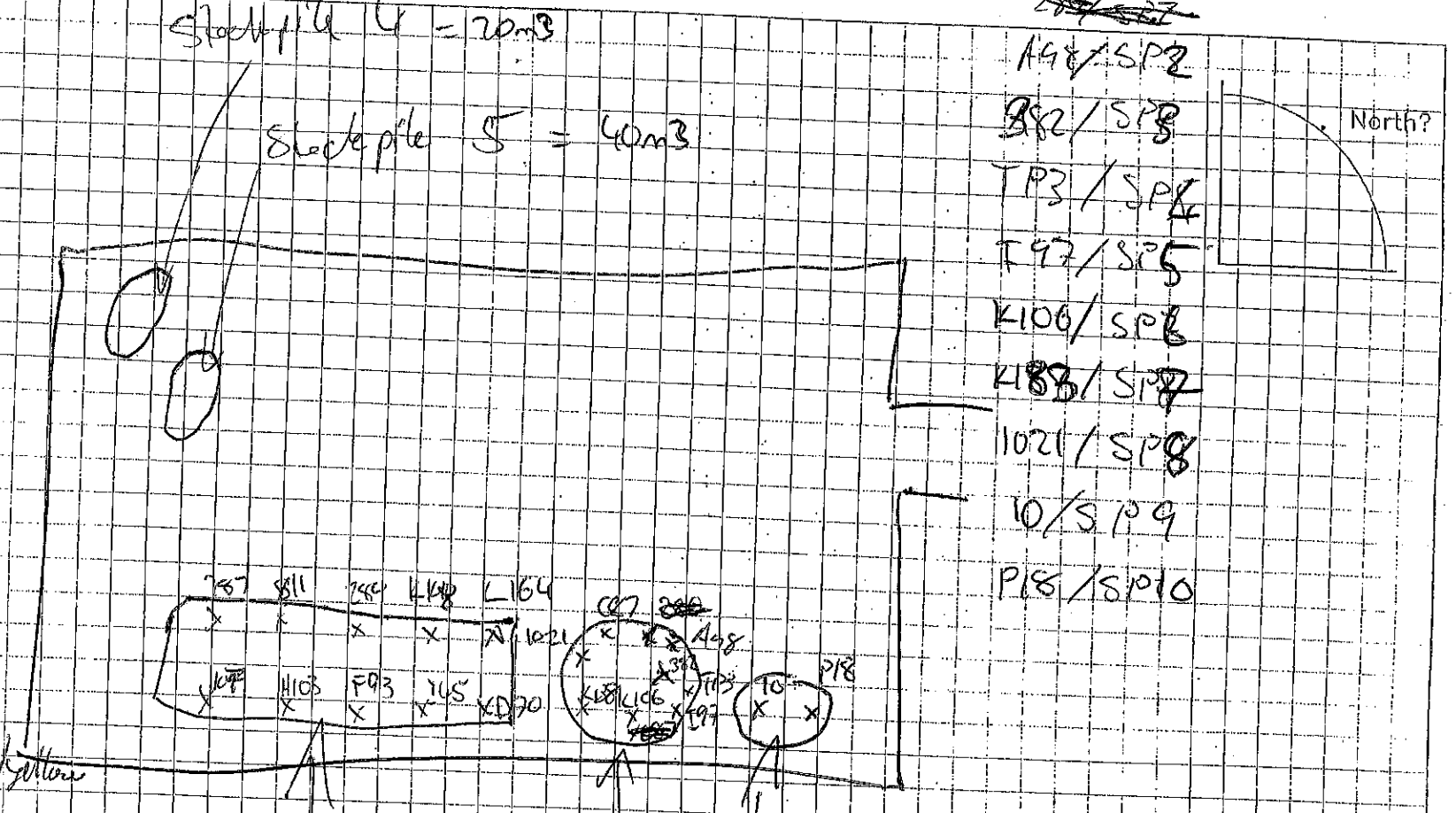
Field sheets

C87 / SP1

~~287 / SP2~~

L164 / SP11
D70 / SP12
K68 / SP13
145 / SP14
288 / SP15
F93 / SP16
H103 / SP17
811 / SP18
287 / SP19
~~K87~~ / SP20

A98 / SP2
~~382~~ / SP3
TP3 / SP4
F97 / SP5
K106 / SP6
K188 / SP7
1021 / SP8
10 / SP9
P18 / SP10



Stockpile 1/2

clayey gravelly Sand, brown/yellow, moist, fine/medium GS, with concrete, bricks, metals, plastics and some asphalt

Stockpile 3

Sandy clayey Gravel, red/brown/grey, with red bricks, ceramics, metals, plastics, wire, cloth, wood, some large stones (in diameter, and concrete.

RCA AUSTRALIA GEOTECHNICAL • ENVIRONMENTAL			
CLIENT		PROJECT No	
DRAWN BY	SCALE	DRAWING No	REV
APPROVED BY	DATE	OFFICE	NEWCASTLE

Appendix B

Site Photographs

PHOTOGRAPH 1 *Showing Stockpile 1*

PHOTOGRAPH 2 *Showing Stockpile 2*

PHOTOGRAPH 3 *Showing Stockpile 3 facing south-west from northern boundary.*

PHOTOGRAPH 4 *Stockpile 3 facing east from south-west corner.*

PHOTOGRAPH 5 *Showing stockpile 4.*

PHOTOGRAPH 6 *Showing stockpile 5*

Appendix C

Summary Results

Sample Identification	PQL	Maximum average concentration for characterisation[A]	Absolute maximum concentration[C]	SP1	SP2	SP3	SP4	SP5	SP6	SP7	SP8	SP9	SP10
Date				7/04/2014	7/04/2014	7/04/2014	7/04/2014	7/04/2014	7/04/2014	7/04/2014	7/04/2014	7/04/2014	7/04/2014
Origin				Stockpile 2	Stockpile 2	Stockpile 2	Stockpile 2	Stockpile 2	Stockpile 2	Stockpile 2	Stockpile 2	Stockpile 1	Stockpile 1
Sample collected by				JG	JG	JG	JG	JG	JG	JG	JG	JG	JG
Physical Parameters													
Electrical Conductivity	5	1.5 dS/m	3.0 dS/m	0.1	0.29	1.1	0.061	0.12	0.045	0.085	0.08	0.055	0.055
Foreign Material - Type 1													
Metal	0	1.00 %	2.00 %	0	0	0	0	0	0	0	0	0	0.1
Foreign Material - Type 2													
Plaster	0	0.25 %	0.50 %	0	0	0	0	0	0	0	0	0	0
Foreign Material - Type 3													
Rubber	0	0.20 %	0.30 %	0	0	0	0	0	0	0	0	0	0
Plastic	0	0.20 %	0.30 %	0	0	0	0	0	0	0	0	0	0
Paint	0	0.20 %	0.30 %	0	0	0	0	0	0	0	0	0	0
Paper	0	0.20 %	0.30 %	0	0	0	0	0	0	0	0	0	0
Cloth	0	0.20 %	0.30 %	0	0	0	0	0	0	0	0	0	0
Wood & other Vegetable Matter	0	0.20 %	0.30 %	0	0	0	0	0	0	0	0	0	0
Metals													
Arsenic	2	20	40	2	< 2	4.7	< 2	< 2	< 2	< 2	2.4	3.3	2.9
Cadmium	0.4	0.5	1.5	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Chromium (total)	5	60	120	5.5	< 5	7.9	< 5	< 5	< 5	5.9	5.2	< 5	< 5
Copper	5	60	150	11	9	10	7.3	9	8.4	10	7.6	12	9.6
Lead	5	75	150	9.9	< 5	7.5	8.6	6.5	6.3	6.8	7.1	6.6	6.6
Nickel	5	40	80	7.5	8.2	12	< 5	6	< 5	7.5	5.9	7.7	6.9
Zinc	5	200	350	63	36	47	50	39	90	52	31	44	40
Mercury	0.05	0.5	1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Metals results presented in mg/kg dry weight

[A] POEO (Waste) Regulation 2005 - General Exemption Under Part 6, Clause 51 and 51A, The recovered aggregate exemption 2010. Table 2, Column 2

[C] POEO (Waste) Regulation 2005 - General Exemption Under Part 6, Clause 51 and 51A, The recovered aggregate exemption 2010. Table 2, Column 4

Results shown in ***italics*** are in excess of the Maximum Average Concentration for Characterisation

Results shown in **shading** are in excess of the Maximum Average Concentration for Routine Testing

Results shown in **BOLD** are in excess of the Absolute Maximum Concentration

PQL = Practical Quantitation Limit

Where average calculations are required, calculation includes components reported as non detected as 1/2 PQL. Underlined averages are those not detected

Sample Identification	PQL	Maximum average concentration for characterisation[A]	Absolute maximum concentration[C]	SP11	SP12	SP13	SP14	SP15	SP16	SP17	SP18	SP19	SP20	Average Concentration
Date				7/04/2014	7/04/2014	7/04/2014	7/04/2014	7/04/2014	7/04/2014	7/04/2014	7/04/2014	7/04/2014	7/04/2014	
Origin				Stockpile 3	Stockpile 3	Stockpile 3	Stockpile 3	Stockpile 3	Stockpile 3	Stockpile 3	Stockpile 3	Stockpile 3	Stockpile 3	
Sample collected by				JG	JG	JG	JG	JG	JG	JG	JG	JG	JG	
Physical Parameters														
Electrical Conductivity	5	1.5 dS/m	3.0 dS/m	0.083	0.11	0.11	0.1	0.08	0.1	0.11	0.087	0.12	0.13	0.33
Foreign Material - Type 1														
Metal	0	1.00 %	2.00 %	0	0	0	0	0.2	0.1	0	0	0	0	0.00
Foreign Material - Type 2														
Plaster	0	0.25 %	0.50 %	0	0	0	0	0	0	0	0	0	0	0.00
Foreign Material - Type 3														
Rubber	0	0.20 %	0.30 %	0	0	0	0	0	0	0	0	0	0	0.00
Plastic	0	0.20 %	0.30 %	0	0	0	0	0.1	0	0	0	0.2	0.1	0.00
Paint	0	0.20 %	0.30 %	0	0	0	0	0	0	0	0	0	0	0.00
Paper	0	0.20 %	0.30 %	0	0	0	0	0	0	0	0	0	0	0.00
Cloth	0	0.20 %	0.30 %	0	0	0	0	0	0	0	0	0	0	0.00
Wood & other Vegetable Matter	0	0.20 %	0.30 %	0	0	0	0	0	0	0	0.1	0.1	0	0.00
Metals														
Arsenic	2	20	40	2.4	< 2	< 2	< 2	< 2	4	< 2	< 2	12	< 2	1.94
Cadmium	0.4	0.5	1.5	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	0.4	0.20
Chromium (total)	5	60	120	6.3	6.1	6.4	6.7	6.9	7.7	< 5	< 5	8.3	6.9	4.18
Copper	5	60	150	7.7	5.5	9	9.7	12	10	< 5	15	18	10	9.26
Lead	5	75	150	14	22	62	62	120	76	68	73	94	110	7.00
Nickel	5	40	80	< 5	< 5	5	5.2	5.8	7.7	6.2	7.8	7.7	< 5	7.24
Zinc	5	200	350	37	47	120	96	160	97	80	92	170	130	47.00
Mercury	0.05	0.5	1	< 0.05	< 0.05	0.11	0.12	0.15	0.12	0.08	0.09	0.12	0.18	0.03

Metals results presented in mg/kg dry weight

[A] POEO (Waste) Regulation 2005 - General Exemption Under Part 6, Clause 51 and 51A, The recovered aggregate exemption 2010. Table 2, Column 2

[C] POEO (Waste) Regulation 2005 - General Exemption Under Part 6, Clause 51 and 51A, The recovered aggregate exemption 2010. Table 2, Column 4

Results shown in ***italics*** are in excess of the Maximum Average Concentration for Characterisation

Results shown in **shading** are in excess of the Maximum Average Concentration for Routine Testing

Results shown in **BOLD** are in excess of the Absolute Maximum Concentration

PQL = Practical Quantitation Limit

Where average calculations are required, calculation includes components reported as non detected as 1/2 PQL. Underlined averages are those not detected

Appendix D

Laboratory Report Sheets

eurofins | mgt

Certificate of Analysis

Robert Carr and Associates Pty Ltd
PO Box 175
Carrington
NSW 2294

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Matt Clark**

Report **414527-S**
Client Reference HEX 10566
Received Date Apr 08, 2014

Client Sample ID			**SP1**	**SP2**	**SP3**	**SP4**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S14-Ap06564**	**S14-Ap06565**	**S14-Ap06566**	**S14-Ap06567**
Date Sampled			**Apr 07, 2014**	**Apr 07, 2014**	**Apr 07, 2014**	**Apr 07, 2014**
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract at 25°C)	5	uS/cm	100	290	1100	61
% Moisture	0.1	%	12	8.0	8.6	16
Heavy Metals						
Arsenic	2	mg/kg	2.0	< 2	4.7	< 2
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	5.5	< 5	7.9	< 5
Copper	5	mg/kg	11	9.0	10	7.3
Lead	5	mg/kg	9.9	< 5	7.5	8.6
Mercury	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	5	mg/kg	7.5	8.2	12	< 5
Zinc	5	mg/kg	63	36	47	50

Client Sample ID			**SP5**	**SP6**	**SP7**	**SP8**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S14-Ap06568**	**S14-Ap06569**	**S14-Ap06570**	**S14-Ap06571**
Date Sampled			**Apr 07, 2014**	**Apr 07, 2014**	**Apr 07, 2014**	**Apr 07, 2014**
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract at 25°C)	5	uS/cm	120	45	85	80
% Moisture	0.1	%	12	14	8.7	8.4
Heavy Metals						
Arsenic	2	mg/kg	< 2	< 2	< 2	2.4
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	< 5	< 5	5.9	5.2
Copper	5	mg/kg	9.0	8.4	10	7.6
Lead	5	mg/kg	6.5	6.3	6.8	7.1
Mercury	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	5	mg/kg	6.0	< 5	7.5	5.9
Zinc	5	mg/kg	39	90	52	31

Client Sample ID			SP9	SP10	SP11	SP12
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S14-Ap06572	S14-Ap06573	S14-Ap06574	S14-Ap06575
Date Sampled			Apr 07, 2014	Apr 07, 2014	Apr 07, 2014	Apr 07, 2014
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract at 25°C)	5	uS/cm	55	55	83	110
% Moisture	0.1	%	9.3	13	18	10
Heavy Metals						
Arsenic	2	mg/kg	3.3	2.9	2.4	< 2
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	< 5	< 5	6.3	6.1
Copper	5	mg/kg	12	9.6	7.7	5.5
Lead	5	mg/kg	6.6	6.6	14	22
Mercury	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	5	mg/kg	7.7	6.9	< 5	< 5
Zinc	5	mg/kg	44	40	37	47

Client Sample ID			SP13	SP14	SP15	SP16
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S14-Ap06576	S14-Ap06577	S14-Ap06578	S14-Ap06579
Date Sampled			Apr 07, 2014	Apr 07, 2014	Apr 07, 2014	Apr 07, 2014
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract at 25°C)	5	uS/cm	110	100	80	100
% Moisture	0.1	%	9.8	11	12	9.8
Heavy Metals						
Arsenic	2	mg/kg	< 2	< 2	< 2	4.0
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	6.4	6.7	6.9	7.7
Copper	5	mg/kg	9.0	9.7	12	10
Lead	5	mg/kg	62	62	120	76
Mercury	0.05	mg/kg	0.11	0.12	0.15	0.12
Nickel	5	mg/kg	5.0	5.2	5.8	7.7
Zinc	5	mg/kg	120	96	160	97

Client Sample ID			SP17	SP18	SP19	SP20
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S14-Ap06580	S14-Ap06581	S14-Ap06582	S14-Ap06583
Date Sampled			Apr 07, 2014	Apr 07, 2014	Apr 07, 2014	Apr 07, 2014
Test/Reference	LOR	Unit				
Conductivity (1:5 aqueous extract at 25°C)	5	uS/cm	110	87	120	130
% Moisture	0.1	%	10	9.8	10	10
Heavy Metals						
Arsenic	2	mg/kg	< 2	< 2	12	< 2
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	0.4
Chromium	5	mg/kg	< 5	< 5	8.3	6.9
Copper	5	mg/kg	< 5	15	18	10
Lead	5	mg/kg	68	73	94	110
Mercury	0.05	mg/kg	0.08	0.09	0.12	0.18
Nickel	5	mg/kg	6.2	7.8	7.7	< 5
Zinc	5	mg/kg	80	92	170	130

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Conductivity (1:5 aqueous extract at 25°C)	Sydney	Apr 14, 2014	7 Day
- Method: E032.2 Electrical Conductivity (EC)			
% Moisture	Sydney	Apr 14, 2014	28 Day
- Method: E005 Moisture Content			
Metals M8	Sydney	Apr 14, 2014	28 Day
- Method: LTM-MET-3040_R0 TOTAL AND DISSOLVED METALS AND MERCURY IN WATERS BY ICP-MS			

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Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Company Name:	Robert Carr and Associates Pty Ltd	**Order No.:**		**Received:**	Apr 8, 2014 9:00 AM
Address:	PO Box 175	**Report #:**	414527	**Due:**	Apr 15, 2014
	Carrington	**Phone:**	02 4902 9200	**Priority:**	5 Day
	NSW 2294	**Fax:**	02 4902 9299	**Contact Name:**	Matt Clark
Client Job No.:	HEX 10566				

Eurofins | mgt Client Manager: Ruth Callander

Sample Detail					% Moisture	Conductivity (1:5 aqueous extract at 25°C)	Metals M8
Laboratory where analysis is conducted							
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217					X	X	X
Brisbane Laboratory - NATA Site # 20794							
External Laboratory							
Sample ID	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
SP1	Apr 07, 2014		Soil	S14-Ap06564	X	X	X
SP2	Apr 07, 2014		Soil	S14-Ap06565	X	X	X
SP3	Apr 07, 2014		Soil	S14-Ap06566	X	X	X
SP4	Apr 07, 2014		Soil	S14-Ap06567	X	X	X
SP5	Apr 07, 2014		Soil	S14-Ap06568	X	X	X
SP6	Apr 07, 2014		Soil	S14-Ap06569	X	X	X
SP7	Apr 07, 2014		Soil	S14-Ap06570	X	X	X
SP8	Apr 07, 2014		Soil	S14-Ap06571	X	X	X
SP9	Apr 07, 2014		Soil	S14-Ap06572	X	X	X
SP10	Apr 07, 2014		Soil	S14-Ap06573	X	X	X

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Eurofins | mgt Client Manager: Ruth Callander

Sample Detail					% Moisture	Conductivity (1:5 aqueous extract at 25°C)	Metals M8
Laboratory where analysis is conducted							
Melbourne Laboratory - NATA Site # 1254 & 14271							
Sydney Laboratory - NATA Site # 18217					X	X	X
Brisbane Laboratory - NATA Site # 20794							
External Laboratory							
SP11	Apr 07, 2014		Soil	S14-Ap06574	X	X	X
SP12	Apr 07, 2014		Soil	S14-Ap06575	X	X	X
SP13	Apr 07, 2014		Soil	S14-Ap06576	X	X	X
SP14	Apr 07, 2014		Soil	S14-Ap06577	X	X	X
SP15	Apr 07, 2014		Soil	S14-Ap06578	X	X	X
SP16	Apr 07, 2014		Soil	S14-Ap06579	X	X	X
SP17	Apr 07, 2014		Soil	S14-Ap06580	X	X	X
SP18	Apr 07, 2014		Soil	S14-Ap06581	X	X	X
SP19	Apr 07, 2014		Soil	S14-Ap06582	X	X	X
SP20	Apr 07, 2014		Soil	S14-Ap06583	X	X	X

Eurofins | mgt Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
4. Results are uncorrected for matrix spikes or surrogate recoveries.
5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
6. Samples were analysed on an 'as received' basis. 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgment.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

****NOTE:** pH duplicates are reported as a range NOT as RPD

UNITS

mg/kg: milligrams per Kilogram

ug/l: micrograms per litre

ppb: Parts per billion

org/100ml: Organisms per 100 millilitres

MPN/100mL: Most Probable Number of organisms per 100 millilitres

mg/l: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Units

TERMS

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery
CRM	Certified Reference Material - reported as percent recovery
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands. In the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate	A second piece of analysis from a sample outside of the clients batch of samples but run within the laboratory batch of analysis.
Batch SPIKE	Spike recovery reported on a sample from outside of the clients batch of samples but run within the laboratory batch of analysis.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
ASLP	Australian Standard Leaching Procedure (AS4439.3)
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within
TEQ	Toxic Equivalency Quotient

QC - ACCEPTANCE CRITERIA

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxophene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxophene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.05			0.05	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	102			70-130	Pass	
Cadmium	%	114			70-130	Pass	
Chromium	%	113			70-130	Pass	
Copper	%	119			70-130	Pass	
Lead	%	97			70-130	Pass	
Mercury	%	90			70-130	Pass	
Nickel	%	113			70-130	Pass	
Zinc	%	96			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S14-Ap06564	CP	%	99			70-130	Pass	
Cadmium	S14-Ap06564	CP	%	105			70-130	Pass	
Chromium	S14-Ap06564	CP	%	98			70-130	Pass	
Copper	S14-Ap06564	CP	%	112			70-130	Pass	
Lead	S14-Ap06564	CP	%	90			70-130	Pass	
Mercury	S14-Ap06564	CP	%	92			70-130	Pass	
Nickel	S14-Ap06564	CP	%	104			70-130	Pass	
Zinc	S14-Ap06564	CP	%	115			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S14-Ap06574	CP	%	96			70-130	Pass	
Cadmium	S14-Ap06574	CP	%	103			70-130	Pass	
Chromium	S14-Ap06574	CP	%	95			70-130	Pass	
Copper	S14-Ap06574	CP	%	100			70-130	Pass	
Lead	S14-Ap06574	CP	%	114			70-130	Pass	
Mercury	S14-Ap06574	CP	%	93			70-130	Pass	
Nickel	S14-Ap06574	CP	%	104			70-130	Pass	
Zinc	S14-Ap06574	CP	%	112			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (1:5 aqueous extract at 25°C)	S14-Ap06564	CP	uS/cm	100	93	9.0	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S14-Ap06564	CP	mg/kg	2.0	2.1	2.0	30%	Pass	
Cadmium	S14-Ap06564	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S14-Ap06564	CP	mg/kg	5.5	5.4	4.0	30%	Pass	
Copper	S14-Ap06564	CP	mg/kg	11	12	8.0	30%	Pass	
Lead	S14-Ap06564	CP	mg/kg	9.9	9.2	7.0	30%	Pass	
Mercury	S14-Ap06564	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Nickel	S14-Ap06564	CP	mg/kg	7.5	7.8	4.0	30%	Pass	
Zinc	S14-Ap06564	CP	mg/kg	63	62	2.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Conductivity (1:5 aqueous extract at 25°C)	S14-Ap06574	CP	uS/cm	83	79	5.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S14-Ap06574	CP	mg/kg	2.4	2.0	17	30%	Pass	
Cadmium	S14-Ap06574	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S14-Ap06574	CP	mg/kg	6.3	6.5	3.0	30%	Pass	
Copper	S14-Ap06574	CP	mg/kg	7.7	9.0	16	30%	Pass	
Lead	S14-Ap06574	CP	mg/kg	14	12	10	30%	Pass	
Mercury	S14-Ap06574	CP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Nickel	S14-Ap06574	CP	mg/kg	< 5	6.0	21	30%	Pass	
Zinc	S14-Ap06574	CP	mg/kg	37	40	8.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Organic samples had Teflon liners	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Ruth Callander	Client Services
Bob Symons	Senior Analyst-Inorganic (NSW)
James Norford	Senior Analyst-Metal (NSW)

Dr. Bob Symons
Laboratory Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

Robert Carr & Associates Pty Ltd Trading as RCA Laboratories – Environmental
92 Hill Street PO Box 175, Carrington NSW 2294
ABN 53 063 515 711 Ph 02 4902 9200 – Fax 02 4902 9299
Email: administrator@rca.com.au Web www.rca.com.au

RCA Australia
92 Hill Street
CARRINGTON NSW 2294

Attention: John Gilbert

Project:	RCA ref 10683-701		
Date:	15.04.14		
Client reference:	Foreign Material Testing		
Received date:	7.04.14	**Number of samples:**	1
Client order number:	Not supplied	**Testing commenced:**	10.04.14

CERTIFICATE OF ANALYSIS

1 ANALYTICAL TEST METHODS

ANALYSIS	METHOD	UNITS	ANALYSING LABORATORY	NATA ANALYSIS/ NON NATA
Foreign Materials Content of recycled Crushed Concrete	T276	n/a	RCA Laboratories - Environmental	NON NATA

Robert Carr & Associates Pty Ltd Trading as RCA Laboratories – Environmental
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ABN 53 063 515 711 Ph 02 4902 9200 – Fax 02 4902 9299
Email: administrator@rca.com.au Web www.rca.com.au

2 RESULTS

ANALYSIS	UNITS	SP1 / C87	SP2 / A98	SP3 / 382	SP4 / TP3	SP5 / I97	SP6 / K106	SP7 / K183	SP8 / 1021	SP9 / 10
Soil										
Sample Number	-	041410683001	041410683002	041410683003	041410683004	041410683005	041410683006	041410683007	041410683008	041410683009
Date Sampled	-	7/04/2014	7/04/2014	7/04/2014	7/04/2014	7/04/2014	7/04/2014	7/04/2014	7/04/2014	7/04/2014
Sampled By		JG	JG	JG	JG	JG	JG	JG	JG	JG
Type I										
Metal	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Glass	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Asphalt	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stone	%	26.9	40.5	32.4	17.8	24.9	27.6	30.2	32.5	29.0
Ceramics	%	2.4	0.0	0.0	0.0	0.0	0.0	0.4	2.5	0.0
Slag	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Type II										
Plaster	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Clay Lumps	%	0.5	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0
Friable Material	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rubber		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Type III	%									
Plastic	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bitumen	%	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Paper	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cloth	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paint	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wood	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vegetable Matter	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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ANALYSIS	UNITS	SP10 / P18	SP11 / L164	SP12 / D70	SP13 / KKK	SP14 / I45	SP15 / 280	SP16 / F93	SP17 / H103	SP18 / 811
Soil										
Sample Number	-	041410683010	041410683011	041410683012	041410683013	041410683014	041410683015	041410683016	041410683017	041410683018
Date Sampled	-	7/04/2014	7/04/2014	7/04/2014	7/04/2014	7/04/2014	7/04/2014	7/04/2014	7/04/2014	7/04/2014
Sampled By		JG	JG	JG	JG	JG	JG	JG	JG	JG
Type I										
Metal	%	0.1	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0
Glass	%	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.3	0.1
Asphalt	%	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2
Stone	%	27.2	49.9	50.7	66.0	58.8	47.5	44.3	44.6	43.5
Ceramics	%	0.0	0.0	3.3	2.3	15.3	14.0	33.1	10.6	18.8
Slag	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Type II										
Plaster	%	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Clay Lumps	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Friable Material	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rubber		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Type III	%									
Plastic	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bitumen	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paper	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cloth	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paint	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wood	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vegetable Matter	%	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1

Robert Carr & Associates Pty Ltd Trading as RCA Laboratories – Environmental
92 Hill Street PO Box 175, Carrington NSW 2294
ABN 53 063 515 711 Ph 02 4902 9200 – Fax 02 4902 9299
Email: administrator@rca.com.au Web www.rca.com.au

ANALYSIS	UNITS	SP19 / 287	SP20 / K7
Soil			
Sample Number	-	041410683019	041410683020
Date Sampled	-	7/04/2014	7/04/2014
Sampled By		JG	JG
Type I			
Metal	%	0.0	0.0
Glass	%	0.0	0.3
Asphalt	%	7.5	0.1
Stone	%	54.6	43.2
Ceramics	%	12.0	20.2
Slag	%	0.0	0.0
Type II			
Plaster	%	0.2	0.1
Clay Lumps	%	0.0	0.0
Friable Material	%	0.0	0.0
Rubber		0.0	0.0
Type III	%		
Plastic	%	0.8	0.0
Bitumen	%	0.0	0.0
Paper	%	0.0	0.0
Cloth	%	0.0	0.0
Paint	%	0.0	0.0
Wood	%	0.0	0.0
Vegetable Matter	%	0.1	0.0

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Please contact the undersigned if you have any queries.

Yours sincerely

Laura Schofield B.Sc
Laboratory Manager
Robert Carr & Associates Pty Ltd Trading as
RCA Laboratories - Environmental

Geoff Mason
General Manager
Robert Carr & Associates Pty Ltd Trading as
RCA Laboratories - Environmental

RCA LABORATORIES
• ENVIRONMENTAL • CONSTRUCTION MATERIALS TESTING

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92 Hill Street, Carrington NSW 2294
www.rca.com.au Email: labenviro@rca.com.au

ENV-F103-4

Client Name: RCA Australia
Client Site: HEX
Contact Name: John Gilbert
Phone Number: 49029210
Email Report To: johng@rca.com.au
Project Manager: Matt Clark

Turnaround Required: ☐ Urgent ☒ Standard (5 Day)
Date Required:
Expected Reporting Date:
(Laboratory Use Only)

RCA Job Number: 10566

ANALYSIS REQUIRED

SAMPLE INFORMATION					Foreign Materials												Notes:
RCA Laboratories Environmental Sample Number	Client ID / Description	Date	Matrix	Total Samples													
041410683001	SP1/C87	7/04/14	Soil	1	X												
041410683002	SP2/A98	7/04/14	Soil	1	X												
041410683003	SP3/382	7/04/14	Soil	1	X												
041410683004	SP4/TP3	7/04/14	Soil	1	X												
041410683005	SP5/I97	7/04/14	Soil	1	X												
041410683006	SP6/K106	7/04/14	Soil	1	X												
041410683007	SP7/K183	7/04/14	Soil	1	X												
041410683008	SP8/1021	7/04/14	Soil	1	X												
041410683009	SP9/10	7/04/14	Soil	1	X												
041410683010	SP10/P18	7/04/14	Soil	1	X												
041410683011	SP11/L164	7/04/14	Soil	1	X												
041410683012	SP12/D70	7/04/14	Soil	1	X												
041410683013	SP13/KKK	7/04/14	Soil	1	X												
041410683014	SP14/145	7/04/14	Soil	1	X												
041410683015	SP15/280	7/04/14	Soil	1	X												
041410683016	SP16/F93	7/04/14	Soil	1	X												

RELINQUISHED BY		RECEIVED BY		Laboratory use only (circle appropriate)
Name: John Gilbert	Date: ~~14/02/2014~~ 7/4/14	Name:	Date: ~~14/04~~ 7/4/14. 10:31	**Received in good condition:** Yes No
Of: RCA Australia	Time:	Of: RCALE.	Time:	**Chilled:** Yes No

RCA Job Number: 10566

ANALYSIS REQUIRED

SAMPLE INFORMATION

RCA Laboratories Environmental Sample Number	Client ID / Description	Date	Matrix	Total Samples	Foreign Materials											Notes:
0414068301 7	SP17/H103	7/04/14	Soil	1	x											
0414068301 8	SP18/811	7/04/14	Soil	1	x											
0414068301 9	SP19/287	7/04/14	Soil	1	x											
0414068302 0	SP20/K7	7/04/14	Soil	1	x											

RELINQUISHED BY		RECEIVED BY		Laboratory use only (circle appropriate)
Name:	Date:	Name:	Date:	**Received in good condition:** Yes No
Of:	Time:	Of:	Time:	**Chilled:** Yes No

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Unit F3 - 6 Building F, 16 Mars Road, Lane Cove
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☐ **Melbourne**
2 Kingston Town Close, Oakleigh, VIC 3166
Phone: +613 8564 5000 Fax: +613 8564 5090
Email: enquiries.melb@mgtlabmark.com.au

CHAIN OF CUSTODY RECORD

CLIENT DETAILS — Page 1 of 2

Company Name :	RCA Australia	**Contact Name:**	John Gilbert	**Purchase Order :**	**COC Number :**
Office Address :	92 Hill St Carrington NSW	**Project Manager :**	Matt Clark	**PROJECT Number :** 10566	**Eurofins | mgt quote ID :**
		Email for results :	johng@rca.com.au; mattc@rca.com.au	**PROJECT Name :** HEX	**Data output format:**

Special Directions & Comments :

Eurofins | mgt DI water batch number:

	Sample ID	Date	Matrix	EC	Metals 8 (Arsenic, Cadmium, Chromium (total), Copper, Nickel, Lead, Zinc, Mercury)
1	SP1	7/04/2014	Soil	x	x
2	SP2	7/04/2014	Soil	x	x
3	SP3	7/04/2014	Soil	x	x
4	SP4	7/04/2014	Soil	x	x
5	SP5	7/04/2014	Soil	x	x
6	SP6	7/04/2014	Soil	x	x
7	SP7	7/04/2014	Soil	x	x
8	SP8	7/04/2014	Soil	x	x
9	SP9	7/04/2014	Soil	x	x
10	SP10	7/04/2014	Soil	x	x
11	SP11	7/04/2014	Soil	x	x
12	SP12	7/04/2014	Soil	x	x
13	SP13	7/04/2014	Soil	x	x
14	SP14	7/04/2014	Soil	x	x
15	SP15	7/04/2014	Soil	x	x
16	SP16	7/04/2014	Soil	x	x

Some common holding times (with correct preservation). For further information contact the lab

Waters		Soils	
BTEX, MAH, VOC	14 days	BTEX, MAH, VOC	14 days
TRH, PAH, Phenols, Pesticides	7 days	TRH, PAH, Phenols, Pesticides	14 days
Heavy Metals	6 months	Heavy Metals	6 months
Mercury, CrVI	28 days	Mercury, CrVI	28 days
Microbiological testing	24 hours	Microbiological testing	72 hours
BOD, Nitrate, Nitrite, Total N	2 days	Anions	28 days
Solids - TSS, TDS etc	7 days	SPOCAS, pH Field and FOX, CrS	24 hours
Ferrous Iron	7 days	ASLP, TCLP	7 days

Containers:

1LP	250P	125P	1LA	40mL vial	125mL A	Jar

Sample comments:

Laboratory Staff

Relinquished By:	**Received By:** Andrew Black
Date & Time::	**Date & Time:** 7/4/14 1pm
Signature:	**Signature:**

Turn around time

1 DAY ☐ 2 DAY ☐ 3 DAY ☐
5 DAY ☑ 10 DAY ☐ Other:

Method Of Shipment

☑ Courier
☐ Hand Delivered
☐ Postal
Courier Consignment # :

Temperature on arrival: 8.0 °C

Report number: 414527

RECEIVED
08 APR 2014
BY: Tom 9:20a

eurofins | mgt

☐ **Sydney**
Unit F3 - 6 Building F, 16 Mars Road, Lane Cove
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Phone: +613 8564 5000 Fax: +613 8564 5090
Email: enquiries.melb@mgtlabmark.com.au

CHAIN OF CUSTODY RECORD

CLIENT DETAILS

Company Name :	RCA Australia	**Contact Name:**	John Gilbert	**Purchase Order :**	**COC Number :**
Office Address :	92 Hill St Carrington NSW	**Project Manager :**	Matt Clark	**PROJECT Number :** 10566	**Eurofins | mgt quote ID :**
		Email for results :	johng@rca.com.au; mattc@rca.com.au	**PROJECT Name :** HEX	**Data output format:**

Special Directions & Comments :

Eurofins | mgt DI water batch number:

Analytes

	Sample ID	Date	Matrix	EC	Metals 8 (Arsenic, Cadmium, Chromium (total), Copper, Nickel, Lead, Zinc, Mercury)
1	SP17	7/04/2014	Soil	x	x
2	SP18	7/04/2014	Soil	x	x
3	SP19	7/04/2014	Soil	x	x
4	SP20	7/04/2014	Soil	x	x

Some common holding times (with correct preservation). For further information contact the lab

Waters		Soils	
BTEX, MAH, VOC	14 days	BTEX, MAH, VOC	14 days
TRH, PAH, Phenols, Pesticides	7 days	TRH, PAH, Phenols, Pesticides	14 days
Heavy Metals	6 months	Heavy Metals	6 months
Mercury, CrVI	28 days	Mercury, CrVI	28 days
Microbiological testing	24 hours	Microbiological testing	72 hours
BOD, Nitrate, Nitrite, Total N	2 days	Anions	28 days
Solids - TSS, TDS etc	7 days	SPOCAS, pH Field and FOX, CrS	24 hours
Ferrous Iron	7 days	ASLP, TCLP	7 days

Containers:

1LP	250P	125P	1LA	40mL vial	125mL A	Jar	

Sample comments:

Laboratory Staff

Relinquished By:

Date & Time::

Signature:

Received By:

Date & Time:

Signature:

RECEIVED 08 APR 2014 BY: Tom 9:20am

Turn around time

1 DAY ☐ 2 DAY ☐ 3 DAY ☐

5 DAY ☑ 10 DAY ☐ Other:

Method Of Shipment

☑ Courier
☐ Hand Delivered
☐ Postal

Courier Consignment # :

Temperature on arrival: 8.0

Report number: 414527

Appendix I

Photographs of Fill for Lot 2, DP502196

Photo 1: 6/5/14: Loxford Fabrications.

Photo 2: 6/5/14: Imported fill removal in progress at Loxford Fabrications.

Title:	Phase 2 ESA	Approved: KW	Project-Nr.: AS130348	Date: July 2014
Site:	Buffer Zone Parcel 10			
Client:	Hydro Aluminium Kurri Kurri Pty Ltd		ENVIRON	

Photo 5: 6/5/14: Imported fill removal in progress at Loxford Fabrications.

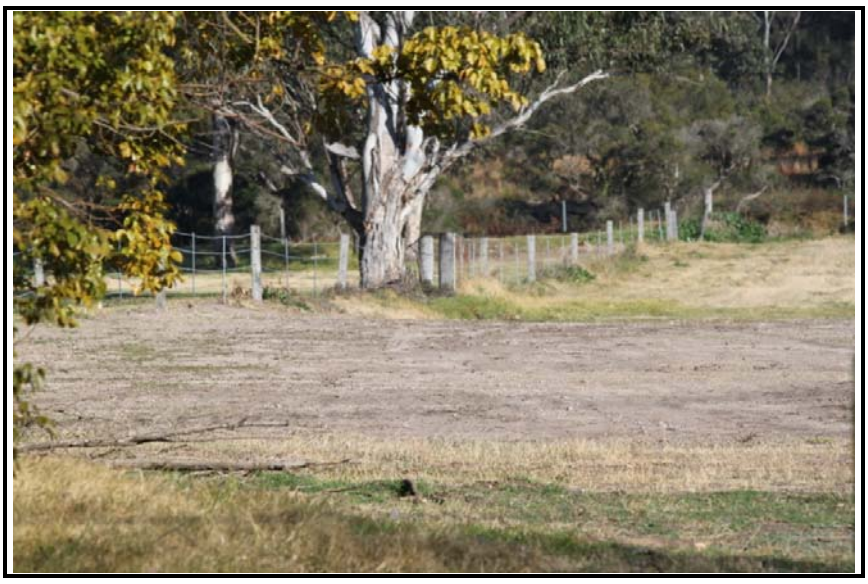

Photo 6: 23/7/14: Final surface following the removal of imported fill at Loxford Fabrications.

Photo 7: 23/7/14: Final surface following the removal of imported fill at Loxford Fabrications.

Photo 8: 23/7/14: Final surface following the removal of imported fill at Loxford Fabrications.