

Phase 2 Environmental Site Assessment, Parcel 15

Prepared for:
Hydro Aluminium Kurri Kurri Pty Ltd

On behalf of:

Prepared by:
ENVIRON Australia Pty Ltd

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ENVIRON

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This document is issued in confidence to Hydro Aluminium Kurri Kurri Australia Pty Ltd for the purposes of a Phase 2 Environmental Site Assessment. It should not be used for any other purpose. The scope of the Phase 2 Environmental Site Assessment was based on ENVIRON's proposal dated 18 November 2013.

Specific assumptions and limitations identified by ENVIRON as being relevant are set out in the report. The methodology adopted and sources of information used by ENVIRON are outlined in our scope of work. ENVIRON has made no independent verification of this information beyond the agreed scope of works.

This report should be read in full.

VERSION CONTROL RECORD

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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

ENVIRON completed a Phase 2 Environmental Site Assessment at Parcel 15, located in the inner eastern portion of the Buffer Zone of the Hydro Aluminium Kurri Kurri Smelter. Parcel 15 is owned by Hydro Aluminium and currently comprises unused bushland, open flat unoccupied land and a motorcycle race track development.

The objectives of the assessment were to assess the potential for contamination at Parcel 15 based on historical and current land use and to assess the suitability of Parcel 15 for the purpose of general industrial (IN1) and environmental conservation (E2) land use.

The ESA comprised a site walkover, surface soil sampling, surface water sampling, intrusive investigation by backhoe in embankments and filled areas and completion of a hazardous The Phase 1 identified that contamination of Parcel 15 may have occurred from dust deposition due to the proximity of the Hydro smelter, illegal dumping due to the remoteness of the area and contamination from the development and use of the site as a Motocross and Speedway facility.

To assess for potential contaminants of concern on Parcel 15, ENVIRON completed a site walkover, surface soil sampling, surface water sampling, intrusive investigation by backhoe in embankments and filled areas and completion of a hazardous materials audit.

Surface soil sampling for soluble fluoride identified low and below guideline concentrations in all samples. These results indicate that the site has not been impacted by dust deposition from the smelter.

The site walkover identified the presence of fill materials, including potentially asbestos containing material (ACM) fragments on the eastern Speedway access track and within the Speedway spectator embankment. The Speedway facility was observed to contain piles of waste including tyres and demolition wastes, as well as unbunded drums of fuel or oils. Waste tyre stockpiles were present on the Motocross facility.

Soil sampling of filled soils on the Speedway spectator embankment and the eastern Motocross access track identified acceptable and below guideline concentrations for all analytes tested with the exception of asbestos. Fragments of bonded ACM were identified on the surface of the Speedway eastern access track.

Two samples, collected from the surface water ponds on Lot 419 and Lot 2, identified concentrations of copper, chromium, nickel and zinc, slightly above the adopted guidelines. These concentrations are not significant, given that no historical or ongoing source for these metals was identified.

A Hazardous Materials Audit was completed to assess the buildings on Parcel 15. Asbestos cement sheeting was identified within buildings at the Speedway facility. ACM was observed to be in poor condition and represents a potential health risk.

Parcel 15 will be suitable for the current landuse subject to the completion of the following interim management requirements:

- An appropriately licensed asbestos removal contractor should be engaged to remove and dispose of the ACM waste in the eastern Speedway access track. Alternatively, the track can be capped with Virgin Excavated Natural Material (VENM) or Excavated Natural Material (ENM) to remove the exposure risk to humans. Validation of the area following removal or capping should be undertaken by an appropriately qualified consultant and documented.

- The recommendations for the handling and management of ACM and polychlorinated biphenyls within the building materials as outlined in the Hazardous Materials Audit should be followed;

- Hydro should continue to monitor and manage impacts to surface water from overland flow that is impacted by leachate from the Capped Waste Stockpile. Any impacts to soils, groundwater or surface water should be remediated as part of the Capped Waste Stockpile remediation program.

Additional investigations are required to assess the suitability of Parcel 15 for the proposed environmental conservation (E2) and general industrial (IN1) landuse, as follows:

- The asbestos identified in the Speedway embankment requires further detailed investigation in accordance with the NEPM to assess the risk to site users from the asbestos fibres identified.

ENVIRON considers that Parcel 15 can be made suitable for the proposed environmental conservation (E2) and general industrial (IN1) land use following remediation. A Remedial Action Plan will be completed to assess the remedial options and outline the requirements for remediation and validation.

Hydro has separately 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 use.

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 15. Parcel 15 is located off Dickson Road, Loxford, New South Wales (2326). Parcel 15 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 smelter in May 2014. A Rezoning Masterplan has been developed that identifies Parcel 15 to comprise land suitable for general industrial (IN1) and environmental conservation (E2) landuse.

A Phase 1 Environmental Site Assessment has previously been prepared for all Hydro owned lands and evaluated the potential for contamination. The Phase 1 assessment identified that contamination of Parcel 15 may have occurred from dust deposition due to the proximity of the Hydro smelter and activities associated with a motor cross track.

It is noted that at the time of the fieldwork, this land parcel was named Employment Land Subarea 2 and as such the soil samples reference this name. The parcel was renamed Parcel 15 during the rezoning process.

The location of Parcel 15 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 15 based on historical and current land use and to assess the suitability of Parcel 15 for the purpose of general industrial (IN1) and environmental conservation (E2) 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;
  - Collection of two surface water samples from ponds on the eastern margin of Parcel 15 (adjacent to Swamp Creek);
  - A site walkover to evaluate other potential locations of buried waste or illegal dumping.

  - Excavations of test pits on Parcel 15, where the site walkover indicated the presence of fill material, specifically the spectator mounds around the motorcycle race track on Dickson Road and the road base used in the new access track to the east of the race track.
- 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 15 suitable for the current and proposed land use.

2 Site Description

2.1 Site Location

Parcel 15 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 15 is Dickson Road, Loxford, New South Wales, Australia. The location of Parcel 15 is shown in **Figure 1**.

Parcel 15 is located within the Buffer Zone of the Hydro Aluminium Kurri Kurri Smelter, immediately east of the smelter, located on the northern side of Dickson Road. The Buffer Zone is an area of land surrounding the smelter that provides a buffer between the smelter and surrounding communities.

Part of Parcel 15 has been developed by the Junior Motorcycle Club and the Kurri Kurri Speedway for motorcycle and car racing. These facilities include earth racing tracks and ancillary facilities.

The remainder of the parcel is predominantly covered in grasses, scattered small trees and shrubs with the eastern-most area (Lot 419 in the south and northern area of Lot 2, adjacent to Swamp Creek, being densely vegetated. A north-south linear pond system is located immediately adjacent to Swamp Creek (within Lots 419 and 2).

Parcel 15 is located within the Cessnock Local Government Area. The western part is zoned IN1 – General Industrial. The eastern part comprising a strip adjacent to Swamp Creek is zoned RU2 – Rural Landscape, under the Cessnock Local Environment Plan.

Parcel 15 is approximately 35 hectares (ha) and comprises the lot numbers and development plans listed in **Table 1**:

Table 1: Lot and Development Plans for Parcel 15.

Subarea	Lot/ DP	Area (ha)	Total Area (ha)
Parcel 15	Lot 2 DP233125 Lot 415 DP755231 Lot 416 DP755231 Lot 417 DP755231 Lot 418 DP755231 Lot 419 DP755231	20.6 2.7 2.7 2.6 2.6 3.5	34.7

Current land uses surrounding Parcel 15 are as follows:

- North: Farmland;
- South: Dickson Road then rural residential land;
- East: Farmland;
- West: The smelter then bushland.

Parcel 15 is located immediately to the east of the smelter site boundary.

2.2 Site Setting

2.2.1 Topography

Parcel 15 is located in a low lying swampy area of the Buffer Zone at approximately 14 mAHD. The main entrance off Dickson Road to Parcel 15 extends along its southern boundary and is the highest point on Parcel 15. The natural topography is generally flat, although the race track facilities comprise man-made landforms at a higher elevation to the natural topography.

2.2.2 Regional Geology

According to the review of the regional geology described on the Sydney Basin Geological Sheet, Parcel 15 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 15 associated with surface water bodies. Quaternary sediments which are associated with Swamp Creek (approximately 100m east of Parcel 15) and the Hunter River consist of gravel, sand, silt and clay.

2.2.3 Site Hydrology

Surface water from Parcel 15 discharges primarily via run off to man-made and natural drainage lines which discharge surface water to the northern and eastern site boundaries.

Surface water in the eastern portion of Parcel 15 is directed via drainage lines, east, towards Swamp Creek, which discharges into Wentworth Swamp. Wentworth Swamp in turn discharges to the Hunter River approximately 7km northeast of Parcel 15 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 15 is expected to flow north east to Swamp Creek located approximately 100m east of the site.

According to the NSW Office of Environment and Heritage (Natural Resource Atlas), there are 21 licensed groundwater abstractions (bores) located within 2km of Parcel 15. 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 15 has been included in **Appendix A**. The bores are used for monitoring purposes. No further information, such as depth to water or logging information was provided.

The Hunter River Alluvium Groundwater Management Unit (GMU) is an important groundwater resource to the region. Groundwater extraction for irrigation, urban supply, drought supply, stock, domestic and commercial/ industrial use occurs, with volumes in excess of 10,000ML per annum extracted from the Hunter River Alluvium GMU. Aquifer storage and recovery is also an important use of this GMU. It is noted that the Hunter River GMU is not the primary drinking water supply in the region, although the protection of drinking water is a water quality objective for the Hunter River (NSW Water Quality and River Flow Objectives)(www.environment.nsw.gov.au/ieo/Hunter/index.htm).

2.3 Site Sensitivity

The sensitivity of Parcel 15 with respect to surface water and groundwater is considered to be moderate based on the following:

- Surface water and groundwater discharge into Swamp Creek, on the Parcel's eastern margin, which discharges to the Hunter River via Wentworth Swamp within the Fishery Creek Catchment, approximately 7km northeast of Parcel 15 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 15 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. Additional information was also sought from Mr Kerry McNaughton, Hydro's Buffer Zone Supervisor. Available information is summarised in the following.

- Earliest records (aerial photograph in 1951) showed Parcel 15 comprised cleared farm land with one dwelling in the south of the parcel near Dickson Road. The dwelling was located on Lot 417 in DP 755231 and was reportedly demolished prior to the construction of the smelter in approximately the late 1960's (pers.corres. K McNaughton);

- Part of Parcel 15 was leased to the Kurri Kurri Junior Motorcycle Club in the late 1970's for construction a motocross track. The track comprised of a soil course with earth jumps and ramps and ancillary facilities including a spectator stand. It is likely that imported and indigenous soils were used to construct the track (pers.corres. K McNaughton). The track was understood to have been reconstructed in 2002 following a major bushfire. Access to the facility was by an unsurfaced access road from Dickson Road;

- In approximately 2009, a third track was constructed to the south of the motocross facility. The land was leased from Hydro by the Kurri Kurri Speedway who constructed a speedway racing track comprising an oval course with earth spectator embankments, access tracks, 'pit lane', ancillary facilities. Kurri Kurri Speedway reported that the track and embankments were constructed from surplus soils arising during Cessnock City Council roadworks at nearby Mitchell Avenue. Kurri Kurri Speedway has been unable to provide any documentation of the material source;

- The construction of the Speedway restricted access to the Motocross facility and an alternate access way was constructed by Kurri Kurri Speedway. This access is situated further to the east of the Speedway, refer to **Figure 4**, and was constructed from soils won from the Clay Borrow Pit, an area within the Hydro buffer zone where good quality clays have been identified;

- Lot 2 DP 233125 was developed as a motor cross track mid to late 1970's (pers.corres K McNaughton). Lot 418 was also constructed as a motorcycle racing track approximately five years ago including spectator embankments constructed from imported fill materials.

The location of the motocross track, speedway and former dwelling are included in **Figure 3**.

The buildings at the Speedway were the subject of a Hazardous Materials Audit, a copy of which is attached in **Appendix H**. The audit found asbestos containing materials in the demountable building at the Speedway and in demolition waste used in a gravel road in the east of the Speedway property.

Based on the historical site information potential activities that could give rise to contamination at the site were identified to be:

- Smelter dust deposition due to the location of Parcel 15 immediately east of the smelter boundary;
- The location of Parcel 15 and remoteness of surrounding bushland may also give rise to illegal dumping although it is noted that the buffer zone area is fenced and regularly monitored by Hydro personnel.
- The activities of tenants in the construction and operation of the race tracks including hydrocarbons from fuels and oils, waste materials such as tyres and general debris, heavy metals and asbestos containment materials (ACM) in imported fill materials; and
- Demolition waste from the removal of the former residence.

4 Previous Investigations

4.1 Surface Water

4.1.1 ENVIRON

Surface water sampling was undertaken in Parcel 15 as part of additional investigations completed at an area of the smelter known as the capped waste stockpile (ENVIRON 2012). Surface water samples were collected from one location (SW3) at a dam adjacent to Swamp Creek within Parcel 15 and analysed for pH, electrical conductivity, fluoride, free cyanide and aluminium, which are contaminants of concern associated with the capped waste stockpile.

Results for pH and electrical conductivity were consistent with a fresh water stream. Aluminium concentrations exceeded the criteria for the protection of 95% of aquatic ecosystems. Free cyanide concentrations did not exceed this criterion. Fluoride concentrations exceeded the criteria for stock watering.

The dam is located down gradient of a leachate plume associated with the capped waste stockpile. The groundwater plume exfiltrates to surface at several topographically low areas between the capped waste stockpile and the dam, and the dam is considered to collect surface water runoff at times of high flow (i.e. during high rainfall events). The close proximity of the dam to Swamp Creek on the eastern boundary of Parcel 15 indicates that the dam provides an inflow point to Swamp Creek. ENVIRON completed an ecological risk assessment (ENVIRON 2013a), which provided a comparison of surface water quality upstream and downstream of this inflow point and concluded that there was no significant change in risk from fluoride concentrations in Swamp Creek as a result of surface water inflow from water associated with the capped waste stockpile groundwater plume.

Aluminium concentrations at the dam exceeded the criterion for the protection of 95% of aquatic ecosystems. The ecological risk assessment (ENVIRON 2013a) concluded that there were no apparent risks from aluminium concentrations within surface water in Swamp Creek.

Surface water sampling locations and results tables are included in **Appendix B**. These results are discussed further in **Section 8.1**.

4.1.1 Hydro Routine Monitoring

Routine surface water monitoring is undertaken in Parcel 15 by Hydro on a monthly basis and for the Annual Environmental Management Review (AEMR). A surface water sample is collected from the pond from Lot 2, in Parcel 15 that ENVIRON sampled as part of the current investigation. Surface water samples are routinely analysed for pH, electrical conductivity and fluoride. Biannually the samples are also analysed for free cyanide.

Results from routine monitoring between July 2013 and December 2013 were evaluated for this report. Results for pH and electrical conductivity were consistent with a fresh water stream. Fluoride concentrations generally exceeded the criteria for stock watering.

Surface water sampling locations and results tables are included in **Appendix B**. These results are discussed further in **Section 8.1**.

5 Sampling and Analytical Quality Plan

5.1 Potential Areas and Contaminants of Concern

Based on Parcel 15 historical information as discussed in **Section 3**, the following areas of concern were identified as follows.

- Former dwelling on Lot 417 that has been demolished.
- The Speedway on Lot 417, which has embankments constructed from imported fill material.
- Import of materials to the site to create race tracks and access roads.
- Smelter dust deposition.
- Illegal dumping and waste dumping from use of the site by the tenants.

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

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

5.2 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 G**.

5.3 Sampling Design

The sampling design was optimised following the development of DQOs and DQIs. The sampling design is outlined below.

5.3.1 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 4Ha.

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 15. 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.

5.3.2 Asbestos

To assess the potential for asbestos and other illegally dumped wastes to be present at Parcel 15, 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 visually 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.

To assess for the potential for asbestos associated with the current and former dwellings at Parcel 15, a 10m by 10m grid was set up in an accessible, cleared area 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.

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

5.3.3 Assessment of Fill

The site walkover identified the presence of fill material at Parcel 15 in the spectator embankments of the Speedway and along the recent access track from the eastern end of Dixon Road, north towards the motocross facility.

A sample of fill was collected from the northern end of the spectator embankment (EMP2-S11) and analysed for a range of potential contaminants, including heavy metals, total recoverable hydrocarbons (TRH), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs), organophosphorous pesticides (OPPs) and asbestos.

A second round of fieldwork was undertaken in March 2014, to further assess the presence of contamination within the fill. A backhoe was used to excavate test pits into areas of potential fill identified at Parcel 15 to allow for visual inspection of the fill as well as sample collection.

The number of test pits completed across Parcel 15 is shown on **Figure 4** and comprised:

- Six test pits excavated in the Speedway spectator embankment; and
- Three test pits excavated in the Lot 418 access track.

The test pits were logged by an ENVIRON environmental scientist and soil samples were collected for analysis.

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

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

5.3.4 Surface Water

Two surface water samples were collected from ponds located on the north-east corner of Lot 419 and the large pond on the north-eastern margin of Lot 2, to assess for impacts from the race track facilities. Samples were analysed for heavy metals, total recoverable hydrocarbons (TRH), polycyclic aromatic hydrocarbons (PAHs) and cations and anions. The laboratory was NATA accredited for the analyses.

6 Basis for Assessment Criteria

6.1 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 15 from the NEPM are as follows:

- HIL D – Health investigation level for commercial/industrial such as shops, offices, factories and industrial sites. 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 2m 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 D	**EIL**
Arsenic	3000	160
Cadmium	900	-
Chromium (VI)	3600	320 (CR III, 1% clay)
Copper	240 000	130
Lead	1500	1800
Nickel	6000	40
Zinc	400 000	380
Mercury (inorganic)	730	-
Fluoride	Ref Table 5	Ref Table 5
Cyanide (free)	1500	-
Carcinogenic PAHs (as BaP TEQ)	40	-
Total PAHs	4000	-
DDT+DDE+DDD	3600	-
Aldrin +dieldrin	45	-
Chlordane	530	-
Endosulfan	2000	-
Endrin	100	-
Heptachlor	50	-
Methoxychlor	2500	-
Chlorpyrifos	2000	-

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

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 D (mg/kg) - Sand				
	0 to <1m	**1m to <2m**	**2m to <4m**	**4m+**
Toluene	NL	NL	NL	NL
Ethylbenzene	NL	NL	NL	NL
Xylenes	230	NL	NL	NL
Naphthalene	NL	NL	NL	NL
Benzene	3	3	3	3
F1(4)	260	370	630	NL
F2(5)	NL	NL	NL	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.

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

Table 4: ESLs and Management Limits for Petroleum Hydrocarbons in Soil			
TRH fraction	**Soil texture**	**ESLs (mg/kg dry soil)**	**Management Limits[1] (mg/kg dry soil)**
		Commercial and Industrial	**Commercial and Industrial**
F1 C6- C10	Fine	215*	800
F2 >C10-C16	Fine	170*	1000
F3 >C16-C34	Fine	2500	5000
F4 >C34-C40	Fine	6600	10 000
Benzene	Fine	95	-
Toluene	Fine	135	-
Ethylbenzene	Fine	185	-
Xylenes	Fine	95	-
Benzo(a)pyrene	Fine	0.7	-

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

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

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

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

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) does 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 level is protective of commercial and industrial site users and is provided in **Table 6**:

Table 6: Site Specific Soil Assessment Guidelines (mg/kg) for Fluoride	
Preliminary screening levels	
Land Use	**Preliminary screening level**
Commercial/ industrial - soil	F 17000mg/kg

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.

6.2 Surface Water

The assessment criteria for the assessment of surface water were sourced from the following references:

- NEPC (2013) National Environmental Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) (NEPM).
- NSW DEC (2007) Guidelines for the Assessment and Management of Groundwater Contamination;
- ANZECC & ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality.
- ENVIRON (2013) Preliminary Screening Level, Health Risk Assessment for Fluoride and Aluminium, Part of the Kurri Kurri Aluminium Smelter, Hart Road, Loxford.

6.2.1 Potential Beneficial Uses

Potential beneficial uses of surface water on site and down gradient of Parcel 15 include:

- Discharge into Swamp Creek, which supports aquatic ecosystems, and potentially flows into the Hunter River;
- Extraction of water from Swamp Creek may also be used for stock watering and/ or irrigation.
- Discharge into groundwater, which may be used by local communities for domestic, recreation, monitoring, irrigation and stock watering purposes, as described in **Section 2.2.4**.

It is noted that drinking water has not been included as a potential beneficial use of water from Swamp Creek, for the following reasons:

- Drinking water supply to the local communities is reticulated and originates from Chichester Dam located on the Chichester River;
- The Kurri Waste Water Treatment Works is located immediately up gradient of Parcel 15. The Works has a licensed discharge point into Swamp Creek, which flows into Wentworth Swamp. Extraction of surface water for drinking water downgradient of this discharge point is therefore not undertaken.

6.2.2 Appropriate Criteria for Surface Water

Based on the review of potential beneficial uses of groundwater and surface water, the criteria for protection of aquatic ecosystems, irrigation and stock watering will be used. Additionally, site specific preliminary screening levels for fluoride and aluminium in surface water have been developed for the Hydro Aluminium Kurri Kurri Smelter (ENVIRON 2013). These are protective of human health and are as follows:

- Surface water (recreational use): Fluoride – 1.5mg/L, Aluminium – 9mg/L.

The investigation levels presented in ANZECC and ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality are considered applicable for the protection of aquatic ecosystems of receiving waters. ANZECC (2000) advocates a site-

specific approach to developing guideline trigger values based on such factors as local biological affects data and the current levels of disturbance of the ecosystem. The guidelines present ‘low risk trigger values’ which are defined as concentrations of key performance parameters below which there is a low risk of adverse biological effects. If these trigger values are exceeded, then further action is required which may include further site-specific investigations to assess potential contamination or management/ remedial action.

Low risk trigger values are presented in Table 3.4.1 of ANZECC (2000) for the protection of 80-99% of species in fresh and marine waters, with trigger values depending on the health of the receiving waters.

Surface water results will be compared against trigger values for the protection of 95% of freshwater species. A 95% protection of fresh water species was selected due to the indication from the Hunter-Central Rivers Catchment Management Authority that declining stream water quality and a reduction in diversity of native plants and animals has occurred in the last ten years. The 99% level of protection was adopted for compounds that are considered to be bioaccumulative and this approach is conservative.

ANZECC (2000) indicates there is currently insufficient data to derive a high reliability trigger value for TRH but propose a low reliability trigger value of 7µg/L. This guideline is considered by industry to be overly conservative and is below the TRH detection limit that most laboratories can achieve. Therefore the limit of reporting (LOR) will be adopted as a screening trigger for TRH.

Trigger values for cadmium, copper, nickel, lead and zinc can be modified for hardness, as the bioavailability of these heavy metals decreases with increasing hardness. Total hardness was calculated for the receiving water using calcium and magnesium concentrations, with results indicating a hardness of average 50mg/L. Trigger values modified for water hardness have been used, as per Table 3.4.3 of ANZECC (2000).

Surface water results will also be compared against trigger values for irrigation and stock watering. Section 4.3.4 of ANZECC (2000) indicates that stock watering trigger values for heavy metals and metalloids are for total concentrations, irrespective of whether the constituent is dissolved, complexed with an organic compound or bound to suspended solids. Fluoride is included in this section.

Investigation levels for livestock drinking water are not available for organic contaminants, such as TRH and PAHs. In the absence of available investigation levels, the limit of reporting (LOR) will be adopted as a screening trigger for TRH and PAHs.

The long term trigger value has been used for irrigation guidelines. Section 9.2.5.11 of ANZECC (2000) indicates that the long term trigger value for fluoride is based on the assumption that the irrigation water could potentially be phytotoxic to sensitive plant species or could contaminate stock drinking water. As stock watering guidelines are for total metal and metalloid concentrations, total fluoride concentrations will be used.

7 Results

7.1 Site Walkover

A site walkover was completed to identify areas of concern, such as illegally dumped wastes and fill at Parcel 15. The findings of the site walkover are described in the following.

An asbestos walk-over grid (Q1) was undertaken in the south-west corner of Lot 417 at the approximate location of the former demolished house, (**Figure 3**). No evidence of the original house was visible.

The Speedway comprises an oval-shaped motorcycle race track surrounded by a grass-covered spectator embankment consisting of soil fill to a height of up to 4m. The western side of the Speedway comprises small demountable buildings associated with site facilities (offices, storage maintenance, competitor organization). Localized oil staining was observed on the ground around the entrance to the pits area (on the mid-western side of the speedway) associated with storage/dispensing of lubricating oils from drums.

The Speedway infrastructure includes a western access road along which is a number of shipping containers used for storage. Inspection of this area identified the presence of various wastes including tyres, empty drums, steel and concrete wastes. More recently placed fill was apparent on the south-west end of the Speedway against the embankment, as a foundation for an amenities block.

The Motocross tracks appear to have been constructed by landscaping the existing cleared area into tracks, pushing up mounds and constructing barriers and fencing. A few small structures and compounds were located around the perimeter of the tracks for storage and amenities. Some small stockpiles of waste materials were identified including old tyres (which were also used as barriers in construction of some of the track area), broken concrete, wood (trees/old pallets) and metal scrap. An additional asbestos walk-over grid (Q2) was undertaken in the south-west corner of Lot 2 in an open area, adjacent to some nearby waste piles that comprised wood and metal (**Figure 3**). No evidence of any housing, or other former structure or demolition materials was observed.

An unpaved road is present on the eastern side of the Speedway, on Lot 418 and provides access to the Speedway. Numerous small fragments of suspected ACM were observed on this roadway. One suspected ACM fragment was collected and submitted for laboratory analysis (EMP2 – ACM03) during the HMA.

A second unpaved road lies immediately to the east of the Speedway access, and provides access from Dickson Road to the Motorcross tracks. This track appeared to be constructed from clayey soils and was consistent with the description provided by Mr Kerry McNaughton that soils were won from the Clay Borrow Pit for the construction.

Areas to the east and west of the Speedway comprise low lying swampland environments associated with Swamp Creek. A series of backwater lagoons discharge overland flow from Parcel 15 in a northerly direction toward Swamp Creek. Land surrounding the Motocross tracks is topographically higher and vegetated. Some clearing has been undertaken for the construction of fire trails and an electricity easement to the north of the Parcel. No fill materials or waste disposal was identified in these areas.

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

7.2 Soil Investigations

7.2.1 Fluoride

Nine surface soil samples (EMP2-SF1 to EMP2-SF9) were collected from across Parcel 15 at a rate of one sample per 4 ha to assess the potential for fluoride in soil from dust deposition from the Hydro Aluminium Kurri Kurri Smelter as shown in **Figure 3**.

A generalised lithology of the surface soils encountered at Parcel 15 is as follows:

- Topsoil: Silt and silty sand brown and dark brown, slightly moist.

7.2.1 Fill Investigation

One soil sample (EMP2-S11) was collected from the northern end of the Speedway embankment (**Figure 3**) in the October 2013 investigation and submitted for laboratory analysis.

In March 2014, a total of six test pits (TP1 to TP6), were excavated in the Speedway embankments and a further three pits (TP7 to TP9), were excavated into the eastern access road on Lot 418. A total of eight samples from the test pits were submitted for analysis.

Test pit locations are presented on **Figure 4**. A summary of test pit investigations is presented in **Table 7** and borelogs are contained in **Appendix G.**

Table 7: Summary of Intrusive Investigations

Lot	No. of Test Pits	Fill	Depth of Fill	Natural Ground	Depth of Natural Ground
Lot 417	6	Fill in embankment above ground (to a height of approx. 4m). Fill comprises clay, sandy clay, sand and silty sand, with weathered rock fragments. Also included wastes such as glass, broken concrete/pavers, wood, plastic. No ACM was observed in embankment.	Surface to approx. 4m above ground level.	Alluvial Sand/Silty Sand, brown, fine to medium grained, no odour.	Underlying fill embankment
Lot 418	3	Between surface and 0.25m along access road. Fill was a sandy gravel road base underlain by natural silty sands. No wastes were identified in the soil profile and no ACM was observed.	Surficial fill: 0.25 deep	Alluvial Sand/Silty Sand, brown, fine to medium grained, no odour.	Underlying 0.25m fill (road base) layer

7.3 Soil Results

A summary of the soil results is presented in **Table 8**. Laboratory tables are included in **Appendix E** and laboratory reports are included in **Appendix F**.

Table 8: Summary of Soil Results

Analyte	No. of Samples	Maximum Concentration (mg/kg)	No. exceeding Site Criteria	Criteria Exceeded (mg/kg)
Fluoride	9	39	0	-
Arsenic	9	13	0	-
Cadmium	9	<LOR	0	-
Chromium	9	19	0	-
Copper	9	97	1	55 (EIL)
Lead	9	109	0	-
Nickel	9	48	0	-
Zinc	9	254	0	-
Mercury	9	0.4	0	-
BaP TEQ	9	7.6	0	-
BaP ESL	9	0.9	0	-
Total PAHs	9	7.6	0	-
Benzene	9	<0.2	0	-
Toluene	9	<0.5	0	-
Ethyl benzene	9	<0.5	0	-
Xylene	9	<0.5	0	-
TRH C6-C10	9	<10	0	-
TRH >C10-C16	9	<50	0	-
TRH >C16-C34	9	120	0	-
TRH >C34-C40	9	240	0	-
OCPs excluding DDE + DDD + DDT	9	<LOR	0	-
Sum of DDE + DDD+ DDT	9	<LOR	0	-
OPPs	9	<LOR	0	-
Asbestos (ID)	9	Chrysoite, and amosite	2(1)	Presence
Asbestos (fines – AF and FA <7mm)	1	0.004%	0	0.001%

(1) An additional potential ACM sample was also collected from the unpaved access track immediately to the east of the embankments during the HMA and analysed for presence of asbestos (which was confirmed)

The results of surface soil sampling for fluoride demonstrate that surface soils at Parcel 15 have not been impacted by stack particulate fallout from the Hydro Aluminium Smelter. The results also indicate that soil within the embankment and along the eastern Motocross access track has not been impacted by petroleum hydrocarbons or polycyclic aromatic hydrocarbons.

Asbestos was identified in fragments in embankment fill in samples, S11 (October 2013) and TP5, (March 2014), both from the northern end of the Speedway embankment. No asbestos was detected in the other embankment samples. The suspected ACM fragment (EMP2-ACM03), sampled from the surface of the eastern access track as part of the HMA, was found to contain asbestos.

Copper slightly exceeded the EIL guideline criteria for one sample however the average concentration for Parcel 15 was 25mg/kg and below the guideline of 55mg/kg.

No other exceedences were noted in the soil samples.

7.4 Surface Water Results

Two surface water samples were collected from the ponds on the margins of Swamp Creek in Lot 419 and Lot 2.

The samples slightly exceeded guideline criteria for dissolved metals chromium, copper, nickel and zinc.

Concentrations of TRH slightly above detection limits were found in the sample from the Lot 419 pond. The TRH analysis includes all recoverable hydrocarbons and can be artificially positive when a significant amount of organic matter is present, as is the case for these backwater lagoons. The presence of naturally occurring organic compounds is the likely contributor to the marginal detections of TRH and no further evaluation is warranted.

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

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

7.5 Hazardous Materials Audit

A Hazardous Materials Audit was conducted as part of the Phase 2 ESA and is presented in full in **Appendix I**. In summary, the HMA identified:

- The surrounds of the Speedway are poorly maintained. Drums and containers of oils and fuels are stored without bunding, and there is evidence of oil/ fuel leakage into soils.
- Various wastes (such as demolition waste and tyres) are scattered throughout the Speedway facility.
- ACM construction materials are present in Speedway facility buildings and are in poor condition thereby representing a potential health risk.
- The Junior Motorcycle Club facility is generally well maintained. There are stockpiles of old tyres throughout the facility.

7.6 Quality Assurance/ Quality Control

A quality assurance assessment for this report is presented in **Appendix H**. 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.

8 Site Characterisation

Parcel 15 is located in the eastern portion of the Buffer Zone of the Hydro Aluminium Kurri Kurri Smelter. Parcel 15 comprises six lots immediately north of Dickson Road between the smelter to the west and Swamp Creek to the east.

Undeveloped bushland covers approximately 60% of the western and northern parts of Lot 2 and all of Lot 419 (adjacent to Swamp Creek). The two western Lots (415 and 416) are largely flat and covered with grass and sparse scrub vegetation. A low area centred on Lot 416 is characterised by a swampy wetland.

Parcel 15 is located in close proximity to the Smelter however low concentrations of fluoride in soils demonstrates that Parcel 15 has not been impacted by dust deposition.

Parts of Parcel 15 have been leased to the Kurri Kurri Junior Motorcycle Club and the Kurri Kurri Speedway who have constructed racing facilities comprising earth race tracks, access tracks and ancillary infrastructure. The construction of these facilities has included the importation of buildings and sheds which were included in a Hazardous Materials Audit, and the placement of soil and other fill materials. Activities at the site by the tenants has also resulted in the presence of general debris and localised oil staining or surface soils.

ACM fragments were identified to be present within road gravels on the Speedway eastern access track. ACM was also identified at one location in the northern end of the Speedway embankment. Other samples collected from the Speedway embankment were found to contain concentrations of analytes below the adopted criteria.

Concentrations of copper, chromium, nickel and zinc, slightly above the adopted criteria in the Lot 419/Lot 2 ponds are not considered to be significant, and there are no historical or ongoing sources identified for these metals. Monitoring and management of the dam on Lot 2 continues as part of the management of leachate from the Capped Waste Stockpile.

Parcel 15 is considered suitable for commercial or industrial land use with the exception of the surface ACM identified on the eastern Speedway access track and localised within the Speedway embankments. These tracks and embankments have been constructed by the tenant and therefore are considered to remain the responsibility of the tenant. Additionally, waste disposal and housekeeping practices implemented by the tenant have the potential to impact on the suitability of the site for the current and proposed land use.

The Hazardous Materials Audit has identified the presence of ACM in poor condition within the building structures. The location and deterioration of the ACM is considered to represent a potential health risk to occupants of the buildings.

9 Conclusions and Recommendations

ENVIRON completed a Phase 2 Environmental Site Assessment at Parcel 15, located in the inner eastern portion of the Buffer Zone of the Hydro Aluminium Kurri Kurri Smelter. Parcel 15 is owned by Hydro Aluminium and currently comprises unused bushland, open flat unoccupied land and a motorcycle race track development.

The objectives of the assessment were to assess the potential for contamination at Parcel 15 based on historical and current land use and to assess the suitability of Parcel 15 for the purpose of general industrial (IN1) and environmental conservation (E2) land use.

The ESA comprised a site walkover, surface soil sampling, surface water sampling, intrusive investigation by backhoe in embankments and filled areas and completion of a hazardous materials audit. The Phase 1 identified that contamination of Parcel 15 may have occurred from dust deposition due to the proximity of the Hydro smelter, illegal dumping due to the remoteness of the area and contamination from the development and use of the site as a Motocross and Speedway facility.

To assess for potential contaminants of concern on Parcel 15, ENVIRON completed a site walkover, surface soil sampling, surface water sampling, intrusive investigation by backhoe in embankments and filled areas and completion of a hazardous materials audit.

Surface soil sampling for soluble fluoride identified low and below guideline concentrations in all samples. These results indicate that the site has not been impacted by dust deposition from the smelter.

The site walkover identified the presence of fill materials, including potentially asbestos containing material (ACM) fragments on the eastern Speedway access track and within the Speedway spectator embankment. The Speedway facility was observed to contain piles of waste including tyres and demolition wastes, as well as unbunded drums of fuel or oils. Waste tyre stockpiles were present on the Motocross facility.

Soil sampling of filled soils on the Speedway spectator embankment and the eastern Motocross access track identified acceptable and below guideline concentrations for all analytes tested with the exception of asbestos. Fragments of bonded ACM were identified on the surface of the Speedway eastern access track.

Two samples, collected from the surface water ponds on Lot 419 and Lot 2, identified concentrations of copper, chromium, nickel and zinc, slightly above the adopted guidelines. These concentrations are not significant, given that no historical or ongoing source for these metals was identified.

A Hazardous Materials Audit was completed to assess the buildings on Parcel 15. Asbestos cement sheeting was identified within buildings at the Speedway facility. ACM was observed to be in poor condition and represents a potential health risk.

Parcel 15 will be suitable for the current landuse subject to the completion of the following interim management requirements:

- An appropriately licensed asbestos removal contractor should be engaged to remove and dispose of the ACM waste in the eastern Speedway access track. Alternatively, the track can be capped with Virgin Excavated Natural Material (VENM) or Excavated Natural Material (ENM) to remove the exposure risk to humans. Validation of the area following removal or capping should be undertaken by an appropriately qualified consultant and documented.

- The recommendations for the handling and management of ACM and polychlorinated biphenyls within the building materials as outlined in the Hazardous Materials Audit should be followed;

- Hydro should continue to monitor and manage impacts to surface water from overland flow that is impacted by leachate from the Capped Waste Stockpile. Any impacts to soils, groundwater or surface water should be remediated as part of the Capped Waste Stockpile remediation program.

Additional investigations are required to assess the suitability of Parcel 15 for the proposed environmental conservation (E2) and general industrial (IN1) landuse, as follows:

- The asbestos identified in the Speedway embankment requires further detailed investigation in accordance with the NEPM to assess the risk to site users from the asbestos fibres identified.

ENVIRON considers that Parcel 15 can be made suitable for the proposed environmental conservation (E2) and general industrial (IN1) land use following remediation. A Remedial Action Plan will be completed to assess the remedial options and outline the requirements for remediation and validation.

Hydro has separately 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 use.

10 References

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

ENVIRON (2012) Environmental Site Assessment, Alcan Mound, Kurri Kurri, Aluminium Smelter;

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

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

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 (2008) Waste Classification Guidelines.

11 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 November 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 15. 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 15 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.

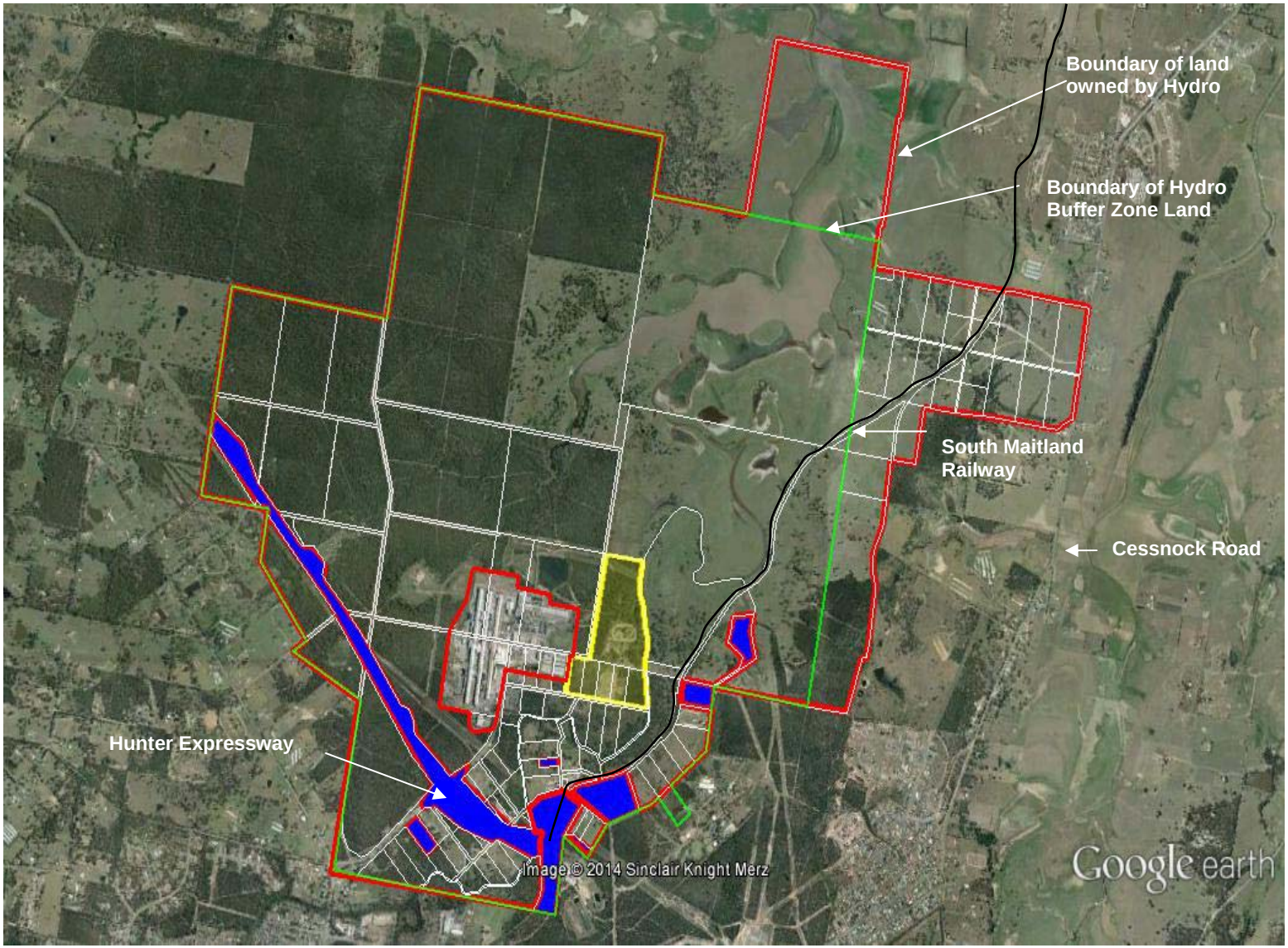
ENVIRON did not independently verify all of the written or oral information provided to ENVIRON during the course of this investigation. While ENVIRON has no reason to doubt the accuracy of the information provided to it, the report is complete and accurate only to the extent that the information provided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

11.1 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

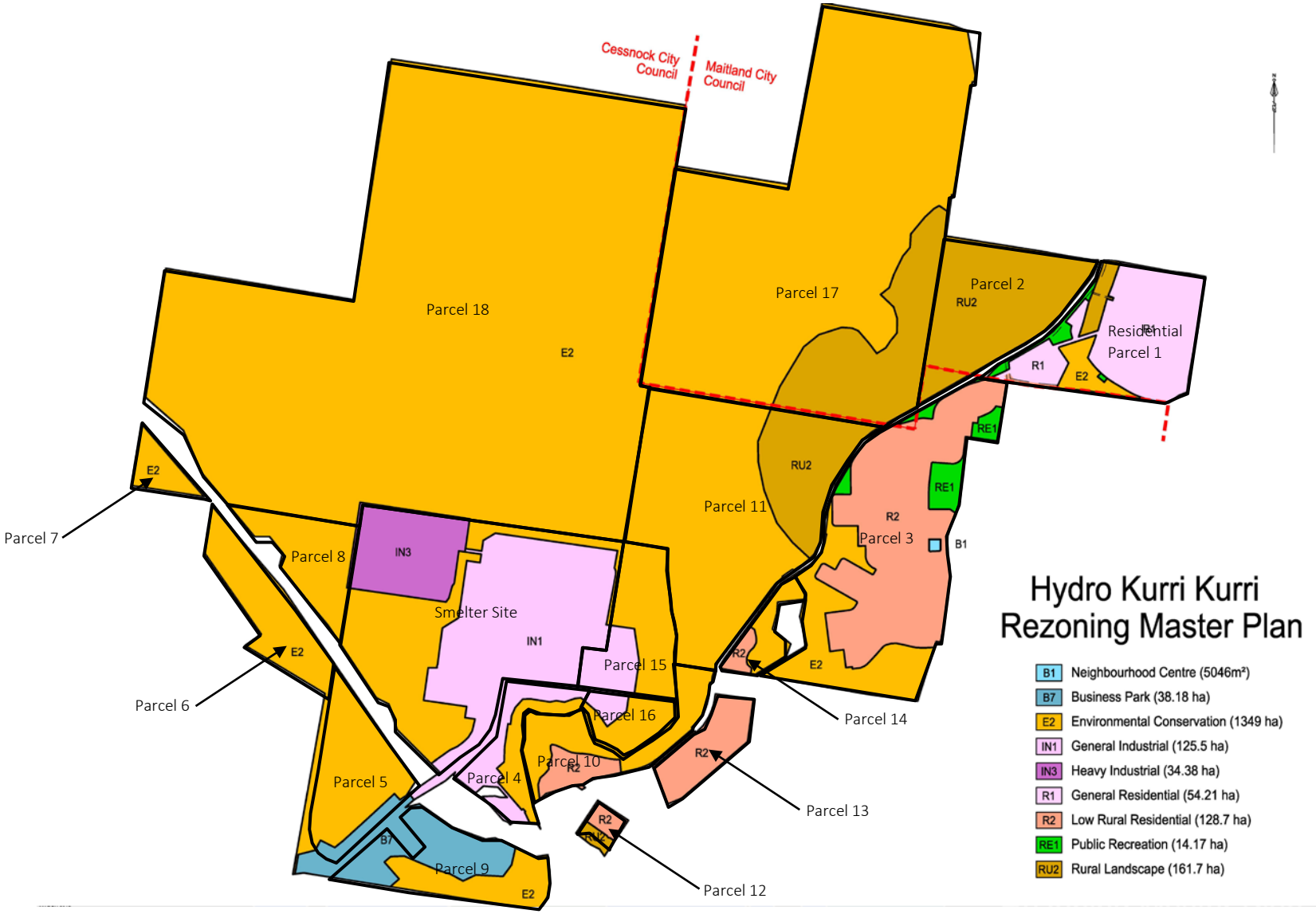
Land not owned by Hydro

Parcel 15

N

Hydro Aluminium Kurri Kurri – Phase 2 Environmental Site Assessment – Parcel 15 | Site Location

ENVIRON | JOB NO: AS130348 | DATE: May 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

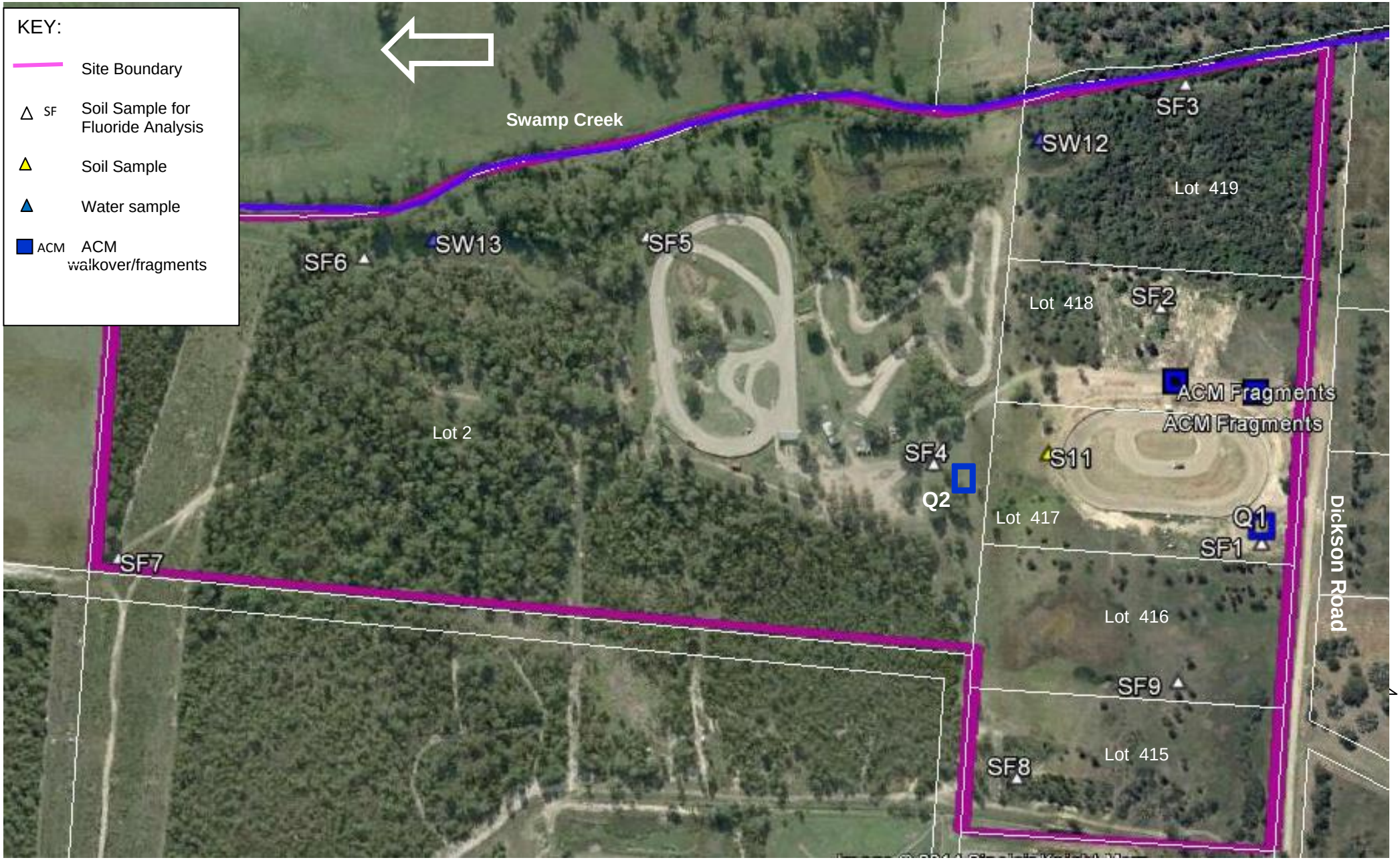
Land Parcels and Proposed Land Zoning

ENVIRON

JOB NO: AS 130348

DATE: March 2015

FIGURE 2



Hydro Aluminium Kurri Kurri – Phase 2 Environmental Site Assessment Parcel 15	Parcel 15 – Soil Sampling Locations

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

KEY:

Site Boundary

TP Test Pit

N

Hydro Aluminium Kurri Kurri –

Phase 2 Environmental Site Assessment Parcel 15

Test Pit Locations - Parcel 15

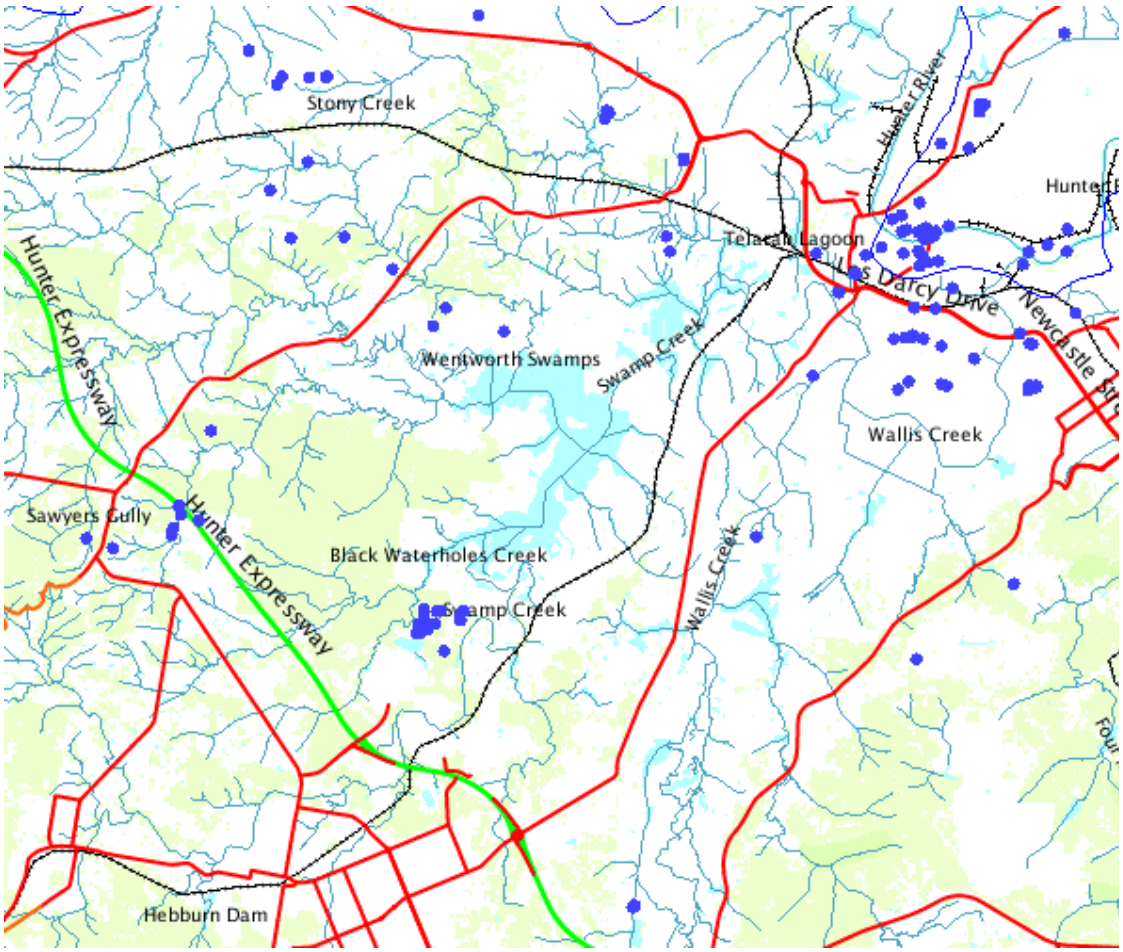
ENVIRON JOB NO:AS130348 DATE: May 2014 FIGURE 4

Appendix A

Surrounding Groundwater Bores

Groundwater Bores near Parcel 15

Map created with NSW Natural Resource Atlas - http://www.nratlas.nsw.gov.au
Monday, January 06, 2014



0 16 Km

Legend

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

Topographic base map

Groundwater Works Summary

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

Print Report

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

Work Requested -- GW079088

Works Details (top)

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

Site Details (top)

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

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

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

Print Report

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

Work Requested -- GW079090

Works Details (top)

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

Site Details (top)

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

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

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

Print Report

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

Work Requested -- GW079092

Works Details (top)

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

Site Details (top)

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

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

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

Print Report

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

Work Requested -- GW079093

Works Details (top)

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

Site Details (top)

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

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

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

Print Report

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

Work Requested -- GW079094

Works Details (top)

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

Site Details (top)

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

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

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

Print Report

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

Work Requested -- GW079096

Works Details (top)

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

Site Details (top)

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

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

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

Print Report

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

Work Requested -- 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 -- 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)

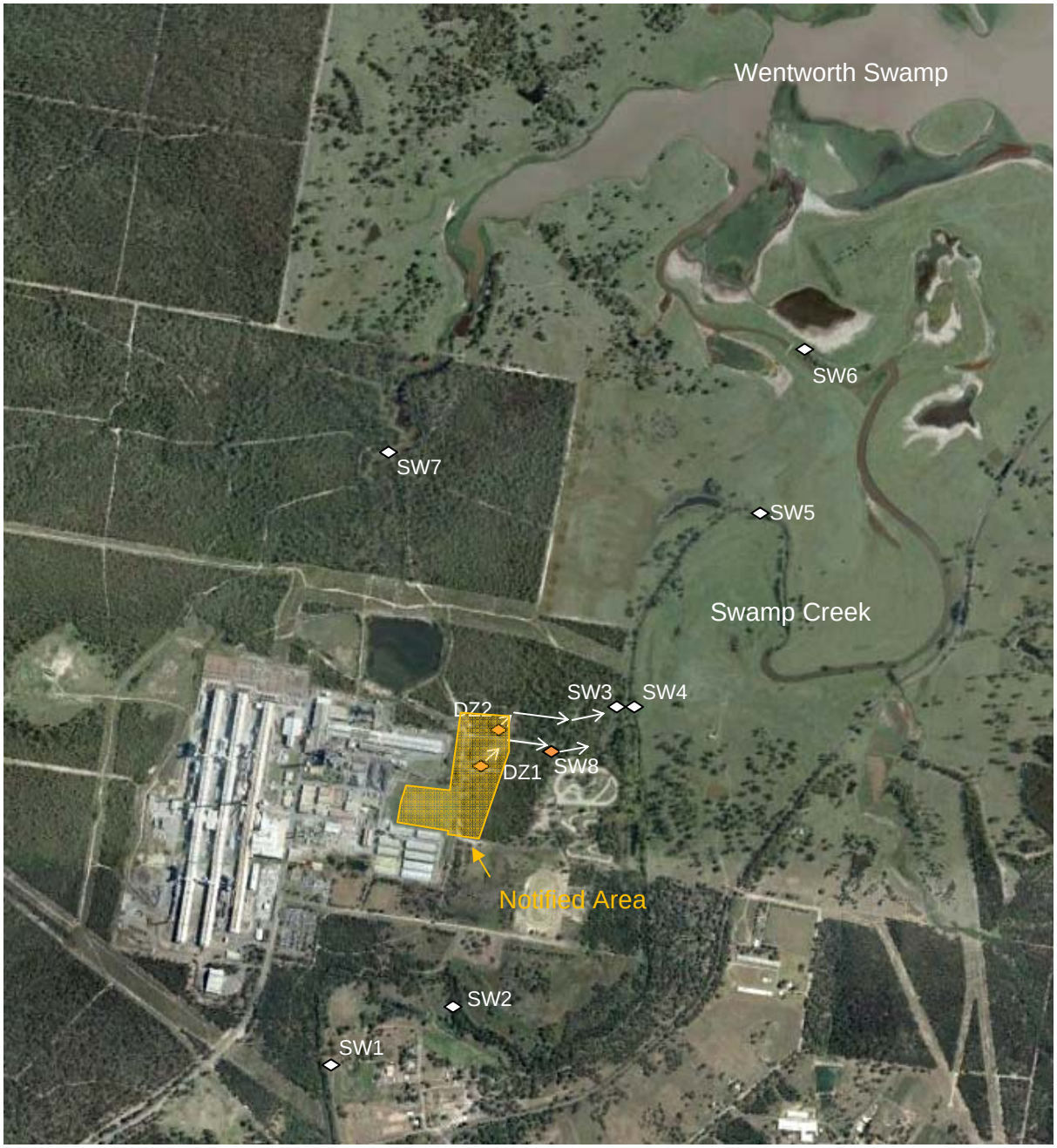
no details

Drillers Log (top)

no details

Appendix B

Data From Previous Investigations



HYDRO AUSTRALIA

SUPPLEMENTARY ESA, ALCAN MOUND

Surface Water Sampling Locations

TABLE LR3 Surface Water Analytical Results

Sample Identification	PQL	Guideline			SW3	SW3
Date		95% Fresh [A]	Irrigation	Stock	9/8/12	28/9/12
Depth to Water (mAHD)					Surface	Surface
Sample Appearance					Clear	Clear
Sample collected by					KJG	SC
Analytes						
pH		6.5-8			7.9	7.3
Electrical Conductivity			4500-7700		500	620
Soluble Fluoride	0.1	5	1	2	18	21
Total Cyanide	0.004				0.026	0.22
Free Cyanide	0.004		0.007		<0.004	<0.004
Total Aluminium pH>6.5	0.01	0.055	5	5	2	1.7
Calcium	0.5				9.5	13
Potassium	0.5				3.7	4.3
Sodium	0.5				99	120
Magnesium	0.5				5.1	6.5
Hydroxide Alkalinity	5				<5	<5
Bicarbonate Alkalinity	5				81	64
Cabonate Alkalinity	5				<5	<5
Total Alkalinity	5				81	64
Sulphate	1				42	63
Chloride	1				63	94
Ionic Balance	%				11	11

All results in mg/L

PQL = Practical Quantitation Limit.

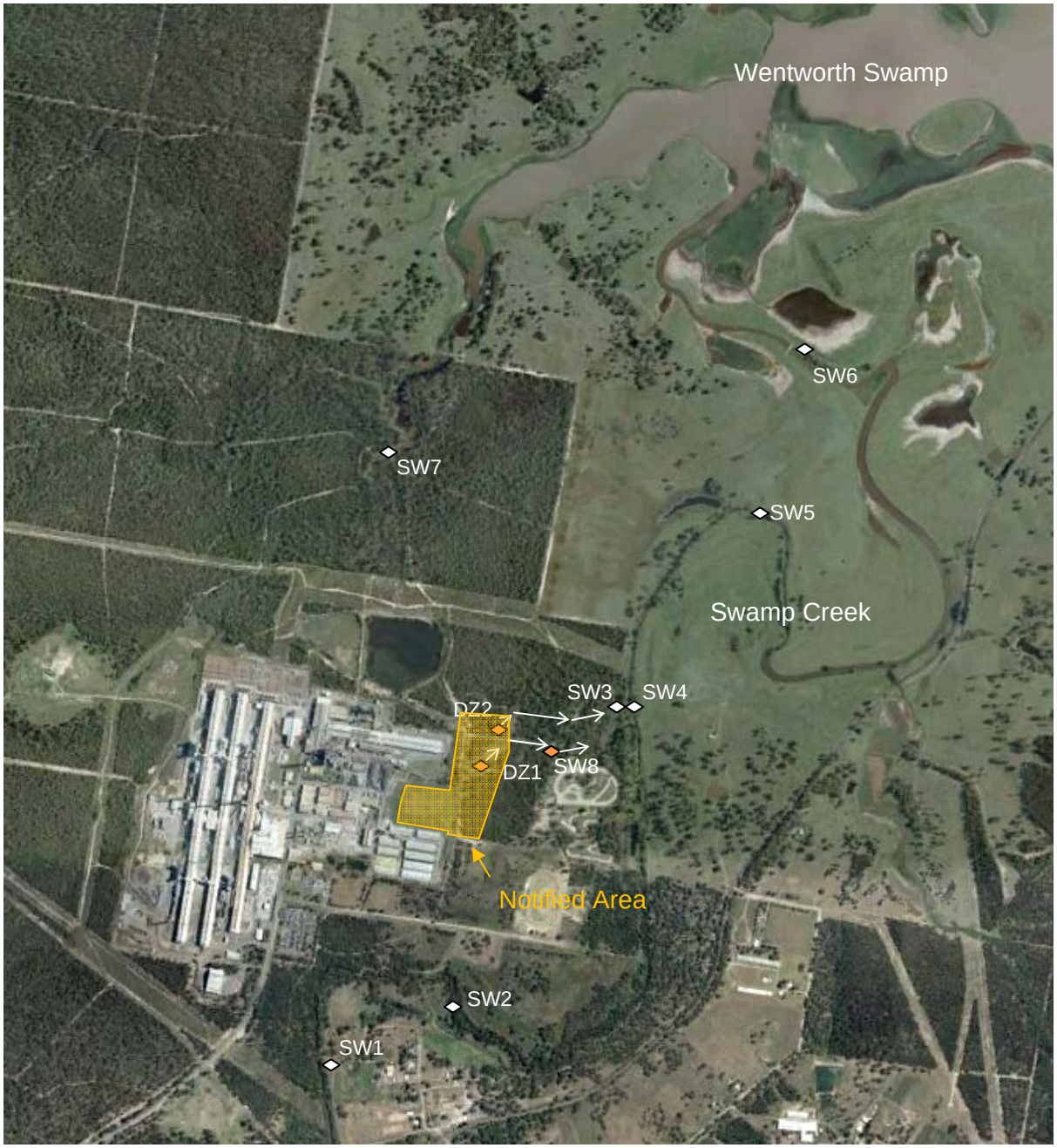
[A] ANZECC 2000 95% Protection Level for Receiving Water Type

Guidelines in *italics* are low level reliability guidelines

* 5mg/L for Fluoride is based on the value used by another Aluminium Smelter

NHMRC guidelines for total cyanide are based on cyanogen chloride (as cyanide).

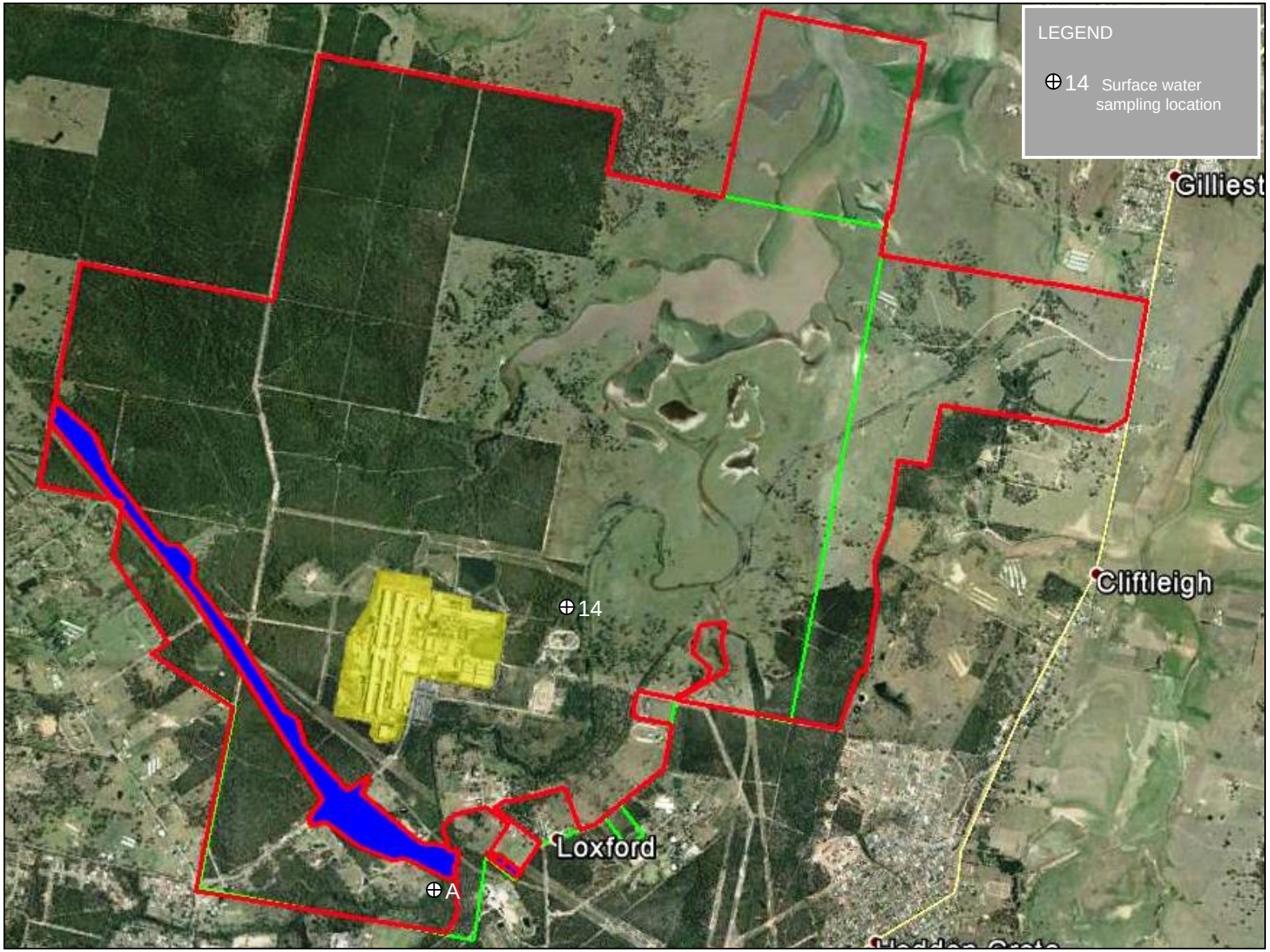
Results shaded grey are in excess of the primary acceptance criteria: ANZECC 95%, NHMRC



HYDRO AUSTRALIA

SUPPLEMENTARY ESA, ALCAN MOUND

Surface Water Sampling Locations



Hydro Aluminium Kurri Kurri Pty Limited	Surface Water Monitoring Locations in Parcel 15

ENVIRON | JOB NO: AS130328 | DATE: 25 March 2014 | FIGURE B

Table 8.1: Surface Water Quality around the Hydro Aluminium Kurri Kurri Smelter for 2013

MONTH		A	14	B	D	E	31	1	2	44	3	9	62
January	pH	7.4	7.4	7.3	7.3	7.8	dry	6.8	5.1	dry	dry	dry	7.7
	Conductivity (uS/cm)	780	1000	900	910	1000	dry	3800	5200	dry	dry	dry	970
	Fluoride (mg/L)	0.8	30.0	0.8	0.9	1.2	dry	5.8	5.1	dry	dry	dry	1.2
February	pH	7.0		6.8	6.8	6.7						5.8	5.9
	Conductivity (uS/cm)	700		720	740	620						970	1100
	Fluoride (mg/L)	0.3		0.5	0.5	0.5						3.5	0.5
March	pH	6.7		6.7	6.7	6.5						6.7	6.5
	Conductivity (uS/cm)	570		410	270	260						230	250
	Fluoride (mg/L)	0.2		0.6	0.4	0.4						0.6	0.4
	Free Cyanide (mg/L)					<0.002							<0.002
April	pH	7.5		7.2	7.2	8.2	6.9	6.7	6.9	6.9	6.2	6.8	7.6
	Conductivity (uS/cm)	970		1100	1100	1200	750	1000	1100	550	340	740	660
	Fluoride (mg/L)	0.6		0.6	0.6	0.7	0.4	2.7	2.8	0.6	0.5	2.0	0.9
May	pH	7.5		7.2	7.1	7.2						6.2	7.1
	Conductivity (uS/cm)	880		1000	1000	1000						930	130
	Fluoride (mg/L)	0.5		0.5	1.0	0.7						2.7	0.2
June	pH	7.7		7.4	7.3	7.2						4.6	5.4
	Conductivity (uS/cm)	880		880	970	970						1200	1700
	Fluoride (mg/L)	0.5		0.5	1.0	0.8						2.9	0.9
	Free Cyanide (mg/L)					<0.002							<0.002

Table 8.1 (cont): Surface Water Quality around the Hydro Aluminium Kurri Kurri Smelter for 2013

MONTH		A	14	B	D	E	31	1	2	44	3	9	62
July	pH	7.4		7.2	7.2	7.1	6.1	6.5	6.6	6.4	6.2	5.3	4.4
	Conductivity (uS/cm)	1300		1100	1200	1200	1100	980	1000	1700	110	1300	1000
	Fluoride (mg/L)	0.3		1.2	0.5	0.9	0.2	1.9	2.6	0.3	0.3	5.3	4.4
August	pH	7.4		7.4	7.3	7.3						4.5	6.5
	Conductivity (uS/cm)	1100		1100	1100	1300						1400	1400
	Fluoride (mg/L)	0.5		0.6	1.3	0.7						2.5	0.9
September	pH	6.8		6.8	6.8	6.8						4.0	6.5
	Conductivity (uS/cm)	930		990	980	1100						1700	1200
	Fluoride (mg/L)	0.6		1.2	1.6	0.9						2.0	1.1
	Free Cyanide (mg/L)					<0.002							<0.002
October	pH	7.2	7.2	7.1	7.2	7.3		7.0	6.6	6.5		3.8	6.8
	Conductivity (uS/cm)	940	510	930	1000	1100		2600	2800	1800		2300	1600
	Fluoride (mg/L)	0.6	18.0	1.7	1.7	1.4		3.6	3.2	0.5		2.8	1.7
November	pH												
	Conductivity (uS/cm)												
	Fluoride (mg/L)												
December	pH												
	Conductivity (uS/cm)												
	Fluoride (mg/L)												
	Free Cyanide (mg/L)					<0.002							<0.002

ANZECC Water Quality Criteria:	pH	Fluoride (mg/L)	Free Cyanide (mg/L)
Irrigation	4.5 - 9.0	1.0	-
Livestock	-	2.0	-
Aquatic Ecosystems	6.5 - 9.0	-	0.0052

Appendix C

Site Photographs

Photo 1: Photograph showing Lot 415 looking west towards speedway.

Photo 2: Photograph of Lot 416 looking north towards swampy ground.

Photo 3: Photograph showing northern end of speedway embankment (Lot 417).

Photo 4: Photograph of Speedway Lot 417- western side looking north

Photo 5: Photograph of western side Lot 417, west of speedway showing waste piles.

Photo 6: Photograph of localized oil staining near pits entrance Lot 417 west speedway.

Photo 7: Photograph of fill profile from TP5 Lot 417 in speedway embankment north .

Photo 8: Photograph of fill profile from TP1 Lot 417 in speedway embankment south.

Photo 9: Photograph of access track eastern side of speedway (ACM fragments on surface).

Photo 10: Photograph of ACM fragments on surface of access track eastern side of speedway.

Photo 11: Photograph of eastern access road on Lot 418, looking north from near Dickson Road entry.

Photo 12: Photograph of roadbase fill profile on access road – eastern Lot 418.

Photo 13: Photograph of Pond in north-east of Lot 419.

Photo 14: Photograph of motocross track Lot 2 – Looking west

Photo 15: Photograph of Pond in north-east of Lot 2 – Looking south from sample Pont SW13.

Photo 16: Photograph of wood and tyre wastes - Lot 2 (western side access track).

Appendix D

Field Investigation Sheets

Site Walkover Checklist

Project No.: AS130348	**Date and Time:** 1/11/13
Land Parcel: EMP2	**Weather:** Fine, mild, 0 cast.
Lot and DP: Lot 415	**Environ Personnel:** SC

Site Description

Topography	Flat. slight slope towards east.
Surface Geology	Alluvial Sands
Fill evident?	No fill evident.
Hummocky ground?	
Structures on site?	Access track (fire track) along western boundary
Location of structures	of Dickson Rd.
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

29 - 32 Pan from NW cnr.

Miscellaneous Field Comment

Bush-covered on W. side - adjacent to plant site.

Site Walkover Checklist

Project No.:	AS130348	**Date and Time:**	1/11/13
Land Parcel:	EMP2	**Weather:**	Fine, mild, o/cast.
Lot and DP:	LOT 416	**Environ Personnel:**	SC.

Site Description

Topography	Flat with depressed, swampy areas in centre/north.
Surface Geology	Alluvial sands.
Fill evident?	No fill observed.
Hummocky ground?	—
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

33-37 Pan from Mid-East site S → E → N.

Miscellaneous Field Comments

Mainly flat area with wetland/swamp in centre & north. Sparse trees & low scrub.

Site Walkover Checklist

Project No.: AS1303448	**Date and Time:** 31/10/13
Land Parcel:	**Weather:** Fine, mild
Lot and DP: Lot 417	**Environ Personnel:** SC

Site Description

Topography	Flat - Fill spectator mounds around racetrack.
Surface Geology	Alluvial Sands
Fill evident?	- Fill mounds. / most of site on fill pad?
Hummocky ground?	
Structures on site?	Mainly portable sheds associated with Track.
Location of structures	See map / HSA.
Building materials used in structures	
Asbestos debris on site?	
Location of asbestos debris?	
Volume of asbestos debris?	

Grid Locations of Interest

Point of Interest	Easting	Northing
Q1 (10x10)	151.48750.	32.79206

Description of Photographs Taken

947-956 - 360° Pan from SW emb.
957-958 - recent fill on SW emb (Grav-Sndy Silt; - some coal frag, plastic, glass etc).
959-963 - Pan on NE car E S W
964-965 - From NW side looking South. - dumped light poles, concrete, tyres, metal waste.
966-969 - Dumped materials W side
970-972 - Drums storage.
973-975 - Mid W side (E Lot 416). Pan W→N - (empty Drums/water trough).

Miscellaneous Field Comments

Site mainly occupied by race track & associated structures.
Q1 10x10 in SW corner (old horseshade) - No ACM.
ACM frags on east access track (Lot 418) on surface to ~ 25-30mm. (1D10).
On W-side Dumped material - stores of Drum - Lube, Meth Alcohol / contents.
Photos 976-977 of Drums at entrance to Pit area on W side - bare ground / spills / Str odour.
978-979 - looking N from SW corner.

Site Walkover Checklist

Project No.:	AS130348	**Date and Time:**	31/10/13
Land Parcel:	EMP2	**Weather:**	Fine/mild.
Lot and DP:	Lot 418	**Environ Personnel:**	SC.

Site Description

Topography	Flat - access track & race track Embankments in West (see 487)
Surface Geology	Alluvials.
Fill evident?	Fill embankments.
Hummocky ground?	
Structures on site?	Demountables on West side (assoc. with race track).
Location of structures	
Building materials used in structures	
Asbestos debris on site?	in access track (- sample ID 10).
Location of asbestos debris?	
Volume of asbestos debris?	Small (20-30 mm) fragments apparent on surface of access track.

Points of Interest

Point of Interest	Easting	Northing

Description of Photographs Taken

980-985 Pan from SW cnr W-N-E.
986-989 - Soil mounds on E. boundary N E S pans.
990-993 — From mid E side Pan N-W-S.

Field Comments

- Flat, grassed area - some trees. On West Border Eastern race track embankment & access track - (ACM on surface).
- On Eastern boundary - soil pushed up into mounds (from constr. of east side access road?)
  - heavily grassed over.
  - ↳ where trees/soil has been pushed to side.

Site Walkover Checklist

Project No.:	AS1303648	**Date and Time:**	31/10/13
Land Parcel:	EMP2	**Weather:**	Fine, mild.
Lot and DP:	LOT 419	**Environ Personnel:**	SC.

Site Description

Topography	Slope towards east → Swamp Ck
Surface Geology	Alluvial
Fill evident?	no
Hummocky ground?	no
Structures on site?	no
Location of structures	no
Building materials used in structures	no
Asbestos debris on site?	no
Location of asbestos debris?	no
Volume of asbestos debris?	no

GPS Locations of Interest

Point of Interest	Easting	Northing

Description of Photographs Taken

493 - 496 - Ponds in NE cnr of lot.

Miscellaneous Field Comments

- Completely Bush Covered / undeveloped.
- Eastern Boundary is Swamp Ck.
- Access track up eastern side.

Site Walkover Checklist

Project No.:	AE130348	**Date and Time:**	31/10/13
Land Parcel:	EMP2	**Weather:**	Fine, mild.
Lot and DP:	Lot 2	**Environ Personnel:**	SC

Site Description

Topography	Generally sloping W→E (towards creek
Surface Geology	Alluvials / - in ridge on NW - Residual?
Fill evident?	-
Hummocky ground?	
Structures on site?	Race track.
Location of structures	R.
Building materials used in structures	
Asbestos debris on site?	
Location of asbestos debris?	
Volume of asbestos debris?	

GPS Location of Interest

Point of Interest	Easting	Northing
Soil mound - (North of track) - natural?	151·48937·	32·78781
Q2 10 x 10. - NO ACM	151· 48852	32·78983

Description of Photographs Taken

001 - 001 Pan from south gate E - N-W.	22 - mid N. Border track	E
002 - 003 - Surface debris - SW area (near well BG)	23 " " " "	W
004 - 008 - Pan from SW - S-E-N	24-26 E-S film NW Cor.	
009 - 013 - Pan from start MX track - SE - E - NW	27 - Pallets/tyres on Mid	W track.
14 - 15 - From East end of MX track looking W.	28 - Compound at Track	-buttons etc'
16 - 17 - Timber/concrete waste + soil mound N. of race track.		
18 - 21 - From N end of East Pond - Pan S - SE - W.		

Miscellaneous Observations

75% Bush-covered, developed race tracks at south end, cleared easement in north. Swamp Ck on E boundary.

MX track formed by pushing up soil into mounds - old tyres etc around. track area - on side of small gully.

Appendix E

Results Tables

TABLE A: Soil Analytical Results - Grid Sampling

Sample Depth: 0.01m - 0.02m
Sampling Date: 23/10/13
Laboratory PQL: 0.5 mg/kg
Site Specific HIL - Fluoride: 17000mg/kg

Sample Identification	Soluble Fluoride mg/kg (1:5 soil:water)
EMP2-SF1	29
EMP2-SF2	25
EMP2-SF3	4
EMP2-SF4	16
EMP2-SF5	6
EMP2-SF6	4
EMP2-SF7	3
EMP2-SF8	39
EMP2-SF9	20

cell shaded grey where investigation criteria exceeded

TABLE B: Soil Analytical Results - Fill Areas

Sample Identification		Guideline						EMP2-S11	P15 TP1 0.2-0.5	P15 TP2 0.3-0.6	P15 TP3 0.3-0.5	P15 TP4 0.3-0.5	P15 TP5 0.3-0.5	P15 TP6 0.3-0.5	P15 TP7 0.1-0.2	P15 TP9 0.1-0.2
Sample Depth (m)	PQL	HIL 'D' [A]	HSL 'D' Silt 0m to 1m	EIL Urban Commercial/Industrial (lowest ACL)[D]	ESL Industrial (Coarse Soil)	Mgt Limits Industrial										
Date								31/10/2013	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014	18/03/2014
Sample Profile								FILL	FILL	FILL	FILL	FILL	FILL	FILL	FILL	FILL
Sample collected by								SC	SC	SC	SC	SC	SC	SC	SC	SC
Asbestos																
Asbestos Detected	1332-21-4							**Yes**	No	No	No	No	**Yes**	No	No	No
Asbestos Type	1332-21-4							Ch	-	-	-	-	Ch + Am	-	-	-
Sample weight (dry)								964	41.6	40	46.7	43	42.1	47	49.2	45.3
Asbestos Quantification																
Weight Used for % Calculation kg								0.964	-	-	-	-	-	-	-	-
Asbestos Containing Material - g								<0.1	-	-	-	-	-	-	-	-
Fibrous Asbestos - g								<0.002	-	-	-	-	-	-	-	-
Asbestos Containing Material (as 15% Asbestos in ACM >7mm) - %		0.05%						<0.01	-	-	-	-	-	-	-	-
Asbestos Fines and Fibrous Asbestos (<7mm) - %		0.001%						<0.001	-	-	-	-	-	-	-	-
Trace Asbestos Detected - %								No	-	-	-	-	-	-	-	-
Heavy Metals																
Arsenic	5	3000		160				9	7	8	13	7	11	7	6	<5
Cadmium	1	900						<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	1	3600		530				9	19	18	14	5	17	11	8	6
Copper	5	240,000		55				11	<5	17	97	10	12	21	8	<5
Lead	5	1500		1800				91	16	72	109	33	9	94	9	7
Nickel	2	6000		160				2	<2	16	10	7	9	16	48	10
Zinc	2	400,000		390				128	20	154	217	74	52	254	34	24
Mercury	0.1	730						0.4	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Polycyclic Aromatic Hydrocarbons (PAH)																
Naphthalene	0.1			370				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	0.1							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	0.1							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	0.1							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	0.1							<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	0.1							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	0.1							1	<0.5	<0.5	1.4	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	0.1							0.9	<0.5	<0.5	1.4	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	0.1							<0.5	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	0.1							<0.5	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b)&(k)fluoranthene	0.2							0.5	<0.5	<0.5	1.1	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a) pyrene	0.05				1.4			<0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	0.1							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene	0.1							<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g,h,i)perylene	0.1							<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ	0.5	40						<0.5	<0.5	<0.5	1.1	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve	--	4000						2.4	<0.5	<0.5	7.6	<0.5	<0.5	<0.5	<0.5	<0.5
Total Recoverable Hydrocarbons (TRH) - NEPM (2013)																
TRH C6 - C10	25		250		215	700		<10	<10	<10	<10	<10	<10	<10	<10	<10
vTPH C6 - C10 less BTEX	25		NL		-	-		<10	<10	<10	<10	<10	<10	<10	<10	<10
TRH >C10-C16	50		NL		170	1000		<50	<50	<50	<50	<50	<50	<50	<50	<50
TRH >C16-C34	100		NL		1700	3500		<100	<100	<100	<100	<100	<100	120	<100	<100
TRH >C34-C40	100		NL		3300	10000		<100	<100	<100	<100	<100	<100	<100	<100	<100
BTEX																
Benzene	0.2		4		75			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	0.5		NL		135			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	1		NL		165			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
m+p-xylene	2		NL		180			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
o-Xylene	1		NL		180			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
OC/ OP Pestcides																
Sum of Aldrin + Dieldrin	0.05	45					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sum of DDD + DDT + DDE	0.05	3600					1.13	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Remainder of OCPs	0.05						<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
OPPs	0.05						<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
PCBs	0.1							<0.1	-	-	-	-	-	-	-	-
pH (Soils)																
pH Value	0.1							-	5.2	-	-	-	-	-	8	-
Exchangeable Cations (as meq/100g)																
Exchangeable Calcium	0.1							-	4.8	-	-	-	-	-	2	-
Exchangeable Magnesium	0.1							-	2.5	-	-	-	-	-	2.4	-
Exchangeable Potassium	0.1							-	0.3	-	-	-	-	-	<0.1	-
Exchangeable Sodium	0.1							-	0.1	-	-	-	-	-	0.7	-
Cation Exchange Capacity	0.1							-	7.7	-	-	-	-	-	5.1	-
Organic Matter																
Total Organic Carbon (%)	0.5							-	<0.5	-	-	-	-	-	<0.5	-

All results are in mg/kg unless otherwise indicated.

[A] HIL D - Commercial/ Industrial landuse

[D] EILs represent value based on average site soil properties.

Results shaded grey are in excess of the investigation criteria.

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

TABLE C Surface Water Analytical Results

Sample Identification	PQL	Guideline			EMP2-SW12	EMP2-SW13	EMP2-QA2
Date		95% Fresh [A]	Irrigation	Stock	31/10/13	31/10/13	31/10/13
Sample Appearance					clear, sl. turbid	clear, sl. turbid	clear, sl. turbid
Sample collected by					SC	SC	SC
Field Parameters							
pH	0.01				7.1	7.7	7.16
Electrical Conductivity (µS/cm	1				713	676	711
Redox Potential (mV	0.1				128	118	128
Dissolved Oxygen (mg/L	0.1				2.8	10.2	1.9
Total Recoverable Hydrocarbons (TRH)							
TRH C6-C9	10				<20	<20	<20
TRH C10-C14	50				<50	<50	<50
TRH C15-C28	100				**300**	<100	**340**
TRH C29-C36	100				**150**	<50	**160**
TRH C10-C36	250				**450**	<50	**500**
Total Recoverable Hydrocarbons (TRH) NEPM (2013)							
TRH C6 - C10	10				<20	<20	<20
vTPH C6 - C10 less BTEX (F1)	10				<20	<20	<20
TRH >C10-C16	50				<100	<100	<100
TRH >C16-C34	100				380	<100	420
TRH >C34-C40	100				140	<100	160
C10 - C16 Fraction minus Naphthalene (F2	100				<100	<100	<100
BTEX							
Benzene	1	950			<1	<1	<1
Toluene	1				<2	<2	<2
Ethylbenzene	1				<2	<2	<2
m+p-xylene	2	200			<2	<2	<2
o-xylene	1	350			<2	<2	<2
Polycyclic Aromatic Hydrocarbons							
Naphthalene	1	16			<1.0	<1.0	<1.0
Acenaphthylene	1				<1.0	<1.0	<1.0
Acenaphthene	1				<1.0	<1.0	<1.0
Fluorene	1				<1.0	<1.0	<1.0
Phenanthrene	1	*0.6*			<1.0	<1.0	<1.0
Anthracene	1	*0.01*			<1.0	<1.0	<1.0
Fluoranthene	1	*1*			<1.0	<1.0	<1.0
Pyrene	1				<1.0	<1.0	<1.0
Benz(a)anthracene	1				<1.0	<1.0	<1.0
Chrysene	1				<1.0	<1.0	<1.0
Benzo(b)fluoranthene	1				<1.0	<1.0	<1.0
Benzo(k)fluoranthene	1				<1.0	<1.0	<1.0
Benzo(a)pyrene	0.5	0.1			<0.5	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	1				<1.0	<1.0	<1.0
Dibenz(a.h)anthracene	1				<1.0	<1.0	<1.0
Benzo(g.h.i)perylene	1				<1.0	<1.0	<1.0
Sum of polycyclic aromatic hydrocarbon	0.5				<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ (zero	0.5				<0.5	<0.5	<0.5
Dissolved Metals (mg/L)							
Arsenic	0.001	0.013	0.1	0.2	0.004	<0.001	0.003
Cadmium	0.0001	0.0084*	0.01	0.01	0.0003	<0.0001	0.0002
Chromium	0.001	0.001	0.1	1	**0.002**	<0.001	**0.002**
Copper	0.001	0.00546*	1	0.5	**0.008**	**0.005**	**0.006**
Mercury	0.0001	0.0006	0.002	0.002	<0.0001	<0.0001	<0.0001
Nickel	0.001	0.0429*	0.2	1	0.014	**0.072**	0.015
Lead	0.001	0.02584*	2	0.1	0.004	<0.001	0.005
Zinc	0.005	0.0312*	0.2	20	**0.071**	**0.073**	**0.069**
Cations & Anions (mg/L)							
Calcium	1				8	9	8
Magnesium	1				5	5	5
Sodium	1				110	104	109
Potassium	1				10	4	10
Hydroxide Alkalinity as CaCO3	1				<1	<1	<1
Carbonate Alkalinity as CaCO3	1				<1	<1	<1
Bicarbonate Alkalinity as CaCO3	1				64	78	67
Total Alkalinity as CaCO3	1				64	78	67
Sulphate, SO4	1				10	20	10
Chloride, Cl	1				117	102	118
Water Hardness as CaCO3 (Calculation)	-				61	39	61

All values are in µg/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	SF1	QA1	RPD %
Sample Depth (m)	0.01-0.02		
Duplicate Type	Intralaboratory		
Sample Profile	Fill soil matrix		
Sample collected by	SC		
Fluoride			
Soluble Fluoride	29	30	3.3

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

TABLE E Surface Water Quality Assurance/ Quality Control Results

Sample Identification	EMP2-SW12	EMP2-QA2	RPD %
Sample Depth (m)	-		
Duplicate Type	Intralaboratory		
Sample Profile	Water		
Sample collected by	SC		
Field Parameters			
pH	7.1	7.16	1
Electrical Conductivity (µS/cm)	713	711	0.3
Redox Potential (mV)	128	128	0
Dissolved Oxygen (mg/L)	2.8	1.9	38
Total Recoverable Hydrocarbons (TRH)			
TRH C6-C9	<20	<20	0
TRH C10-C14	<50	<50	0
TRH C15-C28	300	340	13
TRH C29-C36	150	160	6
TRH C10-C36	450	500	11
Total Recoverable Hydrocarbons (TRH) NEPM (2013)			
TRH C6 - C10	<20	<20	0
vTPH C6 - C10 less BTEX (F1)	<20	<20	0
TRH >C10-C16	<100	<100	0
TRH >C16-C34	380	420	10
TRH >C34-C40	140	160	13
C10 - C16 Fraction minus Naphthalene (F2)	<100	<100	0
BTEX			
Benzene	<1	<1	0
Toluene	<2	<2	0
Ethylbenzene	<2	<2	0
m+p-xylene	<2	<2	0
o-xylene	<2	<2	0
Polycyclic Aromatic Hydrocarbons			
Naphthalene	<1.0	<1.0	0
Acenaphthylene	<1.0	<1.0	0
Acenaphthene	<1.0	<1.0	0
Fluorene	<1.0	<1.0	0
Phenanthrene	<1.0	<1.0	0
Anthracene	<1.0	<1.0	0
Fluoranthene	<1.0	<1.0	0
Pyrene	<1.0	<1.0	0
Benz(a)anthracene	<1.0	<1.0	0
Chrysene	<1.0	<1.0	0
Benzo(b)fluoranthene	<1.0	<1.0	0
Benzo(k)fluoranthene	<1.0	<1.0	0
Benzo(a)pyrene	<0.5	<0.5	0
Indeno(1.2.3.cd)pyrene	<1.0	<1.0	0
Dibenz(a.h)anthracene	<1.0	<1.0	0
Benzo(g.h.i)perylene	<1.0	<1.0	0
Sum of polycyclic aromatic hydrocarbons	<0.5	<0.5	0
Benzo(a)pyrene TEQ (zero)	<0.5	<0.5	0
Dissolved Metals (mg/L)			
Arsenic	0.004	0.003	29
Cadmium	0.0003	0.0002	40
Chromium	0.002	0.002	0
Copper	0.008	0.006	29
Mercury	<0.0001	<0.0001	0
Nickel	0.014	0.015	7
Lead	0.004	0.005	22
Zinc	0.071	0.069	3
Cations & Anions (mg/L)			
Calcium	8	8	0
Magnesium	5	5	0
Sodium	110	109	1
Potassium	10	10	0
Hydroxide Alkalinity as CaCO3	<1	<1	0
Carbonate Alkalinity as CaCO3	<1	<1	0
Bicarbonate Alkalinity as CaCO3	64	67	5
Total Alkalinity as CaCO3	64	67	5
Sulphate, SO4	10	10	0
Chloride, Cl	117	118	1
Water Hardness as CaCO3 (Calculation)*	61	61	0

All values are in µg/L unless otherwise indicated

BOLD identifies where RPD results

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

BOLD identified where blanks >0

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

Appendix F

Laboratory Reports

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1323941**	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 564 MAITLAND NSW, AUSTRALIA 2320	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: scadman@environcorp.com	E-mail	: sydney@alsglobal.com
Telephone	: +61 02 49344354	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 49344359	Facsimile	: +61-2-8784 8500
Project	: HYDRO BUFFER ZONE	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: P5130348		
C-O-C number	: ----	Date Samples Received	: 05-NOV-2013
Sampler	: SC	Issue Date	: 18-FEB-2014
Site	: ----		
		No. of samples received	: 11
Quote number	: SY/446/12	No. of samples analysed	: 11

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

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

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	EMP2-SF1	EMP2-SF2	EMP2-SF3	EMP2-SF4	EMP2-SF5
			Client sampling date / time	31-OCT-2013 15:00	31-OCT-2013 15:00	31-OCT-2013 15:00	31-OCT-2013 15:00	31-OCT-2013 15:00
Compound	CAS Number	LOR	Unit	ES1323941-001	ES1323941-002	ES1323941-003	ES1323941-004	ES1323941-005
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	**4.3**	**14.4**	**11.9**	**7.4**	**5.0**
EK040S: Fluoride Soluble								
Fluoride	16984-48-8	1	mg/kg	**29**	**25**	**4**	**16**	**6**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	EMP2-SF6	EMP2-SF7	EMP2-SF8	EMP2-SF9	EMP2-QA1
			Client sampling date / time	31-OCT-2013 15:00	31-OCT-2013 15:00	31-OCT-2013 15:00	31-OCT-2013 15:00	31-OCT-2013 15:00
Compound	CAS Number	LOR	Unit	ES1323941-006	ES1323941-007	ES1323941-008	ES1323941-009	ES1323941-010
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	7.6	2.5	3.0	5.4	4.4
EK040S: Fluoride Soluble								
Fluoride	16984-48-8	1	mg/kg	4	3	39	20	30

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	EMP2-S11	----	----	----	----
				Client sampling date / time	31-OCT-2013 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1323941-011	----	----	----	----
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1.0	%		12.2	----	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples									
Asbestos Detected	1332-21-4	0.1	g/kg		Yes	----	----	----	----
Asbestos Type	1332-21-4	1	--		Ch	----	----	----	----
Sample weight (dry)	----	0.01	g		964	----	----	----	----
APPROVED IDENTIFIER:	----	1	--		C.OWLER	----	----	----	----
EA200Q: Asbestos Quantification (non-NATA)									
Weight Used for % Calculation	----	0.0001	kg		0.964	----	----	----	----
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	----	----	----	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		9	----	----	----	----
Cadmium	7440-43-9	1	mg/kg		<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg		9	----	----	----	----
Copper	7440-50-8	5	mg/kg		11	----	----	----	----
Lead	7439-92-1	5	mg/kg		91	----	----	----	----
Nickel	7440-02-0	2	mg/kg		2	----	----	----	----
Zinc	7440-66-6	5	mg/kg		128	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		0.4	----	----	----	----
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	----	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		<0.05	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		<0.05	----	----	----	----
beta-BHC	319-85-7	0.05	mg/kg		<0.05	----	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg		<0.05	----	----	----	----
delta-BHC	319-86-8	0.05	mg/kg		<0.05	----	----	----	----
Heptachlor	76-44-8	0.05	mg/kg		<0.05	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	EMP2-S11	----	----	----	----
				Client sampling date / time	31-OCT-2013 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1323941-011	----	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
Aldrin	309-00-2	0.05	mg/kg		<0.05	----	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg		<0.05	----	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg		<0.05	----	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg		<0.05	----	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	----	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	----	----	----	----
Dieldrin	60-57-1	0.05	mg/kg		<0.05	----	----	----	----
4.4`-DDE	72-55-9	0.05	mg/kg		<0.05	----	----	----	----
Endrin	72-20-8	0.05	mg/kg		<0.05	----	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	----	----	----	----
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	----	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	----	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	----	----	----	----
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	----	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	----	----	----	----
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		<0.05	----	----	----	----
^ Sum of DDD + DDE + DDT	----	0.05	mg/kg		<0.05	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		<0.05	----	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg		<0.05	----	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg		<0.2	----	----	----	----
Dimethoate	60-51-5	0.05	mg/kg		<0.05	----	----	----	----
Diazinon	333-41-5	0.05	mg/kg		<0.05	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		<0.05	----	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg		<0.2	----	----	----	----
Malathion	121-75-5	0.05	mg/kg		<0.05	----	----	----	----
Fenthion	55-38-9	0.05	mg/kg		<0.05	----	----	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg		<0.05	----	----	----	----
Parathion	56-38-2	0.2	mg/kg		<0.2	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		<0.05	----	----	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg		<0.05	----	----	----	----
Fenamiphos	22224-92-6	0.05	mg/kg		<0.05	----	----	----	----
Prothiofos	34643-46-4	0.05	mg/kg		<0.05	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	EMP2-S11	----	----	----	----
			Client sampling date / time	31-OCT-2013 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1323941-011	----	----	----	----
EP068B: Organophosphorus Pesticides (OP) - Continued								
Ethion	563-12-2	0.05	mg/kg	<0.05	----	----	----	----
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	----	----	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	----	----	----	----
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	**1.0**	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg	**0.9**	----	----	----	----
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	**2.4**	----	----	----	----
^ 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	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	EMP2-S11	----	----	----	----
				Client sampling date / time	31-OCT-2013 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1323941-011	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 - Continued									
^ **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		<100	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	----	----	----	----
^ **>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	----	----	----	----
^ **Sum of BTEX**	----	0.2	mg/kg		<0.2	----	----	----	----
^ **Total Xylenes**	1330-20-7	0.5	mg/kg		<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	----	----	----	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		**66.1**	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.1	%		**62.0**	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.1	%		**62.1**	----	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.1	%		**95.4**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%		**112**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.1	%		**86.2**	----	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.1	%		**97.2**	----	----	----	----
Anthracene-d10	1719-06-8	0.1	%		**86.2**	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.1	%		**87.3**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		**89.8**	----	----	----	----
Toluene-D8	2037-26-5	0.1	%		**75.1**	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	EMP2-S11	----	----	----	----
			Client sampling date / time	31-OCT-2013 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1323941-011	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.1	%	**96.5**	----	----	----	----

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	EMP2-S11 - 31-OCT-2013 15:00	Mid brown clay soil with some small red and grey rocks plus two small friable asbestos fibre bundles approx 4 x 1 x 1mm

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	72.8	133.2
Toluene-D8	2037-26-5	73.9	132.1
4-Bromofluorobenzene	460-00-4	71.6	130.0

QUALITY CONTROL REPORT

Work Order	: **ES1323941**	Page	: 1 of 13
Amendment	: **1**		
Client	: **ENVIRON AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: MR STEVE CADMAN	Contact	: Client Services
Address	: PO BOX 564 MAITLAND NSW, AUSTRALIA 2320	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: scadman@environcorp.com	E-mail	: sydney@alsglobal.com
Telephone	: +61 02 49344354	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 49344359	Facsimile	: +61-2-8784 8500
Project	: HYDRO BUFFER ZONE	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 05-NOV-2013
Sampler	: SC	Issue Date	: 18-FEB-2014
Order number	: P5130348		
		No. of samples received	: 11
Quote number	: SY/446/12	No. of samples analysed	: 11

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: 3147358)									
ES1323903-011	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	22.4	22.1	1.5	0% - 20%
ES1323940-002	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	4.9	4.7	4.0	No Limit
EA055: Moisture Content (QC Lot: 3147359)									
ES1323941-006	EMP2-SF6	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	7.6	6.7	12.3	No Limit
ES1324004-001	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	17.4	15.5	11.6	0% - 50%
EG005T: Total Metals by ICP-AES (QC Lot: 3149799)									
ES1323610-013	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	5	7	41.2	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	4	5	27.3	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	6	9	29.6	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	8	8	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	30	31	3.8	No Limit
ES1323610-024	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	6	6	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	13	12	12.8	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	11	10	10.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	9	8	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	49	47	3.8	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3149800)									
ES1323610-013	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
ES1323610-024	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EK040S: Fluoride Soluble (QC Lot: 3147239)									
ES1323940-002	Anonymous	EK040S: Fluoride	16984-48-8	1	mg/kg	7	6	0.0	No Limit
ES1323941-005	EMP2-SF5	EK040S: Fluoride	16984-48-8	1	mg/kg	6	6	0.0	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 3147196)									
ES1324019-005	Anonymous	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.0	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 3147195)									
ES1324019-005	Anonymous	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP068A: Organochlorine Pesticides (OC) (QC Lot: 3147195) - continued									
ES1324019-005	Anonymous	EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
ES1324019-036	Anonymous	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 3147195)									
ES1324019-005	Anonymous	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 3147195) - continued									
ES1324019-005	Anonymous	EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
ES1324019-036	Anonymous	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3148823)									
ES1324173-001	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	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit

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: 3148823) - continued									
ES1324173-001	Anonymous	EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3148647)									
ES1323960-003	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
ES1323960-024	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3148822)									
ES1324173-001	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QC Lot: 3148647)									
ES1323960-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
ES1323960-024	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QC Lot: 3148822)									
ES1324173-001	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	>C10_C16	50	mg/kg	<50	<50	0.0	No Limit
EP080: BTEXN (QC Lot: 3148647)									
ES1323960-003	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
ES1323960-024	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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEXN (QC Lot: 3148647) - continued									
ES1323960-024	Anonymous	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: 3149799)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	102	87	129
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	96.4	80	122
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	94.7	71	133
EG005T: Copper	7440-50-8	5	mg/kg	<5	32.0 mg/kg	103	86	128
EG005T: Lead	7439-92-1	5	mg/kg	<5	40.0 mg/kg	93.4	81	123
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55.0 mg/kg	103	84	130
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	103	81	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3149800)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	77.9	66	112
EK040S: Fluoride Soluble (QCLot: 3147239)								
EK040S: Fluoride	16984-48-8	1.0	mg/kg	<1	25.0 mg/kg	111	69	117
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3147196)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	92.1	57.4	117
EP068A: Organochlorine Pesticides (OC) (QCLot: 3147195)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	92.6	71	113
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	75.7	66	122
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	94.8	69	119
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	91.5	71	115
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	82.8	65	113
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	82.8	68	116
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	83.5	68	118
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	69.4	68	116
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	94.6	68	120
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	82.2	69	119
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	73.1	67	121
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	76.5	66	118
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	88.6	69	117
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	100	67	123
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	99.2	76	120
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	95.1	76	120
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	81.7	57.3	115
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	74.9	60	124
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	96.3	67	127
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	71.6	65	123

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 3147195) - continued								
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	110	65	129
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3147195)								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	82.4	56	126
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	102	64	128
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	77.1	54	122
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	86.0	64	124
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	102	73	117
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	78.3	55	119
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	93.4	69	123
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	105	70	120
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	83.7	71	115
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	93.4	68	114
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	107	68	122
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	79.0	69	115
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	72.1	68	116
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	91.6	64	120
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	82.1	68	116
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	90.8	70	118
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	103	67	123
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	93.4	42	126
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3148823)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	4 mg/kg	99.5	80	124
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	4 mg/kg	89.9	77	123
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	4 mg/kg	92.6	79	123
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	4 mg/kg	91.3	77	123
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	4 mg/kg	95.6	79	123
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	4 mg/kg	96.4	79	123
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	4 mg/kg	96.6	79	123
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	4 mg/kg	97.7	79	125
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	4 mg/kg	87.1	73	121
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	4 mg/kg	95.7	81	123
EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	4 mg/kg	85.4	70	118
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	4 mg/kg	97.8	77	123
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	4 mg/kg	91.7	76	122
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	4 mg/kg	85.3	71	113
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	4 mg/kg	84.1	71.7	113
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	4 mg/kg	83.6	72.4	114
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3148647)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	83.8	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 Petroleum Hydrocarbons (QCLot: 3148822)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	98.6	71	131
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	94.5	74	138
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	90.0	64	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3148647)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	83.9	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3148822)								
EP071: >C10 - C16 Fraction	>C10_C16	50	mg/kg	<50	250 mg/kg	99.1	70	130
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	91.3	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----
		50	mg/kg	----	150 mg/kg	91.4	63	131
EP080: BTEXN (QCLot: 3148647)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	94.1	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	79.6	62	128
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	84.3	58	118
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	82.4	60	120
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	89.0	60	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	91.4	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: 3149799)							
ES1323610-013	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	101	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	99.1	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	105	70	130
		EG005T: Copper	7440-50-8	125 mg/kg	95.4	70	130
		EG005T: Lead	7439-92-1	125 mg/kg	99.8	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	104	70	130
		EG005T: Zinc	7440-66-6	125 mg/kg	114	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3149800)							
ES1323610-013	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	85.2	70	130
EK040S: Fluoride Soluble (QCLot: 3147239)							
ES1323940-002	Anonymous	EK040S: Fluoride	16984-48-8	25.0 mg/kg	101	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*
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3147196)							
ES1324019-005	Anonymous	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	91.6	70	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 3147195)							
ES1324019-005	Anonymous	EP068: gamma-BHC	58-89-9	0.5 mg/kg	80.9	70	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	90.1	70	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	73.4	70	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	85.6	70	130
		EP068: Endrin	72-20-8	2 mg/kg	89.1	70	130
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	93.9	70	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3147195)							
ES1324019-005	Anonymous	EP068: Diazinon	333-41-5	0.5 mg/kg	94.9	70	130
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	88.6	70	130
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	92.6	70	130
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	82.4	70	130
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	86.7	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3148823)							
ES1324173-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	72.8	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	78.4	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3148647)							
ES1323960-003	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	106	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3148822)							
ES1324173-001	Anonymous	EP071: C10 - C14 Fraction	----	640 mg/kg	85.9	73	137
		EP071: C15 - C28 Fraction	----	3140 mg/kg	86.8	53	131
		EP071: C29 - C36 Fraction	----	2860 mg/kg	76.8	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3148647)							
ES1323960-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	104	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3148822)							
ES1324173-001	Anonymous	EP071: >C10 - C16 Fraction	>C10_C16	850 mg/kg	108	73	137
		EP071: >C16 - C34 Fraction	----	4800 mg/kg	79.7	53	131
		EP071: >C34 - C40 Fraction	----	2400 mg/kg	58.7	52	132
EP080: BTEXN (QCLot: 3148647)							
ES1323960-003	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	101	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	92.9	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	95.3	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	92.0	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	97.5	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	106	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
EP068A: Organochlorine Pesticides (OC) (QCLot: 3147195)										
ES1324019-005	Anonymous	EP068: gamma-BHC	58-89-9	0.5 mg/kg	80.9	----	70	130	----	----
		EP068: Heptachlor	76-44-8	0.5 mg/kg	90.1	----	70	130	----	----
		EP068: Aldrin	309-00-2	0.5 mg/kg	73.4	----	70	130	----	----
		EP068: Dieldrin	60-57-1	0.5 mg/kg	85.6	----	70	130	----	----
		EP068: Endrin	72-20-8	2 mg/kg	89.1	----	70	130	----	----
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	93.9	----	70	130	----	----
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3147195)										
ES1324019-005	Anonymous	EP068: Diazinon	333-41-5	0.5 mg/kg	94.9	----	70	130	----	----
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	88.6	----	70	130	----	----
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	92.6	----	70	130	----	----
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	82.4	----	70	130	----	----
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	86.7	----	70	130	----	----
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 3147196)										
ES1324019-005	Anonymous	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	91.6	----	70	130	----	----
EK040S: Fluoride Soluble (QCLot: 3147239)										
ES1323940-002	Anonymous	EK040S: Fluoride	16984-48-8	25.0 mg/kg	101	----	70	130	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3148647)										
ES1323960-003	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	106	----	70	130	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3148647)										
ES1323960-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	104	----	70	130	----	----
EP080: BTEXN (QCLot: 3148647)										
ES1323960-003	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	101	----	70	130	----	----
		EP080: Toluene	108-88-3	2.5 mg/kg	92.9	----	70	130	----	----
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	95.3	----	70	130	----	----
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	92.0	----	70	130	----	----
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	97.5	----	70	130	----	----
		EP080: Naphthalene	91-20-3	2.5 mg/kg	106	----	70	130	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3148822)										
ES1324173-001	Anonymous	EP071: C10 - C14 Fraction	----	640 mg/kg	85.9	----	73	137	----	----
		EP071: C15 - C28 Fraction	----	3140 mg/kg	86.8	----	53	131	----	----
		EP071: C29 - C36 Fraction	----	2860 mg/kg	76.8	----	52	132	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3148822)										

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 Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3148822) - continued										
ES1324173-001	Anonymous	EP071: >C10 - C16 Fraction	>C10_C16	850 mg/kg	108	----	73	137	----	----
		EP071: >C16 - C34 Fraction	----	4800 mg/kg	79.7	----	53	131	----	----
		EP071: >C34 - C40 Fraction	----	2400 mg/kg	58.7	----	52	132	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3148823)										
ES1324173-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	72.8	----	70	130	----	----
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	78.4	----	70	130	----	----
EG005T: Total Metals by ICP-AES (QCLot: 3149799)										
ES1323610-013	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	101	----	70	130	----	----
		EG005T: Cadmium	7440-43-9	50 mg/kg	99.1	----	70	130	----	----
		EG005T: Chromium	7440-47-3	50 mg/kg	105	----	70	130	----	----
		EG005T: Copper	7440-50-8	125 mg/kg	95.4	----	70	130	----	----
		EG005T: Lead	7439-92-1	125 mg/kg	99.8	----	70	130	----	----
		EG005T: Nickel	7440-02-0	50 mg/kg	104	----	70	130	----	----
		EG005T: Zinc	7440-66-6	125 mg/kg	114	----	70	130	----	----
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3149800)										
ES1323610-013	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	85.2	----	70	130	----	----

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **ES1323941**	Page	: 1 of 7
Amendment	: **1**		
Client	: ENVIRON AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MR STEVE CADMAN	Contact	: Client Services
Address	: PO BOX 564 MAITLAND NSW, AUSTRALIA 2320	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: scadman@environcorp.com	E-mail	: sydney@alsglobal.com
Telephone	: +61 02 49344354	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 49344359	Facsimile	: +61-2-8784 8500
Project	: HYDRO BUFFER ZONE	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 05-NOV-2013
Sampler	: SC	Issue Date	: 18-FEB-2014
Order number	: P5130348		
		No. of samples received	: 11
Quote number	: SY/446/12	No. of samples analysed	: 11

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

This Interpretive Quality Control Report contains the following information:

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

Analysis Holding Time Compliance

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

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

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

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content							
Pulp Bag (EA055-103)							
EMP2-SF1, EMP2-SF2, EMP2-SF3, EMP2-SF4, EMP2-SF5, EMP2-SF6, EMP2-SF7, EMP2-SF8, EMP2-SF9, EMP2-QA1	**31-OCT-2013**	**----**	----	----	**08-NOV-2013**	14-NOV-2013	✓
Soil Glass Jar - Unpreserved (EA055-103)							
EMP2-S11	**31-OCT-2013**	**----**	----	----	**08-NOV-2013**	14-NOV-2013	✓
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples							
Snap Lock Bag (EA200)							
EMP2-S11	**31-OCT-2013**	**---**	29-APR-2014	----	**14-NOV-2013**	13-MAY-2014	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
EMP2-S11	**31-OCT-2013**	**08-NOV-2013**	29-APR-2014	✓	**11-NOV-2013**	29-APR-2014	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
EMP2-S11	**31-OCT-2013**	**08-NOV-2013**	28-NOV-2013	✓	**11-NOV-2013**	28-NOV-2013	✓
EK040S: Fluoride Soluble							
Pulp Bag (EK040S)							
EMP2-SF1, EMP2-SF2, EMP2-SF3, EMP2-SF4, EMP2-SF5, EMP2-SF6, EMP2-SF7, EMP2-SF8, EMP2-SF9, EMP2-QA1	**31-OCT-2013**	**07-NOV-2013**	07-NOV-2013	✓	**11-NOV-2013**	05-DEC-2013	✓
EP066: Polychlorinated Biphenyls (PCB)							
Soil Glass Jar - Unpreserved (EP066)							
EMP2-S11	**31-OCT-2013**	**08-NOV-2013**	14-NOV-2013	✓	**09-NOV-2013**	18-DEC-2013	✓
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved (EP068)							
EMP2-S11	**31-OCT-2013**	**08-NOV-2013**	14-NOV-2013	✓	**09-NOV-2013**	18-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
EP068B: Organophosphorus Pesticides (OP)							
Soil Glass Jar - Unpreserved (EP068)							
EMP2-S11	**31-OCT-2013**	**08-NOV-2013**	14-NOV-2013	✓	**09-NOV-2013**	18-DEC-2013	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013							
Soil Glass Jar - Unpreserved (EP071)							
EMP2-S11	**31-OCT-2013**	**08-NOV-2013**	14-NOV-2013	✓	**08-NOV-2013**	18-DEC-2013	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM))							
EMP2-S11	**31-OCT-2013**	**08-NOV-2013**	14-NOV-2013	✓	**08-NOV-2013**	18-DEC-2013	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
EMP2-S11	**31-OCT-2013**	**08-NOV-2013**	14-NOV-2013	✓	**08-NOV-2013**	14-NOV-2013	✓
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080)							
EMP2-S11	**31-OCT-2013**	**08-NOV-2013**	14-NOV-2013	✓	**08-NOV-2013**	14-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	15	**13.3**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Moisture Content	EA055-103	4	40	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (SIM)	EP075(SIM)	1	10	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	2	13	**15.4**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Polychlorinated Biphenyls (PCB)	EP066	1	9	**11.1**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	2	19	**10.5**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	2	19	**10.5**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	10	**10.0**	**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)							
Fluoride - Soluble	EK040S	1	15	**6.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (SIM)	EP075(SIM)	1	10	**10.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	13	**7.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Polychlorinated Biphenyls (PCB)	EP066	1	9	**11.1**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	19	**5.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	19	**5.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	10	**10.0**	**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)							
Fluoride - Soluble	EK040S	1	15	**6.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (SIM)	EP075(SIM)	1	10	**10.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	13	**7.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Polychlorinated Biphenyls (PCB)	EP066	1	9	**11.1**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	19	**5.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	19	**5.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	10	**10.0**	**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)							
Fluoride - Soluble	EK040S	1	15	**6.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (SIM)	EP075(SIM)	1	10	**10.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	13	**7.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Polychlorinated Biphenyls (PCB)	EP066	1	9	**11.1**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	19	**5.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	19	**5.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	10	**10.0**	**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
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.
Polychlorinated Biphenyls (PCB)	EP066	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 504)
Pesticides by GCMS	EP068	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 504,505)
TPH - Semivolatile Fraction	EP071	SOIL	(USEPA SW 846 - 8015A) Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)
PAH/Phenols (SIM)	EP075(SIM)	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TPH Volatiles/BTEX	EP080	SOIL	(USEPA SW 846 - 8260B) Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 501)

Preparation Methods	Method	Matrix	Method Descriptions
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 A - Concentrating)	ORG17A	SOIL	In-house, Mechanical agitation (tumbler). 20g of sample, Na2SO4 and surrogate are extracted with 150mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

Preparation Methods	Method	Matrix	Method Descriptions
Tumbler Extraction of Solids (Option B - Non-concentrating)	ORG17B	SOIL	In-house, Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 20mL 1:1 DCM/Acetone by end over end tumble. The solvent is transferred directly to a GC vial for analysis.

Summary of Outliers

Outliers : Quality Control Samples

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

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

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

Regular Sample Surrogates

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

Outliers : Analysis Holding Time Compliance

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

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

Outliers : Frequency of Quality Control Samples

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

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

CHAIN OF CUSTODY

ALS Laboratory: please tick →

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

BRISBANE 32 Shand 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 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com

NEWCASTLE 8 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: ENVIROAUSTRALIA P/L	TURNAROUND REQUIREMENTS: ☐ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)	
OFFICE: 193, 50 Glebe Rd, The Junction NSW	(Standard TAT may be longer for some tests e.g., Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact?	Yes No N/A
PROJECT: HYDRO BUFFER ZONE PROJECT NO.:	ALS QUOTE NO.:	Free ice / frozen ice bricks present upon receipt?	Yes No N/A
ORDER NUMBER: AB30348 PURCHASE ORDER NO.:	COUNTRY OF ORIGIN:	Random Sample Temperature on Receipt:	°C
PROJECT MANAGER: Steve Codman CONTACT PH: 49625444	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7	Other comment:	
SAMPLER: " " SAMPLER MOBILE: 0423 583 538	RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY: Spare
COC Emailed to ALS? (YES / NO) EDD FORMAT (or default):	DATE/TIME: 5/11/13	DATE/TIME: 5/11/13 5:40pm	DATE/TIME: 6/11/13 17:05
Email Reports to (will default to PM if no other addresses are listed): Steve Codman			RECEIVED BY: Stern
Email Invoice to (will default to PM if no other addresses are listed): " "			DATE/TIME: 6/11/13 19:00

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

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	TPH/BTEX	PAHs	8 metals	OCP/OPP/PCBs	Asbestos in soil 200g			Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	EMP2 - SF1	31/10/13	S	Pulp Bag	1	✓								
2	" - SF2				1	✓								
3	" - SF3				1	✓								
4	" - SF4				1	✓								
5	" - SF5				1	✓								
6	" - SF6				1	✓								
7	" - SF7				1	✓								
8	" - SF8				1	✓								
9	" - SF9				1	✓								
10	- QA1				1	✓								
11	" - S11		S	250ml glass + Ziploc	2		✓	✓	✓	✓	✓			
				TOTAL										

Environmental Division
Sydney
Work Order
ES1323941

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.

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1323471**	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
Order number	: AS130348		
C-O-C number	: ----	Date Samples Received	: 31-OCT-2013
Sampler	: SC	Issue Date	: 08-NOV-2013
Site	: ----		
		No. of samples received	: 3
Quote number	: SY/285/10	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
- 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.

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

- **EN055: Ionic Balance out of acceptable limits for sample ID (EMP2-SW12 and EMP2-QA2) due to analytes not quantified in this report.**

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
Hoa Nguyen	Senior Inorganic Chemist	Sydney Inorganics
Merrin Avery	Supervisor - Inorganic	Newcastle - Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Raymond Commodor	Instrument Chemist	Sydney Inorganics

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	EMP2-SW12	EMP2-SW13	EMP2-QA2	----	----
				Client sampling date / time	31-OCT-2013 15:00	31-OCT-2013 15:00	31-OCT-2013 15:00	----	----
Compound	CAS Number	LOR	Unit		ES1323471-001	ES1323471-002	ES1323471-003	----	----
EA005: pH									
pH Value	----	0.01	pH Unit		7.10	7.70	7.16	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		713	676	711	----	----
EA075: Redox Potential									
Redox Potential	----	0.1	mV		128	118	128	----	----
pH Redox	----	0.01	pH Unit		6.8	7.2	6.8	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		64	78	67	----	----
Total Alkalinity as CaCO3	----	1	mg/L		64	78	67	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		10	20	10	----	----
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	1	mg/L		117	102	118	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		8	9	8	----	----
Magnesium	7439-95-4	1	mg/L		5	5	5	----	----
Sodium	7440-23-5	1	mg/L		110	104	109	----	----
Potassium	7440-09-7	1	mg/L		10	4	10	----	----
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.004	<0.001	0.003	----	----
Cadmium	7440-43-9	0.0001	mg/L		0.0003	<0.0001	0.0002	----	----
Chromium	7440-47-3	0.001	mg/L		0.002	<0.001	0.002	----	----
Copper	7440-50-8	0.001	mg/L		0.008	0.005	0.006	----	----
Lead	7439-92-1	0.001	mg/L		0.004	<0.001	0.005	----	----
Nickel	7440-02-0	0.001	mg/L		0.014	0.072	0.015	----	----
Zinc	7440-66-6	0.005	mg/L		0.071	0.073	0.069	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		5.19	4.85	4.88	----	----
Total Cations	----	0.01	meq/L		5.85	5.49	5.81	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	EMP2-SW12	EMP2-SW13	EMP2-QA2	----	----
				Client sampling date / time	31-OCT-2013 15:00	31-OCT-2013 15:00	31-OCT-2013 15:00	----	----
Compound	CAS Number	LOR	Unit		ES1323471-001	ES1323471-002	ES1323471-003	----	----
EN055: Ionic Balance - Continued									
Ionic Balance	----	0.01	%		**5.99**	**6.11**	**8.70**	----	----
EP025: Oxygen - Dissolved (DO)									
Dissolved Oxygen	----	0.1	mg/L		**2.8**	**10.2**	**1.9**	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Acenaphthene	83-32-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Fluorene	86-73-7	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Phenanthrene	85-01-8	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Anthracene	120-12-7	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Fluoranthene	206-44-0	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Pyrene	129-00-0	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(b)fluoranthene	205-99-2	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	<1.0	----	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	<1.0	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		<0.5	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	<0.5	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L		**300**	<100	**340**	----	----
C29 - C36 Fraction	----	50	µg/L		**150**	<50	**160**	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		**450**	<50	**500**	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	<20	----	----
>C10 - C16 Fraction	>C10_C16	100	µg/L		<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L		**380**	<100	**420**	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	EMP2-SW12	EMP2-SW13	EMP2-QA2	----	----
			Client sampling date / time	31-OCT-2013 15:00	31-OCT-2013 15:00	31-OCT-2013 15:00	----	----
Compound	CAS Number	LOR	Unit	ES1323471-001	ES1323471-002	ES1323471-003	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 - Continued								
>C34 - C40 Fraction	----	100	µg/L	**140**	<100	**160**	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	**520**	<100	**580**	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L	<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	----	----
^ Total Xylenes	1330-20-7	2	µg/L	<2	<2	<2	----	----
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	**34.4**	**35.3**	**36.4**	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%	**69.9**	**65.1**	**85.0**	----	----
2.4.6-Tribromophenol	118-79-6	0.1	%	**91.6**	**91.8**	**90.3**	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	**89.6**	**69.0**	**89.0**	----	----
Anthracene-d10	1719-06-8	0.1	%	**74.7**	**86.4**	**88.2**	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	**76.8**	**89.4**	**90.6**	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.1	%	**96.2**	**94.1**	**112**	----	----
Toluene-D8	2037-26-5	0.1	%	**105**	**96.7**	**101**	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	**107**	**96.2**	**110**	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10.0	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27.4	113
4-Terphenyl-d14	1718-51-0	32	112
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

QUALITY CONTROL REPORT

Work Order	: **ES1323471**	Page	: 1 of 10
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	: 31-OCT-2013
Sampler	: SC	Issue Date	: 08-NOV-2013
Order number	: AS130348		
		No. of samples received	: 3
Quote number	: SY/285/10	No. of samples analysed	: 3

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

This Quality Control Report contains the following information:

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

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
Hoa Nguyen	Senior Inorganic Chemist	Sydney Inorganics
Merrin Avery	Supervisor - Inorganic	Newcastle - Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Raymond Commodor	Instrument Chemist	Sydney Inorganics

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: 3139433)									
ES1323471-001	EMP2-SW12	EA005: pH Value	----	0.01	pH Unit	7.10	7.12	0.3	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 3140541)									
ES1323471-001	EMP2-SW12	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	710	706	0.6	0% - 20%
ES1323761-005	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	16100	16000	0.4	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 3144909)									
ES1323958-001	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	3690	3690	0.0	0% - 20%
ES1324033-004	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1740	1740	0.1	0% - 20%
EA075: Redox Potential (QC Lot: 3138589)									
ES1323471-001	EMP2-SW12	EA075: Redox Potential	----	0.1	mV	128	125	2.1	0% - 20%
		EA075: pH Redox	----	0.01	pH Unit	6.8	6.8	0.0	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3140540)									
ES1323471-001	EMP2-SW12	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	64	64	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	64	64	0.0	0% - 20%
ES1323475-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	126	124	1.7	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	126	124	1.7	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3144910)									
ES1323989-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	8	8	0.0	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	8	8	0.0	No Limit
ES1324066-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	56	57	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	56	57	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3140450)									
ES1323471-001	EMP2-SW12	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	9	9	0.0	No Limit
ES1323614-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1370	1360	0.4	0% - 20%
ED045G: Chloride Discrete analyser (QC Lot: 3140449)									
ES1323471-001	EMP2-SW12	ED045G: Chloride	16887-00-6	1	mg/L	118	119	1.2	0% - 20%
ES1323614-007	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	391	390	0.3	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED093F: Dissolved Major Cations (QC Lot: 3140448)									
ES1323471-001	EMP2-SW12	ED093F: Calcium	7440-70-2	1	mg/L	8	8	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	5	5	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	110	112	1.8	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	10	10	0.0	0% - 50%
ES1323614-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	22	22	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	24	24	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	93	94	1.1	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	6	6	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 3139186)									
ES1323475-001	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	<0.001	<0.001	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.007	0.002	106	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	0.066	0.078	17.7	0% - 20%
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.065	0.073	11.5	0% - 50%
ES1323475-008	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	<0.001	0.001	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.004	0.002	55.2	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	<0.001	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: 3140492)									
EP1308316-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
ES1323475-008	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: 3142313)									
ES1323471-001	EMP2-SW12	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
ES1323711-004	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	70	90	23.4	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QC Lot: 3142313)									
ES1323471-001	EMP2-SW12	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
ES1323711-004	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	70	90	21.9	No Limit
EP080: BTEXN (QC Lot: 3142313)									
ES1323471-001	EMP2-SW12	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

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: 3142313) - continued									
ES1323471-001	EMP2-SW12	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
ES1323711-004	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: 3140541)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	110	95	113
EA010P: Conductivity by PC Titrator (QCLot: 3144909)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	2000 µS/cm	111	95	113
EA075: Redox Potential (QCLot: 3138589)								
EA075: Redox Potential	----	0.1	mV	----	86 mV	99.9	95	112
ED037P: Alkalinity by PC Titrator (QCLot: 3140540)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	94.6	81	111
ED037P: Alkalinity by PC Titrator (QCLot: 3144910)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	200 mg/L	89.8	81	111
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3140450)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	99.3	86	122
ED045G: Chloride Discrete analyser (QCLot: 3140449)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	98.3	77	123
ED093F: Dissolved Major Cations (QCLot: 3140448)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	100	87	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	97.1	89	113
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	110	79	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	101	87	115
EG020T: Total Metals by ICP-MS (QCLot: 3139186)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	98.7	79	121
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.8	82	114
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.2	83	115
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	102	83	117
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	100	85	115
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	102	83	117
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	98.4	76	118
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3140492)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.010 mg/L	114	77	115
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3139415)								
EP075(SIM): Naphthalene	91-20-3	0.2	µg/L	----	20 µg/L	84.2	58.6	119
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Acenaphthylene	208-96-8	0.2	µg/L	----	20 µg/L	81.1	63.6	114
		1	µg/L	<1.0	----	----	----	----

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
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3139415) - continued								
EP075(SIM): Acenaphthene	83-32-9	0.2	µg/L	----	20 µg/L	81.5	62.2	113
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Fluorene	86-73-7	0.2	µg/L	----	20 µg/L	81.9	63.9	115
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Phenanthrene	85-01-8	0.2	µg/L	----	20 µg/L	79.8	62.6	116
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Anthracene	120-12-7	0.2	µg/L	----	20 µg/L	81.9	64.3	116
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Fluoranthene	206-44-0	0.2	µg/L	----	20 µg/L	82.0	63.6	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Pyrene	129-00-0	0.2	µg/L	----	20 µg/L	91.5	63.1	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benz(a)anthracene	56-55-3	0.2	µg/L	----	20 µg/L	82.1	64.1	117
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Chrysene	218-01-9	0.2	µg/L	----	20 µg/L	84.0	62.5	116
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.2	µg/L	----	20 µg/L	91.3	61.7	119
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.2	µg/L	----	20 µg/L	93.4	61.7	117
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(a)pyrene	50-32-8	0.2	µg/L	----	20 µg/L	88.3	63.3	117
		0.5	µg/L	<0.5	----	----	----	----
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.2	µg/L	----	20 µg/L	83.5	59.9	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.2	µg/L	----	20 µg/L	84.8	61.2	117
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.2	µg/L	----	20 µg/L	85.8	59.1	118
		1	µg/L	<1.0	----	----	----	----
EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	1	µg/L	<1.0	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3139414)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	100	59	129
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	104	71	131
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	76.3	62	120
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3142313)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	111	75	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3139414)								
EP071: >C10 - C16 Fraction	>C10_C16	100	µg/L	<100	2500 µg/L	114	58.9	131
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	93.7	73.9	138
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----
		50	µg/L	----	1500 µg/L	70.1	67	127

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
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3142313)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	114	75	127
EP080: BTEXN (QCLot: 3142313)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	117	70	124
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	116	65	129
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	114	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	111	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	120	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	112	70	124

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
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3140450)							
ES1323471-001	EMP2-SW12	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L 10 mg/L	106 102	70 70	130 130
ED045G: Chloride Discrete analyser (QCLot: 3140449)							
ES1323471-001	EMP2-SW12	ED045G: Chloride	16887-00-6	250 mg/L	95.8	70	130
EG020T: Total Metals by ICP-MS (QCLot: 3139186)							
ES1323475-002	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	105	70	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	106	70	130
		EG020A-T: Chromium	7440-47-3	1 mg/L	103	70	130
		EG020A-T: Copper	7440-50-8	1 mg/L	102	70	130
		EG020A-T: Lead	7439-92-1	1 mg/L	115	70	130
		EG020A-T: Nickel	7440-02-0	1 mg/L	94.5	70	130
		EG020A-T: Zinc	7440-66-6	1 mg/L	90.6	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3140492)							
EP1308316-002	Anonymous	EG035T: Mercury	7439-97-6	0.010 mg/L	72.5	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3142313)							
ES1323717-006	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	100	70	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3142313)							
ES1323717-006	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	97.7	70	130
EP080: BTEXN (QCLot: 3142313)							

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
EP080: BTEXN (QCLot: 3142313) - continued							
ES1323717-006	Anonymous	EP080: Benzene	71-43-2	25 µg/L	82.2	70	130
		EP080: Toluene	108-88-3	25 µg/L	85.3	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	88.7	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	91.1	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	96.6	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	103	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**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report: Spike Concentration	Spike Recovery (%): MS	Spike Recovery (%): MSD	Recovery Limits (%): Low	Recovery Limits (%): High	RPDs (%): Value	RPDs (%): Control Limit
EG020T: Total Metals by ICP-MS (QCLot: 3139186)										
ES1323475-002	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	105	----	70	130	----	----
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	106	----	70	130	----	----
		EG020A-T: Chromium	7440-47-3	1 mg/L	103	----	70	130	----	----
		EG020A-T: Copper	7440-50-8	1 mg/L	102	----	70	130	----	----
		EG020A-T: Lead	7439-92-1	1 mg/L	115	----	70	130	----	----
		EG020A-T: Nickel	7440-02-0	1 mg/L	94.5	----	70	130	----	----
		EG020A-T: Zinc	7440-66-6	1 mg/L	90.6	----	70	130	----	----
ED045G: Chloride Discrete analyser (QCLot: 3140449)										
ES1323471-001	EMP2-SW12	ED045G: Chloride	16887-00-6	250 mg/L	95.8	----	70	130	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3140450)										
ES1323471-001	EMP2-SW12	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	106	----	70	130	----	----
				10 mg/L	102	----	70	130	----	----
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3140492)										
EP1308316-002	Anonymous	EG035T: Mercury	7439-97-6	0.010 mg/L	72.5	----	70	130	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3142313)										
ES1323717-006	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	100	----	70	130	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3142313)										
ES1323717-006	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	97.7	----	70	130	----	----
EP080: BTEXN (QCLot: 3142313)										
ES1323717-006	Anonymous	EP080: Benzene	71-43-2	25 µg/L	82.2	----	70	130	----	----
		EP080: Toluene	108-88-3	25 µg/L	85.3	----	70	130	----	----
		EP080: Ethylbenzene	100-41-4	25 µg/L	88.7	----	70	130	----	----

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
EP080: BTEXN (QCLot: 3142313) - continued										
ES1323717-006	Anonymous	EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	91.1	----	70	130	----	----
		EP080: ortho-Xylene	95-47-6	25 µg/L	96.6	----	70	130	----	----
		EP080: Naphthalene	91-20-3	25 µg/L	103	----	70	130	----	----

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **ES1323471**	Page	: 1 of 8
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	: 31-OCT-2013
Sampler	: SC	Issue Date	: 08-NOV-2013
Order number	: AS130348		
		No. of samples received	: 3
Quote number	: SY/285/10	No. of samples analysed	: 3

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

This Interpretive Quality Control Report contains the following information:

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

Analysis Holding Time Compliance

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

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

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

Matrix: **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)								
EMP2-SW12, EMP2-QA2	EMP2-SW13,	**31-OCT-2013**	**----**	----	----	**01-NOV-2013**	31-OCT-2013	×
EA010P: Conductivity by PC Titrator								
Clear Plastic Bottle - Natural (EA010-P)								
EMP2-SW12, EMP2-QA2	EMP2-SW13,	**31-OCT-2013**	**---**	28-NOV-2013	----	**04-NOV-2013**	28-NOV-2013	✓
EA075: Redox Potential								
Clear Plastic Bottle - Natural (EA075)								
EMP2-SW12, EMP2-QA2	EMP2-SW13,	**31-OCT-2013**	**----**	----	----	**01-NOV-2013**	31-OCT-2013	×
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
EMP2-SW12, EMP2-QA2	EMP2-SW13,	**31-OCT-2013**	**---**	14-NOV-2013	----	**04-NOV-2013**	14-NOV-2013	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
EMP2-SW12, EMP2-QA2	EMP2-SW13,	**31-OCT-2013**	**---**	28-NOV-2013	----	**04-NOV-2013**	28-NOV-2013	✓
ED045G: Chloride Discrete analyser								
Clear Plastic Bottle - Natural (ED045G)								
EMP2-SW12, EMP2-QA2	EMP2-SW13,	**31-OCT-2013**	**---**	28-NOV-2013	----	**04-NOV-2013**	28-NOV-2013	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
EMP2-SW12, EMP2-QA2	EMP2-SW13,	**31-OCT-2013**	**---**	07-NOV-2013	----	**04-NOV-2013**	07-NOV-2013	✓
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unspecified (EG020A-T)								
EMP2-SW12, EMP2-QA2	EMP2-SW13,	**31-OCT-2013**	**04-NOV-2013**	29-APR-2014	✓	**04-NOV-2013**	29-APR-2014	✓

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
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unspecified (EG035T)							
EMP2-SW12, EMP2-SW13, EMP2-QA2	**31-OCT-2013**	**----**	----	----	**06-NOV-2013**	28-NOV-2013	✓
EP025: Oxygen - Dissolved (DO)							
Clear Plastic Bottle - Natural (EP025)							
EMP2-SW12, EMP2-SW13, EMP2-QA2	**31-OCT-2013**	**----**	----	----	**01-NOV-2013**	31-OCT-2013	×
EP080/071: Total Petroleum Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP071)							
EMP2-SW12, EMP2-SW13, EMP2-QA2	**31-OCT-2013**	**05-NOV-2013**	07-NOV-2013	✓	**07-NOV-2013**	15-DEC-2013	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Amber Glass Bottle - Unpreserved (EP075(SIM))							
EMP2-SW12, EMP2-SW13, EMP2-QA2	**31-OCT-2013**	**05-NOV-2013**	07-NOV-2013	✓	**07-NOV-2013**	15-DEC-2013	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
EMP2-SW12, EMP2-SW13, EMP2-QA2	**31-OCT-2013**	**06-NOV-2013**	14-NOV-2013	✓	**06-NOV-2013**	14-NOV-2013	✓
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080)							
EMP2-SW12, EMP2-SW13, EMP2-QA2	**31-OCT-2013**	**06-NOV-2013**	14-NOV-2013	✓	**06-NOV-2013**	14-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: **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)							
Alkalinity by PC Titrator	ED037-P	4	33	**12.1**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	20	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	4	27	**14.8**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	2	16	**12.5**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
pH	EA005	1	6	**16.7**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Redox Potential	EA075	1	3	**33.3**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	11	**18.2**	**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)							
Alkalinity by PC Titrator	ED037-P	2	33	**6.1**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	20	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	2	27	**7.4**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	16	**6.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Redox Potential	EA075	3	3	**100.0**	**15.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	11	**9.1**	**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	6	**16.7**	**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)							
Chloride by Discrete Analyser	ED045G	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Conductivity by PC Titrator	EA010-P	2	27	**7.4**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	16	**6.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	11	**9.1**	**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	6	**16.7**	**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)							
Chloride by Discrete Analyser	ED045G	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	11	**9.1**	**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

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*	
Matrix Spikes (MS) - Continued							
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) (Appdx. 2)
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) (Appdx. 2)
Redox Potential	EA075	WATER	In House (Ion selective electrode)
Alkalinity by PC Titrator	ED037-P	WATER	APHA 21st ed., 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3) (Appdx. 2)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	APHA 21st ed., 4500-SO4 Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3) (Appdx. 2)
Chloride by Discrete Analyser	ED045G	WATER	APHA 21st ed., 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	Major Cations is determined based on APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises the 0.45um filtered sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (2013) Schedule B(3) (Appdx. 2) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) (Appdx. 2) Hardness parameters are calculated based on APHA 21st ed., 2340 B. This method is compliant with NEPM (2013) Schedule B(3) (Appdx. 2)
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) (Appdx. 2)

Analytical Methods	Method	Matrix	Method Descriptions
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	APHA 21st Ed. 1030F. The Ionic Balance is calculated based on the major Anions and Cations. The major anions include Alkalinity, Chloride and Sulfate which determined by PCT and DA. The Cations are determined by Turbi SO4 by DA. This method is compliant with NEPM (2013) Schedule B(3) (Appdx. 2)
Oxygen - Dissolved	EP025	WATER	APHA 21st ed., 4500-O G. Dissolved Oxygen Probe. This method is compliant with NEPM (2013) Schedule B(3) (Appdx. 2)
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) (Appdx. 2)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Appdx. 2)
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) (Appdx. 2)

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) (Appdx. 2)
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) (Appdx. 2). 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 / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005: pH						
Clear Plastic Bottle - Natural						
EMP2-SW12, EMP2-SW13, EMP2-QA2	----	----	----	01-NOV-2013	31-OCT-2013	**1**
EA075: Redox Potential						
Clear Plastic Bottle - Natural						
EMP2-SW12, EMP2-SW13, EMP2-QA2	----	----	----	01-NOV-2013	31-OCT-2013	**1**
EP025: Oxygen - Dissolved (DO)						
Clear Plastic Bottle - Natural						
EMP2-SW12, EMP2-SW13, EMP2-QA2	----	----	----	01-NOV-2013	31-OCT-2013	**1**

Outliers : Frequency of Quality Control Samples

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

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

CHAIN OF CUSTODY

ALS Laboratory: please tick →

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

BRISBANE 32 Shand 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 27 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com

NEWCASTLE 6 Rose Gum Road Warabrook NSW 2304 Ph: 02 4968 8448 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 Wey 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 4793 0600 E: townesville.environmental@alsglobal.com

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

CLIENT: ENVIRON AUSTRALIA P/L	TURNAROUND REQUIREMENTS: ☐ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)	
OFFICE: 19B 50 Glebe Rd The Junction NSW	(Standard TAT may be longer for some tests e.g., Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact?	Yes / No / N/A
PROJECT: HYDRO Bulli Zone - PROJECT NO.:	ALS QUOTE NO.:	Free Ice / frozen Ice bricks present upon receipt?	Yes / No / N/A
ORDER NUMBER: AS130348 PURCHASE ORDER NO.:	COUNTRY OF ORIGIN:	Random Sample Temperature on Receipt:	5.7 °C
PROJECT MANAGER: Steve Cadman CONTACT PH: 49625444	COC SEQUENCE NUMBER (Circle) COC: 1 2 3 4 5 6 7 OF: 1 2 3 4 5 6 7	Other comment:	
SAMPLER: SC SAMPLER MOBILE: 0423 587 538	RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
COC Emailed to ALS? (YES / NO) EDD FORMAT (or default):	DATE/TIME: 31/10/13 17:35	DATE/TIME: 31/10/13 17:30	DATE/TIME: 1/11/13 17:00	DATE/TIME: 1/11/13 19:30
Email Reports to (will default to PM if no other addresses are listed): Steve Cadman				
Email Invoice to (will default to PM if no other addresses are listed): " "				

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

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	EC, pH, DO Redox -	Cations / Anions	TPH/BTEX -	PAHs -	Total Metals As, Cu, Cd, Cr, Hg, Pb Zn Ni -				Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
	EMP2 - SW12	31/10/13	W	500mP 250mP 40mlVOA	6	✓	✓	✓	✓	✓				pH@GW
2	" SW13	↓	↓		6	✓	✓	✓	✓	✓				
3	" QA2	↓	↓		6	✓	✓	✓	✓	✓				
				TOTAL	18									

Environmental Division
Sydney
Work Order
ES1323471

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	: **ES1408817**	Page	: 1 of 12
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	: 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	: 29-APR-2014
Site	: ----		
		No. of samples received	: 8
Quote number	: SY/433/13	No. of samples analysed	: 8

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

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
Pabi Subba	Senior Organic Chemist	Sydney Organics
Shaun Spooner	Asbestos Identifier	Newcastle - Asbestos
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	P15 TP1 0.2-0.5	P15 TP2 0.3-0.6	P15 TP3 0.3-0.5	P15 TP4 0.3-0.5	P15 TP5 0.3-0.5
				Client sampling date / time	18-MAR-2014 15:00	18-MAR-2014 15:00	18-MAR-2014 15:00	18-MAR-2014 15:00	18-MAR-2014 15:00
Compound	CAS Number	LOR	Unit		ES1408817-001	ES1408817-002	ES1408817-003	ES1408817-004	ES1408817-005
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		5.2	----	----	----	----
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1.0	%		13.0	8.5	9.9	11.3	15.6
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples									
Asbestos Detected	1332-21-4	0.1	g/kg		No	No	No	No	Yes
Asbestos Type	1332-21-4	-	--		-	-	-	-	Ch + Am
Sample weight (dry)	----	0.01	g		41.6	40.0	46.7	43.0	42.1
APPROVED IDENTIFIER:	----	-	--		S.SPOONER	S.SPOONER	S.SPOONER	S.SPOONER	S.SPOONER
ED008: Exchangeable Cations									
Exchangeable Calcium	----	0.1	meq/100g		4.8	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g		2.5	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g		0.3	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g		0.1	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g		7.7	----	----	----	----
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		7	8	13	7	11
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		19	18	14	5	17
Copper	7440-50-8	5	mg/kg		<5	17	97	10	12
Lead	7439-92-1	5	mg/kg		16	72	109	33	9
Nickel	7440-02-0	2	mg/kg		<2	16	10	7	9
Zinc	7440-66-6	5	mg/kg		20	154	217	74	52
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	0.2	<0.1	<0.1	<0.1
EP004: Organic Matter									
Organic Matter	----	0.5	%		<0.5	----	----	----	----
Total Organic Carbon	----	0.5	%		<0.5	----	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
beta-BHC	319-85-7	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	P15 TP1 0.2-0.5	P15 TP2 0.3-0.6	P15 TP3 0.3-0.5	P15 TP4 0.3-0.5	P15 TP5 0.3-0.5
			Client sampling date / time	18-MAR-2014 15:00	18-MAR-2014 15:00	18-MAR-2014 15:00	18-MAR-2014 15:00	18-MAR-2014 15:00
Compound	CAS Number	LOR	Unit	ES1408817-001	ES1408817-002	ES1408817-003	ES1408817-004	ES1408817-005
EP068A: Organochlorine Pesticides (OC) - Continued								
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Sum of DDD + DDE + DDT	----	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

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

Compound	CAS Number	LOR	Unit	Client sample ID	P15 TP1 0.2-0.5	P15 TP2 0.3-0.6	P15 TP3 0.3-0.5	P15 TP4 0.3-0.5	P15 TP5 0.3-0.5
				Client sampling date / time	18-MAR-2014 15:00	18-MAR-2014 15:00	18-MAR-2014 15:00	18-MAR-2014 15:00	18-MAR-2014 15:00
					ES1408817-001	ES1408817-002	ES1408817-003	ES1408817-004	ES1408817-005
EP068B: Organophosphorus Pesticides (OP) - Continued									
Bromophos-ethyl	4824-78-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	**0.6**	<0.5	<0.5
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	**1.4**	<0.5	<0.5
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	**1.4**	<0.5	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	**0.8**	<0.5	<0.5
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	**0.8**	<0.5	<0.5
Benzo(b)fluoranthene	205-99-2	0.5	mg/kg		<0.5	<0.5	**1.1**	<0.5	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		<0.5	<0.5	**0.9**	<0.5	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	**0.6**	<0.5	<0.5
^ **Sum of polycyclic aromatic hydrocarbons**	----	0.5	mg/kg		<0.5	<0.5	**7.6**	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (zero)**	----	0.5	mg/kg		<0.5	<0.5	**1.1**	<0.5	<0.5
^ **Benzo(a)pyrene TEQ (half LOR)**	----	0.5	mg/kg		**0.6**	**0.6**	**1.4**	**0.6**	**0.6**
^ **Benzo(a)pyrene TEQ (LOR)**	----	0.5	mg/kg		**1.2**	**1.2**	**1.7**	**1.2**	**1.2**
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg		<50	<50	<50	<50	<50

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	Client sample ID	P15 TP1 0.2-0.5	P15 TP2 0.3-0.6	P15 TP3 0.3-0.5	P15 TP4 0.3-0.5	P15 TP5 0.3-0.5
				Client sampling date / time	18-MAR-2014 15:00	18-MAR-2014 15:00	18-MAR-2014 15:00	18-MAR-2014 15:00	18-MAR-2014 15:00
					ES1408817-001	ES1408817-002	ES1408817-003	ES1408817-004	ES1408817-005
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	>C10_C16	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.1	%		**96.0**	**90.3**	**83.5**	**95.6**	**90.0**
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.1	%		**97.0**	**95.0**	**82.2**	**113**	**105**
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.1	%		**90.5**	**104**	**86.0**	**85.6**	**86.2**
2-Chlorophenol-D4	93951-73-6	0.1	%		**97.3**	**99.7**	**92.5**	**89.0**	**93.9**
2.4.6-Tribromophenol	118-79-6	0.1	%		**113**	**115**	**97.5**	**92.6**	**105**
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.1	%		**97.7**	**103**	**94.1**	**97.4**	**95.2**
Anthracene-d10	1719-06-8	0.1	%		**101**	**104**	**95.1**	**97.9**	**95.6**
4-Terphenyl-d14	1718-51-0	0.1	%		**102**	**106**	**98.1**	**101**	**99.2**
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		**73.1**	**79.1**	**84.8**	**82.3**	**81.1**
Toluene-D8	2037-26-5	0.1	%		**83.9**	**86.3**	**94.4**	**89.3**	**88.3**
4-Bromofluorobenzene	460-00-4	0.1	%		**92.3**	**93.6**	**99.8**	**100**	**96.9**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	P15 TP6 0.3-0.5	P15 TP7 0.1-0.2	P15 TP9 0.1-0.2	----	----
			Client sampling date / time	18-MAR-2014 15:00	18-MAR-2014 15:00	18-MAR-2014 15:00	----	----
Compound	CAS Number	LOR	Unit	ES1408817-006	ES1408817-007	ES1408817-008	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	8.6	3.8	18.6	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples								
Asbestos Detected	1332-21-4	0.1	g/kg	No	No	No	----	----
Asbestos Type	1332-21-4	-	--	-	-	-	----	----
Sample weight (dry)	----	0.01	g	47.0	49.2	45.3	----	----
APPROVED IDENTIFIER:	----	-	--	S.SPOONER	S.SPOONER	S.SPOONER	----	----
EG005T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	7	6	<5	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	----	----
Chromium	7440-47-3	2	mg/kg	11	8	6	----	----
Copper	7440-50-8	5	mg/kg	21	8	<5	----	----
Lead	7439-92-1	5	mg/kg	94	9	7	----	----
Nickel	7440-02-0	2	mg/kg	16	48	10	----	----
Zinc	7440-66-6	5	mg/kg	254	34	24	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	----	----
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	P15 TP6 0.3-0.5	P15 TP7 0.1-0.2	P15 TP9 0.1-0.2	----	----
				Client sampling date / time	18-MAR-2014 15:00	18-MAR-2014 15:00	18-MAR-2014 15:00	----	----
Compound	CAS Number	LOR	Unit		ES1408817-006	ES1408817-007	ES1408817-008	----	----
EP068A: Organochlorine Pesticides (OC) - Continued									
^ Endosulfan (sum)	115-29-7	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
4.4`-DDD	72-54-8	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
4.4`-DDT	50-29-3	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
^ Sum of DDD + DDE + DDT	----	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Monocrotophos	6923-22-4	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
Dimethoate	60-51-5	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Diazinon	333-41-5	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Parathion-methyl	298-00-0	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
Malathion	121-75-5	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Fenthion	55-38-9	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Parathion	56-38-2	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
Pirimphos-ethyl	23505-41-1	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Chlorfenvinphos	470-90-6	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Bromophos-ethyl	4824-78-6	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Fenamiphos	22224-92-6	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Prothiofos	34643-46-4	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Ethion	563-12-2	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Carbophenothion	786-19-6	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
Azinphos Methyl	86-50-0	0.05	mg/kg		<0.05	<0.05	<0.05	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	P15 TP6 0.3-0.5	P15 TP7 0.1-0.2	P15 TP9 0.1-0.2	----	----
			Client sampling date / time	18-MAR-2014 15:00	18-MAR-2014 15:00	18-MAR-2014 15:00	----	----
Compound	CAS Number	LOR	Unit	ES1408817-006	ES1408817-007	ES1408817-008	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**0.6**	**0.6**	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.2**	**1.2**	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	----	----
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	----	----
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	----	----
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	----	----
>C10 - C16 Fraction	>C10_C16	50	mg/kg	<50	<50	<50	----	----
>C16 - C34 Fraction	----	100	mg/kg	**120**	<100	<100	----	----
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	**120**	<50	<50	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	----	----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	P15 TP6 0.3-0.5	P15 TP7 0.1-0.2	P15 TP9 0.1-0.2	----	----
			Client sampling date / time	18-MAR-2014 15:00	18-MAR-2014 15:00	18-MAR-2014 15:00	----	----
Compound	CAS Number	LOR	Unit	ES1408817-006	ES1408817-007	ES1408817-008	----	----
EP080: BTEXN - Continued								
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
^ **Total Xylenes**	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	----	----
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	----	----
EP068S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.1	%	**93.8**	**86.4**	**105**	----	----
EP068T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.1	%	**73.2**	**86.8**	**113**	----	----
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.1	%	**80.8**	**84.6**	**84.3**	----	----
2-Chlorophenol-D4	93951-73-6	0.1	%	**86.0**	**89.4**	**89.5**	----	----
2.4.6-Tribromophenol	118-79-6	0.1	%	**108**	**105**	**109**	----	----
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.1	%	**93.4**	**96.0**	**106**	----	----
Anthracene-d10	1719-06-8	0.1	%	**93.6**	**96.7**	**97.9**	----	----
4-Terphenyl-d14	1718-51-0	0.1	%	**98.0**	**101**	**101**	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.1	%	**80.0**	**84.6**	**80.4**	----	----
Toluene-D8	2037-26-5	0.1	%	**80.8**	**88.8**	**82.0**	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	**90.2**	**98.2**	**91.8**	----	----

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	P15 TP1 0.2-0.5 - 18-MAR-2014 15:00	Mid red - brown clay soil with red and grey rocks plus a trace of vegetation.
EA200: Description	P15 TP2 0.3-0.6 - 18-MAR-2014 15:00	Mid brown clay soil with red and grey rocks plus a trace of vegetation.
EA200: Description	P15 TP3 0.3-0.5 - 18-MAR-2014 15:00	Pale grey - brown clay soil with red and grey rocks plus a trace of vegetation.
EA200: Description	P15 TP4 0.3-0.5 - 18-MAR-2014 15:00	Pale grey clay soil with red and grey rocks plus a trace of vegetation.
EA200: Description	P15 TP5 0.3-0.5 - 18-MAR-2014 15:00	Mid red - brown clay soil with grey rocks plus one friable asbestos fibre bundle approx 2 x 1 x 1 mm.
EA200: Description	P15 TP6 0.3-0.5 - 18-MAR-2014 15:00	Pale brown clay soil with grey rocks plus a trace of vegetation.
EA200: Description	P15 TP7 0.1-0.2 - 18-MAR-2014 15:00	Pale grey clay soil with grey rocks plus some small synthetic mineral fibre bundles and a trace of vegetation.
EA200: Description	P15 TP9 0.1-0.2 - 18-MAR-2014 15:00	Pale grey - brown clay soil with grey and brown rocks plus some metal fragments and a trace of vegetation.

Surrogate Control Limits

Sub-Matrix: **SOIL**

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

QUALITY CONTROL REPORT

Work Order	: **ES1408817**	Page	: 1 of 7
Client	: **ENVIRON AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Sydney
Contact	: STEVE CADMAN	Contact	: Client Services
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Project	: 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	: 29-APR-2014
Order number	: AS130348		
		No. of samples received	: 8
Quote number	: SY/433/13	No. of samples analysed	: 8

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
Pabi Subba	Senior Organic Chemist	Sydney Organics
Shaun Spooner	Asbestos Identifier	Newcastle - Asbestos
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics

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 (%)*
EA002 : pH (Soils) (QC Lot: 3400690)									
ES1408818-002	Anonymous	EA002: pH Value	----	0.1	pH Unit	4.7	4.4	6.6	0% - 20%
ED008: Exchangeable Cations (QC Lot: 3403155)									
ES1408817-001	P15 TP1 0.2-0.5	ED008: Exchangeable Calcium	----	0.1	meq/100g	4.8	4.8	0.0	0% - 20%
		ED008: Exchangeable Magnesium	----	0.1	meq/100g	2.5	2.5	0.0	0% - 20%
		ED008: Exchangeable Potassium	----	0.1	meq/100g	0.3	0.3	0.0	0% - 20%
		ED008: Exchangeable Sodium	----	0.1	meq/100g	0.1	0.1	0.0	0% - 20%
		ED008: Cation Exchange Capacity	----	0.1	meq/100g	7.7	7.7	0.0	0% - 20%
EP004: Organic Matter (QC Lot: 3402744)									
ES1408817-001	P15 TP1 0.2-0.5	EP004: Organic Matter	----	0.5	%	<0.5	<0.5	0.0	No Limit
		EP004: Total Organic Carbon	----	0.5	%	<0.5	<0.5	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 Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

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
ED008: Exchangeable Cations (QCLot: 3403155)								
ED008: Exchangeable Calcium	----	0.1	meq/100g	<0.1	1 meq/100g	100	90	128
ED008: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.67 meq/100g	100	86	120
ED008: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.51 meq/100g	100	85	135
ED008: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.87 meq/100g	100	86	128
ED008: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	----	----	----	----
EG005T: Total Metals by ICP-AES (QCLot: 3400304)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	114	92	130
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	108	87	121
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	105	80	136
EG005T: Copper	7440-50-8	5	mg/kg	<5	32.0 mg/kg	112	93	127
EG005T: Lead	7439-92-1	5	mg/kg	<5	40.0 mg/kg	106	86	124
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55.0 mg/kg	109	93	131
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	115	81	133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3400305)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	91.1	70	105
EP004: Organic Matter (QCLot: 3402744)								
EP004: Organic Matter	----	0.5	%	<0.5	4.58 %	94.5	85	105
EP004: Total Organic Carbon	----	0.5	%	<0.5	2.66 %	94.4	84	106
EP068A: Organochlorine Pesticides (OC) (QCLot: 3399558)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	88.8	71	113
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	93.0	66	122
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	92.6	69	119
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	89.0	71	115
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	82.5	65	113
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	92.1	68	116
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	90.3	68	118
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	93.6	68	116
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	107	68	120
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	90.7	69	119
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	93.0	67	121
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	90.3	66	118
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	93.8	69	117
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	96.8	67	123
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	93.6	76	120

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 3399558) - continued								
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	97.4	76	120
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	66.4	57.3	115
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	81.9	60	124
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	95.1	67	127
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	83.1	65	123
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	90.0	65	129
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3399558)								
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	87.1	56	126
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	84.0	64	128
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	78.0	54	122
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	80.7	64	124
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	81.5	73	117
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	90.5	55	119
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	76.2	69	123
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	87.9	70	120
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	86.6	71	115
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	96.5	68	114
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	89.1	68	122
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	97.6	69	115
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	86.8	70	118
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	91.6	68	116
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	92.1	64	120
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	93.9	68	116
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	91.8	70	118
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	93.1	67	123
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	62.3	42	126
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3399562)								
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	4 mg/kg	91.0	80	124
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	4 mg/kg	92.9	77	123
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	4 mg/kg	89.9	79	123
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	4 mg/kg	93.0	77	123
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	4 mg/kg	92.2	79	123
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	4 mg/kg	90.3	79	123
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	4 mg/kg	93.2	79	123
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	4 mg/kg	93.9	79	125
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	4 mg/kg	86.8	73	121
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	4 mg/kg	91.0	81	123
EP075(SIM): Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	4 mg/kg	85.4	70	118
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	4 mg/kg	97.3	77	123

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3399562) - continued								
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	4 mg/kg	83.3	76	122
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	4 mg/kg	82.6	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	82.8	72.4	114
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3399559)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	90.1	68.4	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3399561)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	96.0	71	131
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	104	74	138
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	105	64	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3399559)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	84.5	68.4	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3399561)								
EP071: >C10 - C16 Fraction	>C10_C16	50	mg/kg	<50	250 mg/kg	96.8	70	130
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	106	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----
		50	mg/kg	----	150 mg/kg	101	63	131
EP080: BTEXN (QCLot: 3399559)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	86.1	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	84.3	62	128
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	78.7	58	118
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	79.2	60	120
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	79.7	60	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	91.9	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
EP004: Organic Matter (QCLot: 3402744)							
ES1408817-001	P15 TP1 0.2-0.5	EP004: Organic Matter	----	4.58 %	104	----	----
		EP004: Total Organic Carbon	----	2.66 %	103	----	----

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*
EP004: Organic Matter (QCLot: 3402744)										
ES1408817-001	P15 TP1 0.2-0.5	EP004: Organic Matter	----	4.58 %	104	----	----	----	----	----
		EP004: Total Organic Carbon	----	2.66 %	103	----	----	----	----	----

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **ES1408817**	Page	: 1 of 8
Client	: ENVIRON AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: STEVE CADMAN	Contact	: Client Services
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Project	: 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	: 29-APR-2014
Order number	: AS130348		
		No. of samples received	: 8
Quote number	: SY/433/13	No. of samples analysed	: 8

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
EA002 : pH (Soils)							
Soil Glass Jar - Unpreserved (EA002)							
P15 TP1 0.2-0.5	**18-MAR-2014**	**22-APR-2014**	25-MAR-2014	×	**25-MAR-2014**	22-APR-2014	✓
EA055: Moisture Content							
Soil Glass Jar - Unpreserved (EA055-103)							
P15 TP1 0.2-0.5, P15 TP2 0.3-0.6, P15 TP3 0.3-0.5, P15 TP4 0.3-0.5, P15 TP5 0.3-0.5, P15 TP6 0.3-0.5, P15 TP7 0.1-0.2, P15 TP9 0.1-0.2	**18-MAR-2014**	**----**	----	----	**25-MAR-2014**	01-APR-2014	✓
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples							
Snap Lock Bag (EA200)							
P15 TP1 0.2-0.5, P15 TP2 0.3-0.6, P15 TP3 0.3-0.5, P15 TP4 0.3-0.5, P15 TP5 0.3-0.5, P15 TP6 0.3-0.5, P15 TP7 0.1-0.2, P15 TP9 0.1-0.2	**18-MAR-2014**	**---**	14-SEP-2014	----	**23-APR-2014**	20-OCT-2014	✓
ED008: Exchangeable Cations							
Soil Glass Jar - Unpreserved (ED008)							
P15 TP1 0.2-0.5	**18-MAR-2014**	**24-APR-2014**	15-APR-2014	×	**26-MAR-2014**	15-APR-2014	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
P15 TP1 0.2-0.5, P15 TP2 0.3-0.6, P15 TP3 0.3-0.5, P15 TP4 0.3-0.5, P15 TP5 0.3-0.5, P15 TP6 0.3-0.5, P15 TP7 0.1-0.2, P15 TP9 0.1-0.2	**18-MAR-2014**	**22-APR-2014**	14-SEP-2014	✓	**22-APR-2014**	14-SEP-2014	✓
EG035T: Total Recoverable Mercury by FIMS							
Soil Glass Jar - Unpreserved (EG035T)							
P15 TP1 0.2-0.5, P15 TP2 0.3-0.6, P15 TP3 0.3-0.5, P15 TP4 0.3-0.5, P15 TP5 0.3-0.5, P15 TP6 0.3-0.5, P15 TP7 0.1-0.2, P15 TP9 0.1-0.2	**18-MAR-2014**	**22-APR-2014**	15-APR-2014	×	**22-APR-2014**	15-APR-2014	×
EP004: Organic Matter							
Soil Glass Jar - Unpreserved (EP004)							
P15 TP1 0.2-0.5	**18-MAR-2014**	**23-APR-2014**	15-APR-2014	×	**28-MAR-2014**	15-APR-2014	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved (EP068)							
P15 TP1 0.2-0.5, P15 TP2 0.3-0.6, P15 TP3 0.3-0.5, P15 TP4 0.3-0.5, P15 TP5 0.3-0.5, P15 TP6 0.3-0.5, P15 TP7 0.1-0.2, P15 TP9 0.1-0.2	**18-MAR-2014**	**24-MAR-2014**	01-APR-2014	✓	**19-APR-2014**	03-MAY-2014	✓
EP068B: Organophosphorus Pesticides (OP)							
Soil Glass Jar - Unpreserved (EP068)							
P15 TP1 0.2-0.5, P15 TP2 0.3-0.6, P15 TP3 0.3-0.5, P15 TP4 0.3-0.5, P15 TP5 0.3-0.5, P15 TP6 0.3-0.5, P15 TP7 0.1-0.2, P15 TP9 0.1-0.2	**18-MAR-2014**	**24-MAR-2014**	01-APR-2014	✓	**19-APR-2014**	03-MAY-2014	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013							
Soil Glass Jar - Unpreserved (EP071)							
P15 TP1 0.2-0.5, P15 TP2 0.3-0.6, P15 TP3 0.3-0.5, P15 TP4 0.3-0.5, P15 TP5 0.3-0.5, P15 TP6 0.3-0.5, P15 TP7 0.1-0.2, P15 TP9 0.1-0.2	**18-MAR-2014**	**24-MAR-2014**	01-APR-2014	✓	**20-APR-2014**	03-MAY-2014	✓
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons							
Soil Glass Jar - Unpreserved (EP075(SIM))							
P15 TP1 0.2-0.5, P15 TP2 0.3-0.6, P15 TP3 0.3-0.5, P15 TP4 0.3-0.5, P15 TP5 0.3-0.5, P15 TP6 0.3-0.5, P15 TP7 0.1-0.2, P15 TP9 0.1-0.2	**18-MAR-2014**	**24-MAR-2014**	01-APR-2014	✓	**19-APR-2014**	03-MAY-2014	✓
EP080: BTEXN							
Soil Glass Jar - Unpreserved (EP080)							
P15 TP1 0.2-0.5, P15 TP2 0.3-0.6, P15 TP3 0.3-0.5, P15 TP4 0.3-0.5, P15 TP5 0.3-0.5, P15 TP6 0.3-0.5, P15 TP7 0.1-0.2, P15 TP9 0.1-0.2	**18-MAR-2014**	**24-MAR-2014**	01-APR-2014	✓	**28-APR-2014**	01-APR-2014	×
EP080/071: Total Petroleum Hydrocarbons							
Soil Glass Jar - Unpreserved (EP080)							
P15 TP1 0.2-0.5, P15 TP2 0.3-0.6, P15 TP3 0.3-0.5, P15 TP4 0.3-0.5, P15 TP5 0.3-0.5, P15 TP6 0.3-0.5, P15 TP7 0.1-0.2, P15 TP9 0.1-0.2	**18-MAR-2014**	**24-MAR-2014**	01-APR-2014	✓	**28-APR-2014**	01-APR-2014	×

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Exchangeable Cations with pre-treatment	ED008	1	3	**33.3**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Organic Matter	EP004	1	3	**33.3**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
pH (1:5)	EA002	1	3	**33.3**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Exchangeable Cations with pre-treatment	ED008	1	3	**33.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Organic Matter	EP004	1	3	**33.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (SIM)	EP075(SIM)	1	16	**6.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	16	**6.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	16	**6.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	16	**6.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	16	**6.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	16	**6.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Exchangeable Cations with pre-treatment	ED008	1	3	**33.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Organic Matter	EP004	1	3	**33.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
PAH/Phenols (SIM)	EP075(SIM)	1	16	**6.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Pesticides by GCMS	EP068	1	16	**6.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	16	**6.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-AES	EG005T	1	16	**6.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	16	**6.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	16	**6.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Organic Matter	EP004	1	3	**33.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	(APHA 21st ed., 4500H+) pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM (2013) Schedule B(3) (Method 103)
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
Exchangeable Cations with pre-treatment	ED008	SOIL	Rayment & Higginson (1992) Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM (2013) Schedule B(3) (Method 301)
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)
Organic Matter	EP004	SOIL	AS1289.4.1.1 - 1997., Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM (2013) Schedule B(3)
Pesticides by GCMS	EP068	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 504,505)
TPH - Semivolatile Fraction	EP071	SOIL	(USEPA SW 846 - 8015A) Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C36. This method is compliant with NEPM (2013) Schedule B(3) (Method 506.1)
PAH/Phenols (SIM)	EP075(SIM)	SOIL	(USEPA SW 846 - 8270B) Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TPH Volatiles/BTEX	EP080	SOIL	(USEPA SW 846 - 8260B) Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 501)

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	Rayment & Higginson (1992) method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
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.

Preparation Methods	Method	Matrix	Method Descriptions
Organic Matter	EP004-PR	SOIL	AS1289.4.1.1 - 1997., Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM (2013) Schedule B(3) (Method 105)
Methanolic Extraction of Soils for Purge and Trap	* ORG16	SOIL	(USEPA SW 846 - 5030A) 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids (Option A - Concentrating)	ORG17A	SOIL	In-house, Mechanical agitation (tumbler). 20g of sample, Na2SO4 and surrogate are extracted with 150mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.
Tumbler Extraction of Solids (Option B - Non-concentrating)	ORG17B	SOIL	In-house, Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 20mL 1:1 DCM/Acetone by end over end tumble. The solvent is transferred directly to a GC vial for analysis.

Summary of Outliers

Outliers : Quality Control Samples

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

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

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

Regular Sample Surrogates

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

Outliers : Analysis Holding Time Compliance

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

Matrix: **SOIL**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA002 : pH (Soils)						
Soil Glass Jar - Unpreserved						
P15 TP1 0.2-0.5	22-APR-2014	25-MAR-2014	**28**	----	----	----
ED008: Exchangeable Cations						
Soil Glass Jar - Unpreserved						
P15 TP1 0.2-0.5	24-APR-2014	15-APR-2014	**9**	----	----	----
EG035T: Total Recoverable Mercury by FIMS						
Soil Glass Jar - Unpreserved						
P15 TP1 0.2-0.5, P15 TP2 0.3-0.6, P15 TP3 0.3-0.5, P15 TP4 0.3-0.5, P15 TP5 0.3-0.5, P15 TP6 0.3-0.5, P15 TP7 0.1-0.2, P15 TP9 0.1-0.2	22-APR-2014	15-APR-2014	**7**	22-APR-2014	15-APR-2014	**7**
EP004: Organic Matter						
Soil Glass Jar - Unpreserved						
P15 TP1 0.2-0.5	23-APR-2014	15-APR-2014	**8**	----	----	----
EP080/071: Total Petroleum Hydrocarbons						
Soil Glass Jar - Unpreserved						
P15 TP1 0.2-0.5, P15 TP2 0.3-0.6, P15 TP3 0.3-0.5, P15 TP4 0.3-0.5, P15 TP5 0.3-0.5, P15 TP6 0.3-0.5, P15 TP7 0.1-0.2, P15 TP9 0.1-0.2	----	----	----	28-APR-2014	01-APR-2014	**27**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013						

Matrix: **SOIL**

Method / Container / Client Sample ID(s)	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 - Analysis Holding Time Compliance						
Soil Glass Jar - Unpreserved						
P15 TP1 0.2-0.5, P15 TP2 0.3-0.6, P15 TP3 0.3-0.5, P15 TP4 0.3-0.5, P15 TP5 0.3-0.5, P15 TP6 0.3-0.5, P15 TP7 0.1-0.2, P15 TP9 0.1-0.2	----	----	----	28-APR-2014	01-APR-2014	**27**
EP080: BTEXN						
Soil Glass Jar - Unpreserved						
P15 TP1 0.2-0.5, P15 TP2 0.3-0.6, P15 TP3 0.3-0.5, P15 TP4 0.3-0.5, P15 TP5 0.3-0.5, P15 TP6 0.3-0.5, P15 TP7 0.1-0.2, P15 TP9 0.1-0.2	----	----	----	28-APR-2014	01-APR-2014	**27**

Outliers : Frequency of Quality Control Samples

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

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

CHAIN OF CUSTODY

ALS Laboratory: please tick →

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 Pty Ltd	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☐ Standard TAT (List due date):	**FOR LABORATORY USE ONLY (Circle)**
OFFICE: 19B, 50 Glebe Road, The Junction, NSW 2291		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes No N/A
PROJECT: Hydro Buffer Zone Investigation — **PROJECT NO** AS130348	**ALS QUOTE NO.:**	**COC SEQUENCE NUMBER (Circle)**	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER:: AS130348 — **PURCHASE ORDER NO.:**	**COUNTRY OF ORIGIN:**	COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Steve Cadman — **CONTACT PH:** 49625444		OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: Kate Woods/Steve Cadman — **SAMPLER MOBILE:** 0423583538	**RELINQUISHED BY:**	**RECEIVED BY:** Dan. J	**RELINQUISHED BY:**
COC Emailed to ALS? (YES / NO) Yes — **EDD FORMAT (or default):**	DATE/TIME:	DATE/TIME: 20/3 1600	DATE/TIME:
Email Reports to (will default to PM if no other addresses are listed): scadman@environcorp.com			
Email Invoice to (will default to PM if no other addresses are listed): scadman@environcorp.com			

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

Environmental Division Sydney
Work Order
ES1405849

Telephone : +61-2-8784 8555

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 pric Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).									
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	TPH/BTEX	PAHs	8 metals	asbestos ID	OC/OP Pesticides	asbestos 200N	HOLD	pH, CEC, TOC		
1	P4 Lot 422 TP1 0-0.5	17/03/2014	S		1	1	1	1	1	1					
2	P4 Lot 422 TP2 0-0.4	17/03/2014	S		1	1	1	1	1	1					
3	P4 Lot 422 TP3 0-0.3	17/03/2014	S		1	1	1	1	1	1			1		
4	P4 Lot 422 TP4 0-0.3	17/03/2014	S		2	1	1	1	1	1	1			ES1405849	
5	P4 Lot 422 TP5 0-0.3	17/03/2014	S		2	1	1	1	1	1	1				
6	P4 Lot 420 TP1 0-0.3	18/03/2014	S		1	1	1	1	1	1					
(38)	P4 Lot 420 TP1 0.6-0.8	18/03/2014	S		1							1			
7	P4 Lot 420 TP2 0.05-0.2	18/03/2014	S		1	1	1	1	1	1					
8	P4 Lot 420 TP3 0.05-0.25	18/03/2014	S		1	1	1	1	1	1			1		
9	P4 Lot 420 TP4 0.05-0.25	18/03/2014	S		1	1	1	1	1	1					
10	P15 TP1 0.2-0.5	18/03/2014	S		1	1	1	1	1	1			1		
11	P15 TP2 0.3-0.6	18/03/2014	S		1	1	1	1	1	1					
				TOTAL	14	11	11	11	11	11	2	1			

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

CHAIN OF CUSTODY

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 24 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

☐MUDGEE 1/20 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

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

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	TPH/BTEX	PAHs	8 metals	asbestos ID	OC/OP Pesticides		HOLD	pH, CEC, TOC	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
12	P15 TP3 0.3-0.5	18/03/2014	S			1	1	1	1	1				
13	P15 TP4 0.3-0.5	18/03/2014	S			1	1	1	1	1				
14	P15 TP5 0.3-0.5	18/03/2014	S			1	1	1	1	1				
15	P15 TP6 0.3-0.5	18/03/2014	S			1	1	1	1	1				
16	P15 TP7 0.1-0.2	18/03/2014	S			1	1	1	1	1				
39	P15 TP8 0.1-0.2	18/03/2014	S									1		
17	P15 TP9 0.1-0.2	18/03/2014	S			1	1	1	1	1				
18	P4 Lot16 TP1 0.35-0.8	18/03/2014	S			1	1	1	1	1				
19	P4 Lot16 TP2 0.1-0.2	18/03/2014	S			1	1	1	1	1			1	
20	P4 Lot16 TP3 0.1-0.3	18/03/2014	S			1	1	1	1	1				
21	P4 Lot16 TP4 0.1-0.3	18/03/2014	S			1	1	1	1	1				
22	P4 Lot16 TP5 0.1-0.2	18/03/2014	S			1	1	1	1	1				
				TOTAL	0	11	11	11	11	11	0	1		

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 = Lugol's Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

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☐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

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

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	TPH/BTEX	PAHs	8 metals	asbestos ID	OC/OP Pesticides		HOLD	pH, CEC, TOC	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
23	P4 Lot 16 TP6 0.3-0.5	18/03/2014	S		1	1	1	1	1	1				
24	P4 Lot 16 TP7 0.2-0.4	18/03/2014	S		1	1	1	1	1	1				
25	P8 TP1 0.2-0.5	19/03/2014	S		1	1	1	1	1	1				
26	P8 TP2 0.2-0.5	19/03/2014	S		1	1	1	1	1	1			1	
27	P8 TP3 0.2-0.5	19/03/2014	S		1	1	1	1	1	1				
28	P8 TP4 0.1-0.3	19/03/2014	S		1	1	1	1	1	1				
29	P8 TP5 0.1-0.3	19/03/2014	S		1	1	1	1	1	1				
30	P14 TP1 0.3-0.5	19/03/2014	S		1	1	1	1	1	1				
31	P14 TP2 0.3-0.5	19/03/2014	S		1	1	1	1	1	1			1	
32	P14 TP3 0.2-0.4	19/03/2014	S		1	1	1	1	1	1				
				TOTAL	10	10	10	10	10	10	0	0		

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V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

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ALS Laboratory: please tick →

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☐MUDGEE 1/20 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com

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

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

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

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED Including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	TPH/BTEX	PAHs	8 metals	asbestos ID	OC/OP Pesticides		HOLD		Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
33	ID1	17/03/2014	S		1				1					
34	ID2	17/03/2014	S		1				1					
35	QA01	17/03/2014	S		1	1	1	1	1	1				
36	QA02	18/03/2014	S		1	1	1	1	1	1				
37	QA03	19/03/2014	S		1	1	1	1	1	1				
				TOTAL	5	3	3	3	5	3	0	0		

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V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

Appendix G

Test Pit Logs

TEST PIT NUMBER TP1

ENVIRON

CLIENT Hydro Aluminium Australia Kurri Kurri **PROJECT NAME** Hydro Buffer Zone Investigation

PROJECT NUMBER AS130348 **PROJECT LOCATION** Kurri Kurri

DATE STARTED 18/3/14 **COMPLETED** 18/3/14 **R.L. SURFACE** **DATUM**

EXCAVATION CONTRACTOR **SLOPE** --- **BEARING** ---

EQUIPMENT Backhoe **TEST PIT LOCATION** Parcel 15 - Lot 417

TEST PIT SIZE **LOGGED BY** SC **CHECKED BY** KG

NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
						TOPSOIL		
						FILL; CLAY; brown-medium brown, medium-high plasticity, trace plastic, broken asphalt fragments	TP1 - 0.2-0.5m	
			0.5					
			1.0					
						Borehole TP1 terminated at 1.1m		
			1.5					
			2.0					
			2.5					
			3.0					

TEST PIT NUMBER TP2

ENVIRON

CLIENT Hydro Aluminium Australia Kurri Kurri **PROJECT NAME** Hydro Buffer Zone Investigation

PROJECT NUMBER AS130348 **PROJECT LOCATION** Kurri Kurri

DATE STARTED 18/3/14 **COMPLETED** 18/3/14 **R.L. SURFACE** **DATUM**

EXCAVATION CONTRACTOR **SLOPE** --- **BEARING** ---

EQUIPMENT Backhoe **TEST PIT LOCATION** Parcel 15 - Lot 418

TEST PIT SIZE **LOGGED BY** SC **CHECKED BY** KG

NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
			0.5			FILL; Silty SAND; brown, fine grained, with some brick fragments, rock fragments	TP2 - 0.3-0.6m	
			1.0			Borehole TP2 terminated at 1m		
			1.5					
			2.0					
			2.5					
			3.0					

TEST PIT NUMBER TP3

ENVIRON

CLIENT Hydro Aluminium Australia Kurri Kurri **PROJECT NAME** Hydro Buffer Zone Investigation

PROJECT NUMBER AS130348 **PROJECT LOCATION** Kurri Kurri

DATE STARTED 18/3/14 **COMPLETED** 18/3/14 **R.L. SURFACE** **DATUM**

EXCAVATION CONTRACTOR **SLOPE** --- **BEARING** ---

EQUIPMENT Backhoe **TEST PIT LOCATION** Parcel 15, Lot 418

TEST PIT SIZE **LOGGED BY** SC **CHECKED BY** KG

NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
			0.5			FILL; Silty SAND; dark grey, fragments of clay, concrete, bricks	TP3 - 0.3-0.5m	
			1.0			Alluvial SAND; yellow-brown, fine to medium grained, slightly moist		
			1.5			Borehole TP3 terminated at 1m		
			2.0					
			2.5					
			3.0					

TEST PIT NUMBER TP4

ENVIRON

CLIENT Hydro Aluminium Australia Kurri Kurri **PROJECT NAME** Hydro Buffer Zone Investigation

PROJECT NUMBER AS130348 **PROJECT LOCATION** Kurri Kurri

DATE STARTED 18/3/14 **COMPLETED** 18/3/14 **R.L. SURFACE** **DATUM**

EXCAVATION CONTRACTOR **SLOPE** --- **BEARING** ---

EQUIPMENT Backhoe **TEST PIT LOCATION** Parcel 15, Lot 418

TEST PIT SIZE **LOGGED BY** SC **CHECKED BY** KG

NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
			0.5			FILL; Silty CLAY; white/light grey, medium plasticity, some timber, steel, bricks, concrete	TP4 - 0.3-0.6m	
			1.0			Alluvial SAND; light brown and yellow-brown, fine to medium grained, slightly moist		
			1.5			Borehole TP4 terminated at 1.1m		
			2.0					
			2.5					
			3.0					

TEST PIT NUMBER TP5

ENVIRON

CLIENT Hydro Aluminium Australia Kurri Kurri **PROJECT NAME** Hydro Buffer Zone Investigation

PROJECT NUMBER AS130348 **PROJECT LOCATION** Kurri Kurri

DATE STARTED 18/3/14 **COMPLETED** 18/3/14 **R.L. SURFACE** **DATUM**

EXCAVATION CONTRACTOR **SLOPE** --- **BEARING** ---

EQUIPMENT Backhoe **TEST PIT LOCATION** Parcel 15, Lot 419

TEST PIT SIZE **LOGGED BY** SC **CHECKED BY** KG

NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
			0.5			FILL; Gravelly CLAY; brown and yellow-brown, medium plasticity, rock fragments, concrete, timber, asphalt paving	TP5 - 0.3-0.5m	
			1.0			CLAY; yellow-brown, medium plasticity, moist		
			1.5			Borehole TP5 terminated at 1m		
			2.0					
			2.5					
			3.0					

TEST PIT NUMBER TP6

ENVIRON

CLIENT Hydro Aluminium Australia Kurri Kurri **PROJECT NAME** Hydro Buffer Zone Investigation

PROJECT NUMBER AS130348 **PROJECT LOCATION** Kurri Kurri

DATE STARTED 18/3/14 **COMPLETED** 18/3/14 **R.L. SURFACE** **DATUM**

EXCAVATION CONTRACTOR **SLOPE** --- **BEARING** ---

EQUIPMENT Backhoe **TEST PIT LOCATION** Parcel 15, Lot 419

TEST PIT SIZE **LOGGED BY** SC **CHECKED BY** KG

NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
			0.5			FILL; Gravelly CLAY; yellow-brown to brown, medium-high plasticity, large fragments, pavers, concrete, steel, plastic, pockets of sand	TP6 - 0.3-0.5m	
			1.0					
			1.5			Alluvial SAND; light brown, medium grained, moist		
			2.0			Borehole TP6 terminated at 1.5m		
			2.5					
			3.0					

TEST PIT NUMBER TP7

ENVIRON

CLIENT Hydro Aluminium Australia Kurri Kurri **PROJECT NAME** Hydro Buffer Zone Investigation

PROJECT NUMBER AS130348 **PROJECT LOCATION** Kurri Kurri

DATE STARTED 18/3/14 **COMPLETED** 18/3/14 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR _____ **SLOPE** --- **BEARING** ---

EQUIPMENT Backhoe **TEST PIT LOCATION** Parcel 15, Lot 418

TEST PIT SIZE _____ **LOGGED BY** SC **CHECKED BY** KG

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
						ROADBASE Alluvial SAND; yellow-brown, fine-medium grained, moist	TP7 - 0.1-0.2m	
			0.5 1.0 1.5 2.0 2.5 3.0			Borehole TP7 terminated at 0.25m		

BOREHOLE / TEST PIT AS130348 PARCEL 15.GPJ GINT STD AUSTRALIA.GDT 9/10/14

TEST PIT NUMBER TP8

ENVIRON

CLIENT Hydro Aluminium Australia Kurri Kurri **PROJECT NAME** Hydro Buffer Zone Investigation

PROJECT NUMBER AS130348 **PROJECT LOCATION** Kurri Kurri

DATE STARTED 18/3/14 **COMPLETED** 18/3/14 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR _____ **SLOPE** --- **BEARING** ---

EQUIPMENT Backhoe **TEST PIT LOCATION** Parcel 15, Lot 418

TEST PIT SIZE _____ **LOGGED BY** SC **CHECKED BY** KG

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
						ROADBASE	TP8 - 0.1-0.2m	
			0.5			Borehole TP8 terminated at 0.2m		
			1.0					
			1.5					
			2.0					
			2.5					
			3.0					

BOREHOLE / TEST PIT AS130348 PARCEL 15.GPJ GINT STD AUSTRALIA.GDT 9/10/14

TEST PIT NUMBER TP9

ENVIRON

CLIENT Hydro Aluminium Australia Kurri Kurri **PROJECT NAME** Hydro Buffer Zone Investigation

PROJECT NUMBER AS130348 **PROJECT LOCATION** Kurri Kurri

DATE STARTED 18/3/14 **COMPLETED** 18/3/14 **R.L. SURFACE** **DATUM**

EXCAVATION CONTRACTOR **SLOPE** --- **BEARING** ---

EQUIPMENT Backhoe **TEST PIT LOCATION** Parcel 15, Lot 418

TEST PIT SIZE **LOGGED BY** SC **CHECKED BY** KG

NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description	Samples Tests Remarks	Additional Observations
						ROADBASE	TP9 - 0.0-0.1m	
			0.5			Borehole TP9 terminated at 0.15m		
			1.0					
			1.5					
			2.0					
			2.5					
			3.0					

Appendix H

QA/QC Assessment

APPENDIX H

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 15.

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 15 appear to be limited to motor cycle racetrack/motor cross tracks and, historically, a dwelling. The remainder of Parcel 15 has not been developed and remains open treed land. These uses of Parcel 15 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 15 consistent with site observations?
- Has Parcel 15 been impacted by fluoride from dust deposition from the Hydro smelter?
- Has Parcel 15 been impacted by other contaminants from historical/current site use?
- Is Parcel 15 suitable for general industrial and environmental conservation 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 15, as shown on Figure 1.

Vertical boundaries – as areas of concern at Parcel 15 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 15 for general industrial and environmental conservation landuse, then an assessment of the suitability of Parcel 15 for general industrial and environmental conservation 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 15 for general industrial and environmental conservation 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 15.

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 Table 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 15 to assess the impact of particulate fallout from Hydro Aluminium Smelter. Targeted sampling was undertaken in areas of fill identified in Lot 417 and 418. A total of 6 test pits were excavated on Lot 417 and 3 pits on Lot 418.
Sampling Density	Nine soil samples were collected from an approximate grid across open areas of Parcel 15 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. A total of nine samples were collected and analysed from 9 test pits in fill profiles identified on Lots 417 and 418. Given the homogeneous nature of the fill and its limited vertical distribution, this sampling density is considered adequate
Sample depths	Surface soil samples were collected from a grid across the entire of Parcel 15 from surface soils. Soil samples were collected from 0.05m to 0.25m from within the fill profiles on Lot 418 and within the raised embankments on Lot 417.
Sample Collection Method	Surface soil samples across Parcel 15 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. Test pits samples (fill) were collected from the centre of the back hoe bucket using dedicated disposable gloves. Soil samples were collected into laboratory supplied, acid rinsed glass jars.

Table B: QA/QC – Sampling and Analysis Methodology Assessment	
Sampling Methodology	**Methodology**
Decontamination Procedures	Surface soil samples across Parcel 15 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. As fill soil samples were collected from the centre of the back hoe bucket, decontamination of the back hoe was not required.
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 TRH, BTEX and PAHs analysed for the grid samples across the entire of Parcel 15. No rinsate blank samples were collected.
Field quality control results	Intra-laboratory duplicate results are presented in Table D. There were no RPD exceedances 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 15 assessment criteria.

Table C: QA/QC – Field and Lab Quality Assurance and Quality Control	
Field and Lab QA/QC	**ENVIRON Comments**
	PQLs for the surface water sample exceeded the guideline criteria for some PAHs. This is not considered to significantly impact on site results for Parcel 15 as these compounds were not identified as contaminants of concern in the soil analyses.
Laboratory quality control samples	Laboratory quality control samples including duplicates, laboratory control samples, matrix spikes, surrogate spikes and blanks were undertaken by the laboratories at appropriate frequencies.
Laboratory quality control results	All results for laboratory soil duplicates, laboratory control samples, matrix spikes and surrogates were acceptable and no detections were made in blank samples.

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

Appendix I

Hazardous Materials Audit

Privileged and Confidential
Prepared at the Request of Counsel



Hazardous Materials Audit
Parcel 15

Prepared for:
Hydro Aluminium Kurri Kurri Pty Limited

Prepared by:
ENVIRON Australia Pty Ltd

Date:
October 2014

Project Number:
AS130348

ENVIRON

Prepared by:			**Authorised by:**		
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Signature:		Date: 09/10/14	Signature:		Date: 09/10/14

VERSION CONTROL RECORD

Document File Name	**Date Issued**	**Version**	**Author**	**Reviewer**
Draft Hydro Parcel 15 Hazardous Materials Audit Report	9 October 2014	Draft 1	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 2, 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 that were considered 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 on structures within Parcel 2.

The survey methodology involved the following:

- An inspection of the accessible sections of the outside and inside of all buildings, as well as any accessible power boxes on power poles within the properties.
- Wherever possible, confirmation of the presence or absence of asbestos in a material was by 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 make and model of fluorescent lighting was noted and compared against those listed in *Identification Of PCB-Containing Capacitors* (ANZECC, 1997) as having capacitors that contain PCBs.
- Visual confirmation of the presence of SMF.

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

- While the audit focussed on structures within the parcel, any confirmed or potential hazardous materials identified in soils or outside of structures were also 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 Section 6.

2 Surveys Details

2.1 Buildings Descriptions

The hazardous materials survey was undertaken on 29 October 2013 by ENVIRON Senior Environmental Scientist Shaun Taylor.

Table 1 describes the following:

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

A total of 10 buildings within four properties were inspected for hazardous materials. Figures 2 and 3 show the locations of the listed buildings.

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

Areas not Accessed

During the audit, all areas of the buildings and structures within the area which were both readily accessible and safe to access were inspected. Where access was not available to areas which could potentially 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 is summarised in **Section 3**, with the supporting laboratory analytical certificate contained in Appendix C.

The remaining ACM was 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 No.**	**Building Type/s**	**Main Construction Materials**	**Estimated Pre or Post 1990 construction**	**Any Inaccessible Areas**
Parcel 2					
Kurri Kurri Speedway (Lots 416/ 417/ 418 DP755231)	1	Demountable (west side of track). Former school demountable transported onto the property by the current tenant	Metal (corrugated), compressed timber sheets, metal framing, cement sheeting.	Pre-1990 (transported onto site)	Interior not accessible.
	2	Demountable (east side of track). Larger building, two large rooms transported onto the property by the current tenant.	Metal (corrugated), compressed timber sheets, metal framing, cement sheeting.	Pre-1990 (transported onto site)	Some parts of the interior were not accessible.
	3	Race callers box (east side of track)	Cement sheeting, metal	Post-1990	Interior not accessible.
	4	Various demountable toilet blocks and storage sheds, transportable.	Most are corrugated metal, one included timber.	Post-1990	Interior not accessible.
	5	Covered vehicle maintenance area (“pit lane”)	Metal	Post-1990	N/A
Junior Motor Cycle Club (Lot 2 DP 233125)	6	Undercover race starting area	Metal	Post-1990	N/A
	7	Portable toilets	Metal	Post-1990	Interior not accessible.
	8	Clubhouse	Metal	Pre-1990 (due to old appearance of roof material, although this could have been re-used)	Interior not accessible.
	9	Storage shed	Metal	Post-1990	Interior not accessible.
	10	Undercover picnic shelter	Metal	Post-1990	N/A

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:

- The floor to the front deck of a demountable building on the western side of the speedway track.
- The floor, internal ceiling and underside of the front awning to a demountable building on the eastern side of the speedway track.

  From a review of aerial photographs, the ACM structures (demountable/ transportable buildings) have been brought onto the property since February 2010 by the current tenant.
- At two locations within demolition waste used in a gravel road in the east of the speedway property.

No potential ACMs were observed within the Junior Motorcycle Club facility.

One sample was collected for laboratory analysis from sheeting used for the caller's box on the eastern side of the speedway track. The results showed that this sheeting did not contain asbestos. The laboratory certificates are presented in **Appendix C**.

3.3 Synthetic Mineral Fibre Materials

No SMF were observed. However, the interiors of most buildings could not be accessed, and there is potential that SMF was used as insulation to wall and ceiling cavities in the demountable buildings.

3.4 Polychlorinated Biphenyls

There is potential that the fluorescent light fittings used on the older buildings at both the speedway and the junior motorcycle club may also have capacitors containing PCBs.

3.5 Lead Based Paint

Due to the expected age of most structures lead based paint is unlikely to be present. Lead based paint, however, may have been used on the older demountable buildings (those containing ACM).

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:

- The surrounds of the speedway are poorly maintained. Drums and containers of oils and fuels are stored without bunding, and there is evidence of oil/ fuel leakage into soils.
- Various wastes (such as demolition waste and tyres) are scattered throughout the speedway facility.
- The Junior Motorcycle Club facility is generally well maintained. There are stockpiles of old tyres throughout the facility.

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 ACMs identified on site generally pose a health risk due to their poor condition and location.
- It is recommended that Kurri Kurri Speedway be advised of the ACM present within the structures, and their obligations under the Work Health and Safety Regulation 2011 (the requirements for asbestos management apply to both commercial and voluntary organisations).
- 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.
- It is recommended that due to the poor condition of the material, and the potential for pedestrian activity to continuously abrade the ACM used as flooring material, that the material be removed.

4.1.2 Building Demolition

- If necessary due to demolition or refurbishment works, remove identified ACMs under controlled condition using an appropriately licensed removal contractor.

  This should be done by Kurri Kurri Speedway prior to relocation of the demountable/ transportable structures, in the event that they are moved off site.
- Any asbestos work is carried out in accordance with the *Code of Practice for the Management and Control of Asbestos in the Workplace [NOHSC: 2018 (2005)].*
- Ensure appropriately licenced removalists are used for any planned removal, and that any removal works are undertaken in accordance with the *NOHSC Code of Practice for the Safe Removal of Asbestos 2nd Edition [NOHSC:2002(2005)].*

4.2 Synthetic Mineral Fibre Materials

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

4.3 Polychlorinated Biphenyls

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

4.4 Lead Based Paint

The majority of buildings and structures on site are post-1990 and/ or transportable structures. Therefore LBP is unlikely to be present. However it is potentially present in those demountable buildings that contain ACM. In the event that these buildings are to be demolished or upgraded, the painted ACM would be managed in accordance with **Section 4.1.2** as asbestos containing materials. Any paint on other surfaces should not be abraded, or should be tested to determine the presence, and level, of lead in the paint.

4.5 Dangerous Goods

In accordance with the NSW *OHS Regulation 2001*, the storage, handling and transport of dangerous goods is regulated. The NSW WorkCover *Storage and Handling of Dangerous Goods: Code of Practice* provides further information. Under this legislation the tenants are responsible for the appropriate handling of dangerous goods on their lease areas. This legislation also applies to volunteer organisation.

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.

The audit included an inspection of accessible sections of the structures, and included sampling and laboratory analyses of materials to confirm the presence or absence of hazardous materials. While every care has been taken, not all parts of the building are accessible (such as within wall cavities). We cannot therefore preclude the presence of hazardous materials not identified within this report.

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

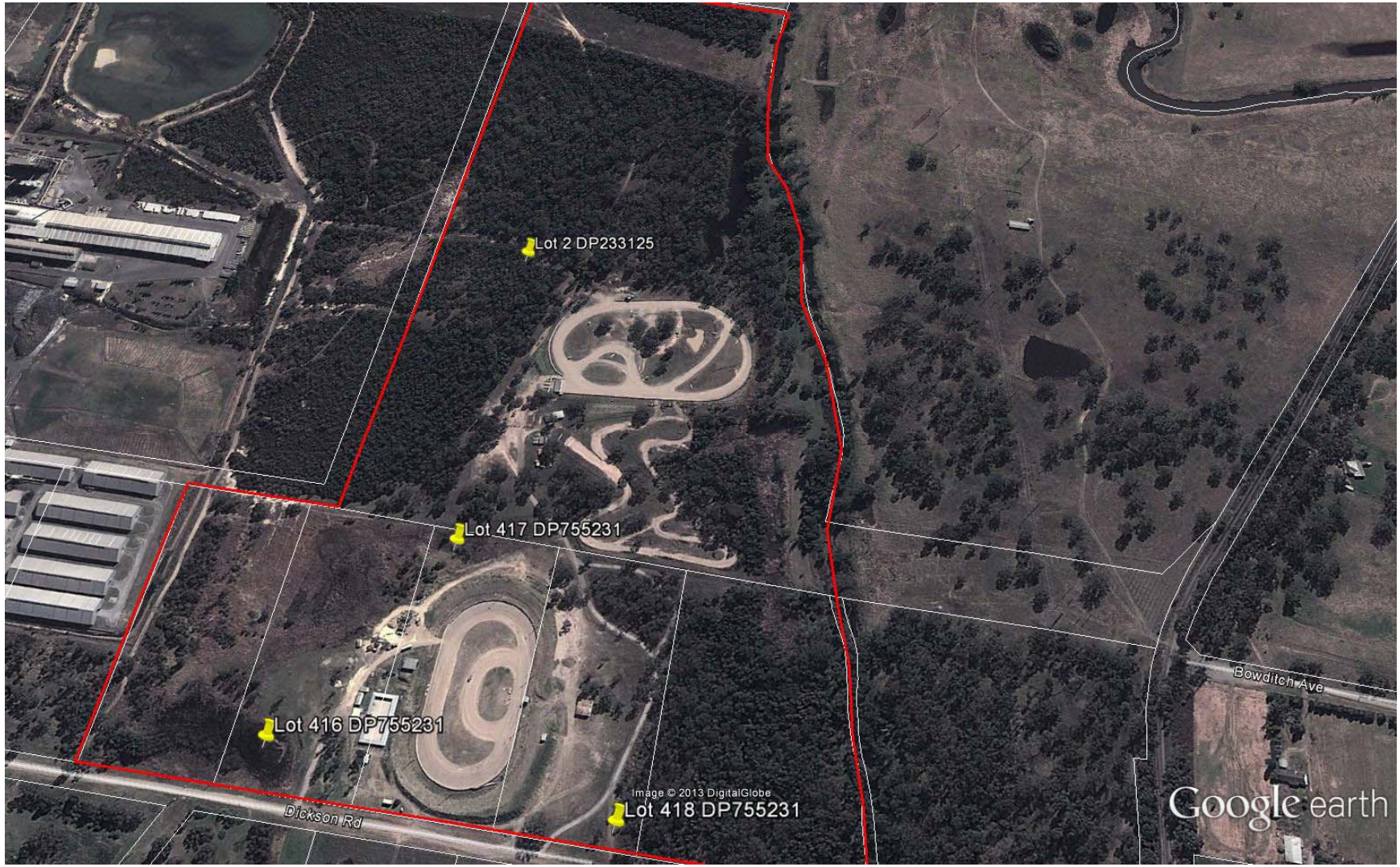

Figure 1. Parcel 15

Figure 2. Kurri Kurri Speedway Buildings

Figure 3. Kurri Kurri Junior Motorcycle Club Buildings

Appendix A

Photographs

Photo 1: Floor to front deck to the western demountable building

Photo 2: Underside to awning to the eastern demountable building

Photo 3: Ceiling lining to the eastern demountable building

Photo 4: Example of ACM fragments in gravel road in the east of the speedway property

Photo 5: Fluorescent light to the front deck to the western demountable building

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).

Appendix C

Laboratory Certificates

Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EN1304129**	Page	: 1 of 3
Client	: **ENVIRON**	Laboratory	: Environmental Division Newcastle
Contact	: MR STEVE CADMAN	Contact	: Peter Keyte
Address	: PO Box 435 THE JUNCTION NSW 2291	Address	: 5/585 Maitland Road Mayfield West NSW Australia 2304
E-mail	: scadman@environcorp.com	E-mail	: peter.keyte@als.com.au
Telephone	: ----	Telephone	: 61-2-4968-9433
Facsimile	: ----	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	: 08-NOV-2013
Sampler	: S TAYLOR	Issue Date	: 14-NOV-2013
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
- 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.

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	**EMP2-ACM-03**	----	----	----	----
			Client sampling date / time	29-OCT-2013 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**EN1304129-001**	**----**	**----**	**----**	**----**
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples								
Asbestos Detected	1332-21-4	0.1	g/kg	**No**	----	----	----	----
Asbestos Type	1332-21-4	0.1	--	**-**	----	----	----	----
Sample weight (dry)	----	0.01	g	**35.0**	----	----	----	----
APPROVED IDENTIFIER:	----	-	--	**S.SPOONER**	----	----	----	----

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	EMP2-ACM-03 - 29-OCT-2013 00:00	One piece of organic fibre board with cement containing synthetic mineral fibres attached to one side approximately 90 x 63 x 5 mm.

Environmental

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EN1304129**	Page	: 1 of 5
Client	: ENVIRON	Laboratory	: Environmental Division Newcastle
Contact	: MR STEVE CADMAN	Contact	: Peter Keyte
Address	: PO Box 435 THE JUNCTION NSW 2291	Address	: 5/585 Maitland Road Mayfield West NSW Australia 2304
E-mail	: scadman@environcorp.com	E-mail	: peter.keyte@als.com.au
Telephone	: ----	Telephone	: 61-2-4968-9433
Facsimile	: ----	Facsimile	: +61-2-4968 0349
Project	: AS130348 - HYDRO ALUMIUM BUFFER ZONE	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 08-NOV-2013
Sampler	: S TAYLOR	Issue Date	: 14-NOV-2013
Order number	: ----		
		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: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples							
Snap Lock Bag (EA200)							
EMP2-ACM-03	**29-OCT-2013**	**---**	27-APR-2014	----	**14-NOV-2013**	13-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:

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	

Brief Method Summaries

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

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

Regular Sample Surrogates

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

Outliers : Analysis Holding Time Compliance

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

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

Outliers : Frequency of Quality Control Samples

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

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

Environmental

QUALITY CONTROL REPORT

Work Order	: **EN1304129**	Page	: 1 of 4
Client	: **ENVIRON**	Laboratory	: Environmental Division Newcastle
Contact	: MR STEVE CADMAN	Contact	: Peter Keyte
Address	: PO Box 435 THE JUNCTION NSW 2291	Address	: 5/585 Maitland Road Mayfield West NSW Australia 2304
E-mail	: scadman@environcorp.com	E-mail	: peter.keyte@als.com.au
Telephone	: ----	Telephone	: 61-2-4968-9433
Facsimile	: ----	Facsimile	: +61-2-4968 0349
Project	: AS130348 - HYDRO ALUMIUM BUFFER ZONE	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 08-NOV-2013
Sampler	: S TAYLOR	Issue Date	: 14-NOV-2013
Order number	: ----		
		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

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

WORLD RECOGNISED ACCREDITATION

Signatories

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

Signatories	*Position*	*Accreditation Category*
Christopher Owler	Team Leader - Asbestos	Newcastle - Asbestos

General Comments

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

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

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

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

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

Laboratory Duplicate (DUP) Report

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

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

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

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control 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.

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

Matrix Spike (MS) Report

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

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

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

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

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

EN 130 4129

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

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

CLIENT: ENVIRON Australia Pty Ltd	**TURNAROUND REQUIREMENTS :** (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)	☑ Standard TAT **(List due date):**	**FOR LABORATORY USE ONLY (Circle)**
OFFICE: Newcastle		☐ Non Standard or urgent TAT **(List due date):**	Custody Seal Intact? Yes No N/A
PROJECT: Hydro Alumium Buffer Zone **PROJECT NO.:** AS130348	**ALS QUOTE NO.:**	**COC SEQUENCE NUMBER (Circle)**	Free ice / frozen ice bricks present upon receipt? Yes No N/A
ORDER NUMBER: **PURCHASE ORDER NO.:**	**COUNTRY OF ORIGIN:** Australia	COC: 1 2 3 4 5 6 7	Random Sample Temperature on Receipt: °C
PROJECT MANAGER: Fiona Robinson **CONTACT PH:** 02 4962 5444		OF: 1 2 3 4 5 6 7	Other comment:
SAMPLER: Shaun Taylor **SAMPLER MOBILE:** 0408 386 663	**RELINQUISHED BY:**	**RECEIVED BY:**	**RELINQUISHED BY:** / **RECEIVED BY:**
COC Emailed to ALS? (YES / NO) **EDD FORMAT (or default):**	DATE/TIME: 4/11/13	DATE/TIME: 8/11/13 1120	DATE/TIME: / DATE/TIME:
Email Reports to (will default to PM if no other addresses are listed): staylor@environcorp.com			
Email Invoice to (will default to PM if no other addresses are listed): klewis@environcorp.com			

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where **Metals** are required, specify **Total** (unfiltered bottle required) or **Dissolved** (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE *(refer to codes below)*	TOTAL BOTTLES	Asbestos								Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	EMP2-ACM-03	29/10/2013 0:00	S	B	1	X								
				TOTAL										

Environmental Division
Newcastle
Work Order
EN1304129

Telephone : +61 2 4014 2500

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

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 ACM
29/10/2013	Parcel 15	Lots 416/ 417/ 418 DP755231 (Speedway)	Demountable 1 (west side of track)	ACM	Sheeting (thick)	Floor to the deck at the front of the demountable	Poor condition: paint and sheeting surface worn through pedestrian movement, with flaking paint. Edges damaged.	Readily accessible, the floor to the front deck	20m2	Photo 1	N/A	Field
29/10/2013	Parcel 15	Lots 416/ 417/ 418 DP755231 (Speedway)	Demountable 1 (west side of track)	PCB	Fluoro Light	One external and multiple internal fluorusecent light	Good condition	Out of reach (approx 2.4m from floor)	4	Photo 5	N/A	Assumed
29/10/2013	Parcel 15	Lots 416/ 417/ 418 DP755231 (Speedway)	Demountable 2 (east side of track)	ACM	Sheeting	Lining to the underside of the front awning and internal ceiling	Poor condition, with significant damage to the awning section (large section cracked and missing). Plastic and timber strips to edges, some have come away from the ACM.	Out of reach (approx 2.4m from floor)	150m2	Photos 2 and 3	N/A	Field
29/10/2013	Parcel 15	Lots 416/ 417/ 418 DP755231 (Speedway)	Demountable 2 (east side of track)	ACM	Sheeting (thick)	Floor to the deck at the front of the demountable	Poor condition: paint and sheeting surface worn through pedestrian movement, with flaking paint. Edges damaged.	Readily accessible, the floor to the front deck	40m2	N/A	N/A	Field
29/10/2013	Parcel 15	Lots 416/ 417/ 418 DP755231 (Speedway)	Demountable 2 (east side of track)	PCB	Fluoro Light	Four internal fluorusecent lights visible (others may be present in inaccessible rooms)	Good condition	Out of reach (approx 2.4m from floor)	4 to 8	Photo 3	N/A	Assumed
29/10/2013	Parcel 15	Lots 416/ 417/ 418 DP755231 (Speedway)	Gravel track immediately west of Demountable 2	ACM	Sheeting (fragments)	Fragments scattered throughout demolition waste used in gravel road	Poor condition; various fragments spread over a large area within the section of the track.	Readily accessible	TBC	Photo 4	N/A	Field
29/10/2013	Parcel 15	Lots 416/ 417/ 418 DP755231 (Speedway)	Gravel track in west of Lot 418 DP755231 used to access Junior Motorcycle Club	ACM	Sheeting (fragments)	Some fragments within demolition waste north of the access	Poor condition; various fragments	Readily accessible	TBC	Photo 4	N/A	Field
29/10/2013	Parcel 15	Lots 416/ 417/ 418 DP755231 (Speedway)	Callers Box	ACM	Sheeting	Exterior wall lining to the caller's box, eastern side of the track	Fair: minor damage, edges concreted	Reafily accessible	30m2	N/A	EMP2-ACM-03	NAD
29/10/2013	Parcel 15	Lot 2 DP 233125 (Junior Motorcycle Club)	Various buildings	PCB	Fluoro Lights	Various external locations and likely to be present within buildings (inaccesible)	Good and TBC	Out of reach (approx 2.4m from floor)	TBC	N/A	N/A	Assumed