Phase 2 Environmental Site Assessment, Parcel 9

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On behalf of:

Prepared by:
ENVIRON Australia Pty Ltd

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Acronyms and Abbreviations

ACM	Asbestos Containing Material
AHD	Australian Height Datum
ALS	Australian Laboratory Services
ASET	Australian Safer Environment and Technology Pty Ltd. (Laboratory)
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)
CN	Cyanide (total or free)
CT	Certificate of Title
DP	Deposited Plan
DQO	Data Quality Objective
EIL	Ecological Investigation Level
EPA	Environment Protection Authority
ESA	Environmental Site Assessment
Ha	Hectare
km	Kilometres
LOR	Limit of Reporting
m	Metres
MAH	Monocyclic Aromatic Hydrocarbons
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 BGL	Metres below ground level
mg/L	Micrograms per Litre
NATA	National Association of Testing Authorities
NC	Not Calculated
ND	Not Detected
NEHF	National Environmental Health Forum
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
n	Number of Samples
OCPs	Organochlorine Pesticides
OH&S	Occupational Health & Safety
OPPs	Organophosphorus Pesticides
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PID	Photoionisation Detector
PQL	Practical Quantitation Limit
pH	a measure of acidity, hydrogen ion activity
QA/QC	Quality Assurance/Quality Control
RPD	Relative Percent Difference
SILs	Soil Investigation Levels
SVOCs	Semi Volatile Organic Compounds
TPHs	Total Petroleum Hydrocarbons
UCL	Upper Confidence Limit
VENM	virgin excavated natural material
VOCs	Volatile Organic Compounds
µg/L	Micrograms per Litre
-	On tables is "not calculated", "no criteria" or "not applicable"

Executive Summary

This report presents the findings of a Phase 2 Environmental Site Assessment undertaken on part of the Hydro Aluminium Kurri Kurri (Hydro) owned land known as Parcel 9.

Parcel 9 are rural properties located within the Buffer Zone of the Hydro Aluminium Kurri Kurri Smelter, approximately 600m south of the Smelter to the south-east of Hart Road and the south-west of Scales Avenue.

The objectives of this Phase 2 ESA assessment were to assess the potential for contamination at Parcel 9 based on historical and current landuse and to assess the suitability of Parcel 9 for Business Park (B7) and environmental conservation (E2) landuse.

A Phase 1 Environmental Site Assessment has previously been completed for the Hydro owned lands including Parcel 9 (ENVIRON (22 October 2013) Phase 1 ESA, Hydro Kurri Kurri Aluminium Smelter). The Phase 1 identified that contamination of Parcel 9 may have occurred from dust deposition due to the proximity of the Hydro smelter, (1km to the north), and/or construction and demolition of dwellings which may have resulted in impacts from asbestos fragments resulting from onsite burial of wastes or poor demolition practices. The location of a former municipal landfill was identified covering three lots in the south-west portion of the site.

To assess the potential contaminants of concern on Parcel 9, a site walkover was conducted and surface soil samples were collected across the parcel. A More comprehensive investigation was completed at Lots 20 and 439, including rigorous walkovers, excavation of test pits in targeted areas, sampling and analysis of selected soil profiles and asbestos identification analyses of solid samples. Intrusive investigations were completed separately at the location of the former municipal landfill on Lots 435, 436 and 437 (reported separately).

The investigation identified six lots that are or were previously used for residential purposes and had asbestos containing materials on the surface and in near surface soils:

- Lot 439: Scattered ACM over footprint of former residence. Stockpiles containing soil pushed up after house demolition including wastes and ACM fragments;
- Lot 448: Scattered ACM over footprint of former residence. Waste stockpiles included metal building frames and fence posts, concrete pieces, small metal piping, bricks and metal sheeting;
- Lot 449: Two small ACM fragments on footprint of former residence. Waste materials include car bodies and concrete;
- Lot 20: ACM visible in soils at footprint of former building. Small stockpile of demolition waste at rear of house footprint, including bagged ACM fragments;
- Lot 22: One ACM fragment found in grass on former residential building footprint. Wastes in surface debris near old shed footprint comprising broken ceramic pipes, metal rods, square concrete tank and old wire.

The ACM fragments on these lots are considered to pose a risk to human health and these lots are not considered suitable for the current landuse or future Business Park (B7) and environmental conservation (E2) landuse.

Lots 435, 436 and 437 are not considered suitable for the current landuse or the proposed landuse due to the presence of buried wastes including ACM at the former municipal landfill. This contamination is considered to present a low risk currently as the waste materials are generally buried, the area is fenced and is not generally accessed by the public.

The remaining lots (Lots 438, 447, 448 and 449 in DP755231 and Lots 13, 15 and 21 in DP 1082569) are considered suitable for the current landuse and the proposed Business Park (B7) and environmental conservation (E2) landuse.

Parcel 9 will be suitable for the proposed Business Park (B7) and environmental conservation (E2) landuse subject to the completion of the following remedial actions:

- Lots impacted by ACM fragments should be evaluated for feasible remediation options including excavation and combined encapsulation at another location within Hydro-owned land.
- Lots impacted by buried wastes associated with the former Kurri Kurri municipal landfill should be similarly evaluated for feasible remediation options which including excavation and combined encapsulation of all materials at another location within Hydro-owned land.
- For aesthetic reasons, other wastes across Parcel 9 should be removed and recycled as appropriate.

ENVIRON consider that Parcel 9 can be made suitable for the proposed Business Park (B7) and environmental conservation (E2) landuse following remediation. A Remedial Action Plan will be completed to assess the remedial options and outline the requirements for remediation and validation.

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

1 Introduction

1.1 Background

This report presents the findings of a Phase 2 Environmental Site Assessment undertaken on part of the Hydro Aluminium Kurri Kurri Pty Limited (Hydro) owned land known as Parcel 9, which is part of the Buffer Zone. Parcel 9 is located off Hart Road and Horton Road, Loxford, New South Wales (2326). Employment Land Subarea 9 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 divestment of land parcels for a range of proposed uses following the closure of the smelter in May 2014. A Rezoning Masterplan has been developed that identifies Parcel 9 to comprise land suitable for Business Park (B7) 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. On Parcel 9 these investigations identified nine lots where historical demolition practices and burial of demolition wastes has resulted in the potential for contamination, particularly asbestos, to remain on site. In addition, anecdotal information from Hydro personnel indicated the presence of the former Kurri Kurri municipal landfill within three lots to the south-east of Hart Road (Lots 435 to 437, DP 755231).

It is noted that at the time of the fieldwork, this land parcel was named Employment Land Subarea 9 and as such the soil samples reference this name. The name of the land parcel as referenced in this report changed to Parcel 9 during the rezoning process.

The location of Parcel 9 in relation to 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 9 based on historical and current land use and to assess the suitability of Parcel 9 for Business Park (B7) and environmental conservation (E2) landuse.

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 from each lot on the site or from a coarse grid to assess the potential for fluoride contamination from dust deposition from the smelter operations;

  - Surface sampling for asbestos containing material (ACM) in 10m x 10m grids on the former building footprints on the site.
  - Test pitting of onsite stockpiles of material and potentially buried fill material on Lot 20 and Lot 439 to assess for ACM and asbestos fines/fibrous asbestos (AF/FA) in an area where buildings were formerly located and the walkover assessment of the balance of each Lot for the presence of ACM on the surface.
  - A site walkover to evaluate other potential locations of buried waste or illegal dumping.
- Data interpretation including comparison against relevant guidelines and a discussion of the findings in terms of human health and environment risk under the current and future land use scenarios.
- Review of options available for remediation or management to render Parcel 9 suitable for the proposed land use.

2 Site Description

2.1 Site Location

Parcel 9 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 9 is Hart Road and Horton Road, Loxford, New South Wales (2326), Australia. The location of Parcel 9 is shown in **Figure 1.**

Parcel 9 is located within the Buffer Zone of the Hydro Aluminium Kurri Kurri Smelter, approximately 600m south of the Smelter. The Buffer Zone is an area of land surrounding the smelter that provides a buffer between the smelter and surrounding communities.

Parcel 9 comprises vacant land, areas of which are both cleared of vegetation and sometimes used for stock grazing or comprising sparse to dense natural bushland. Swamp Creek flows north east across the site, near the southern site boundary towards Wentworth Swamp, located approximately 2.5 km north east of the site. The Buffer Zone is an area of land surrounding the smelter that provides a buffer between the smelter and surrounding communities.

Parcel 9 is located within the Cessnock Local Government Area and is zoned RU2 – Rural Landscape under the Cessnock Local Environment Plan.

The South Maitland Railway line extends north south and forms the eastern site boundary. The line is privately owned and extends from Pelton, south of Cessnock to Maitland. Train movements along the line are infrequent.

Parcel 9 is approximately 42.9 hectares (ha) and comprises the lot numbers and development plans listed in Table 1:

Table 1: Lot and Development Plans for Parcel 9

Subarea	Lot/ DP	Area (ha)	Total Area (ha)
Parcel 9	Lot 435 DP755231 Lot 436 DP755231 Lot 437 DP755231 Lot 438 DP755231 Lot 439 DP755231 Lot 447 DP755231 Lot 448 DP755231 Lot 449 DP755231 Lot 13 DP1082569 Lot 15 DP1082569 Lot 19 DP1082569 Lot 20 DP1082569 Lot 21 DP1082569 Lot 22 DP1082569	4.0 3.9 3.9 2.4 2.6 3.1 2.5 2.6 10.6 1.5 0.4 2.2 0.6 2.6	42.9

2.2 Site Setting

2.2.1 Topography

Parcel 9 is located on a gentle slope from 20 mAHD at the western boundary of the site at Hart Road to 10mAHD at Swamp Creek (which flows through the site). Lot 13 is the exception and slopes from 20 mAHD from the railway line (eastern boundary) to 10m AHD at Swamp Creek (which forms the western boundary of Lot 13). Wentworth Swamp is located approximately 2.5km north east of the site at an elevation of approximately 10 mAHD.

2.2.2 Regional Geology

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

The Sydney Basin is a sedimentary basin consisting of Permian and Triassic sedimentary rocks, which extends from Newcastle in the north to Batemans Bay in the south and to Lithgow, just west of the Blue Mountains. The basin overlies older basement rocks of the Lachlan Fold Belt. The sedimentary rocks of the basin generally consist of near horizontal sandstones and shales, with some recent igneous dykes. Only minor folding and faulting has occurred since these sedimentary rock sequences first formed. The Dalwood Group is stratigraphically located near the base of the Sydney Basin below both the Greta Coal Measures and Newcastle Coal Measures and was deposited in a marine environment.

2.2.3 Site Hydrology

Surface water from Parcel 9 discharges primarily via infiltration and overland flow to Swamp Creek, which flows across the site near the southern boundary of the site. Swamp Creek discharges into Wentworth Swamp, which in turn discharges to the Hunter River approximately 2.5 km northeast of Employment Land Subarea 9 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 9 is expected to flow south east to Swamp Creek located near the southern boundary of the site, with the exception of Lot 13, where groundwater is expected to flow west to Swamp Creek (which forms the western boundary of Lot 13).

According to the NSW Office of Environment and Heritage (Natural Resource Atlas), there are 21 licensed groundwater abstractions (bores) located within 3km of Parcel 9. The majority of the groundwater bores are located within the aluminium smelter and buffer zone.

Information for 11 bores located in a 2km radius from Parcel 9 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 9 with respect to surface water and groundwater is considered to be moderate based on the following:

- Surface water and groundwater discharge into Swamp Creek, which flows across the site near the southern site boundary and discharges to the Hunter River via Wentworth Swamp within the Fishery Creek Catchment, approximately 11 km northeast of Parcel 9 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 9 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 & Potential Areas of Concern

Site history investigations included in the Phase 1 ESA for the Hydro Aluminium Kurri Kurri Smelter, dated 26 August 2013 indicate that Parcel 9 formed part of the land that was divided into 25 acre lots for returned soldiers prior to the construction of the smelter. The main farming activity on the rural residential properties was small scale poultry farming. Two large scale poultry farms were also located in this area. Houses located in the Buffer Zone have been demolished over the years, generally with remaining wastes buried at the property. These areas may be impacted with asbestos fragments resulting from onsite burial of wastes or poor demolition practices.

A summary of the site history and potential contaminants of concern for each lot in Parcel 9 is presented in **Table 2**.

Table 2 – Summary of Historical Information & Contaminants of Concern

Lot	Historical Information	Potential Areas and Contaminants of Concern
Lot 13 DP1082569	Large development and clearing (1975) on the property adjacent to the southern site boundary	Dumped waste in accessible bushland on the site boundaries and along fire trails (asbestos)
Lot 19 DP1082569	Housing, large portion now Hunter Expressway	Asbestos from demolition of former residence
Lot 20 DP1082569	Housing (1961), recently demolished and bushland.	Asbestos impacts to surface and subsurface soils from poor demolition practices. Dumped waste (asbestos)
Lot 22 DP1082569	Housing, unknown infrastructure (1951), different development (1975), current housing	Asbestos from demolition of previous developments
Lot 436 DP755231	Land disturbance (1975); Site of former Council Landfill (anecdotal).	General household waste and demolition waste. Contaminants may include metals, asbestos and petroleum hydrocarbons
Lot 437 DP755231	Land clearing and development on property adjacent to the southern site boundary (1961, 1966 and 1975), now demolished.	Dumped waste in accessible bushland on the site boundaries and along fire trails (asbestos)
Lot 439 DP755231	Housing, six sheds (poultry farming) on property (1961), housing recently demolished.	Asbestos impacts to surface soils and buried asbestos possible
Lot 447 DP755231	Housing (1975), demolished, scattered debris (Google Earth)	Asbestos from demolition of former

Lot 448 DP755231	Housing (1975), demolished	residence
Lot 449 DP755231	Housing (1975), demolished	
Remaining Lots (Lot 15 DP1082569, Lot 21 DP1082569, Lot 438 DP755231, Lot 435 DP755231)		Nil

- Dust deposition of particulates containing fluoride due to the proximity of smelter (1km to the north), may have resulted in contamination of surface soils.

4 Former Kurri Kurri Municipal Landfill Investigation

ENIVRON completed a separate Phase 2 Environmental Site Assessment (ENVIRON (2014) "*Phase 2 Environmental Site Assessment, Former Kurri Kurri Municipal Landfill Hart Road, Loxford",* on Lots 435, 436 and 437in December 2013/January 2014.

This assessment was completed to assess the former use of a portion of these lots as a municipal landfill, dating back to the 1960's. The investigation included the excavation of fifteen test pits, the installation of two groundwater wells and the collection and analysis of soil and groundwater samples.

Soil sampling found concentrations of a range of potential contaminants generally within health based guideline criteria, based on a potential future commercial/industrial use. The exception to this was the presence of fragments of ACM, both on the surface and within the fill profile and the presence of Benzo(a)pyrene and zinc above the ecological based criteria for industrial land use within the landfill soils. Quantification of asbestos in soil also indicated the presence of asbestos fines and fibrous asbestos (less than 7mm) at percentages above the health screening guideline criteria.

An assessment of groundwater found potential impacts from the presence of the landfill activities including elevated nitrate and zinc concentrations. Any groundwater impact immediately below the former landfill site was considered to have limited potential for down-hydraulic gradient migration (to surface water) given the discontinuous channelled nature of the shallow aquifer encountered during the drilling. The groundwater was also located within the underlying alluvial sediments (not within the waste profile). It is considered that additional direct impact on the groundwater may be limited given that infiltration leading to leaching from the waste mass is likely to be reduced given the age of the emplaced waste. To further evaluate impacts to groundwater, it was recommended that additional analysis of groundwater be undertaken to assess nitrate and zinc concentrations under a range of rainfall conditions.

On the basis of the investigations undertaken, risks to human health from site contaminants (chiefly the presence of asbestos containing materials, and the unsuitable aesthetic and geotechnical characteristics of the site) were present in the area of the former municipal landfill. Remediation of this area is therefore required. Material volumes were estimated to comprise municipal waste/soil mix estimated to be approximately between 800T and 2500T.

A range of remediation options were considered. Options that were considered feasible and recommended be further studied further included:

- Excavation and encapsulation of all materials at another location within Hydro owned land; or
- Encapsulate and manage in-situ.

Consideration of these options will be undertaken in conjunction with an assessment of remedial options for all Hydro-owned land and in consideration of the future proposed land use.

5 Sampling and Analytical Quality Plan

5.1 Potential Areas and Contaminants of Concern

Based on Parcel 9 historical information as discussed in **Section 3**, the following areas of concern were identified:

- Former dwellings on Lots 20, 22, 439, 447, 448 and 449 that have been demolished.
- The filling of land as a former municipal landfill on Lots 436 and 437 (**NB** as discussed in **Section 4**, the former municipal landfill area was investigated and reported under separate cover.
- Smelter dust deposition.
- Illegal dumping.

Contaminants of concern associated with the former uses of Parcel 9 (not including the municipal landfill area):

- Asbestos; and
- Fluoride;

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. ENVIRON notes that the historical site activities indicate potential contamination to surface soils only.

No potential contamination sources to subsurface soils, surface water or groundwater have been identified.

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 5ha.

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

- Aerial dust deposition is likely to be relatively consistent over the surface of the parcel;

- Sampling on a low density will allow for identification of whether or not dust deposition is an issue;

- 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 9. Sample locations were logged by GPS. A total of twelve surface soil samples were collected from across Parcel 9.

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.

5.3.1 Asbestos

To assess the potential for asbestos and other illegally dumped wastes to be present at Parcel 9, a site walkover of accessible areas was completed.

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

The location of former dwellings and sheds were identified to assess for potential ACM associated with the demolition of the structures. A 10m by 10m grid was set up over the footprint 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.

One fragment of ACM was collected for analysis from within the 10m by 10m grid at Lot 22 and Lot 449 during the intensive walkover and was sent to the laboratory for confirmation of the presence asbestos. The former building footprint on Lot 448 was observed to have large amounts of ACM scattered across it and therefore a 10m by 10m grid walkover was not undertaken. One sample was collected for analysis and sent to the laboratory for confirmation of the presence of asbestos.

In the lots where recent demolition of dwellings and sheds had occurred (Lot 20 and Lot 439 on Horton Road) and potentially resulted in bonded ACM contamination of surficial soils and in shallow subsurface soils.

To investigate the potential for ACM contamination on the surface and at depth the following scope of work was undertaken:

5.3.1.1 Lot 20

Soil sampling for Lot 20 targeted the following aspects:

- possible impacts to shallow surface soils and tracking of the site during demolition works may have resulted in some penetration of ACM and therefore investigation of the upper 10cm soil profile was proposed;
- immediately south of the former residential footprint, shallow sandy soils may have been impacted to depths great than 10cm by ACM following poor demolition practices and on-site burial; and
- in land surrounding the former residential footprint, impacts may have occurred but likely to be isolated to the surface.

The following investigation methodologies were undertaken to assess the potential impacts:

Residential Footprint

Investigation comprised walking over a series of contiguous 10 x 10m grids, over the entire residential footprint area (where the former residential and related buildings had been demolished). This included a total of 30 grids where hand picking was undertaken in two passes with a 90° directional change between. All visible ACM was collected, bagged and weighed.

To assess the potential for penetration of ACM below the surface, two shallow test pits were excavated in the areas of highest ACM surface density (as identified during the walk-over). Soil profiles were logged and 10L samples collected and sieved. The sample was sieved through a ≤7mm sieve and the volume of ACM retained on the sieve, weighed.

The sieved portion was out on a colour-contrasting material to determine if ACM fractions passed through the 7mm sieve and this sample was submitted for asbestos fines analysis.

South of Residential Footprint

In this area, where there was evidence of disturbed ground and potential for buried ACM, three test pits were excavated. Soil profiles were logged and 10L samples collected and sieved. The sample was sieved through a ≤7mm sieve and the volume of asbestos retained on the sieve weighed.

The sieved portion was out on a colour-contrasting material to determine if ACM fractions passed through the 7mm sieve and this sample was submitted for asbestos fines analysis.

Lands Surrounding Residential Area

Investigation comprised hand picking on 10x10m grids (as described above), on a density of 14 per hectare. A total of four grids were assessed to the west and north of the residential footprint in the balance of the Lot 20 property.

5.3.1.2 Lot 439

Soil sampling targeted the following aspects of Lot 439:

- over the former residential footprint, surface soils were largely removed, however seepage pits and other in-filled areas may exist and soils may have been impacted by ACM at the surface or where buried rubble or fill is present;
- surface soils containing ACM and building debris were excavated and stockpiled in the central area of the site, (estimated volume 150m^3), however the density of ACM is not known;
- potential for buried ACM in area former poultry sheds (removed in 1960's) located immediately to the south of the residential footprint; and
- general farmland (to the west), surrounding former residence, may have been impacted but are likely to be isolated to the surface, (soils are sandy and comprise grassed grazing land)..

The following investigation methodologies were undertaken to assess these potential impacts:

Residential Footprint

Investigation comprised walking over a series of contiguous 10 x 10m grids, over the entire residential footprint area (where the former residential and related buildings had been demolished). This included a total of 30 grids where hand picking was undertaken in two passes with a 90° directional change between. All visible ACM was collected, bagged and weighed.

The natural soil (alluvial sandy soils) profile was exposed across the footprint and where there had been voids (eg, sumps etc), these had been excavated. There was no indication of buried/filled areas.

Stockpiles

During demolition works site surface soils had been scraped off the residential footprint area (and immediate surrounds) and stockpiled across the western side.

To investigate the stockpiles, ten test pits were excavated into the mounded soil and ten representative 10L samples were collected. The 10L samples collected and sieved through a ≤7mm sieve, and the volume of ACM retained on the sieve and weighed.

The sieved portion was out on a colour-contrasting material to determine if ACM fractions passed through the 7mm sieve and this sample was submitted for asbestos fines analysis.

Area South of the Residential Footprint (Former Poultry Sheds)

The former poultry sheds area was targeted by excavating five test pits across then area to the south of the former residence.

Soil profiles were logged and 10L samples collected and sieved. The sample was sieved through a ≤7mm sieve and the volume of asbestos retained on the sieve weighed.

The sieved portion was out on a colour-contrasting material to determine if ACM fractions passed through the 7mm sieve and this sample was submitted for asbestos fines analysis.

Remainder of Lot 439 Land

Investigation comprised hand picking on 10x10m grids (as described above), on a density of 14 per hectare. A total of 20 grids were assessed to the west of the residential footprint in the balance of the Lot 439 lands.

6 Assessment Criteria

6.1 Soil

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

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

The objective of the Phase 2 ESA is to assess soil contamination at Parcel 9 in relation to risks posed to human health and the environment under the proposed future land use of commercial/ industrial. As the contaminants of concern are fluoride and asbestos, guidelines for these contaminants under commercial/ industrial and environmental conservation landuse scenarios are provided below.

The Health Screening Levels (HSLs) for asbestos are applicable for assessing human health risk via the exposure pathway of inhalation of airborne asbestos and are presented in **Table 3**. The HSLs are generic to all soil types. As there is no HSL for environmental conservation landuse, the HSL for Residential A will be used and is considered conservative.

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

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

NEPM (2013) do not provide criteria for fluoride in soils in Australia. Therefore, ENVIRON (2013) conducted a preliminary level Human Health Risk Assessment (HRA) specific to fluoride in order to derive a specific preliminary screening level for fluoride for the Hydro Aluminium Kurri Kurri Smelter . The screening levels are protective of the range of human receptors and are provided in **Table 4:**

Table 4: Site Specific Soil Assessment Criteria (mg/kg) for Fluoride	
Preliminary screening levels	
Land Use	**Preliminary screening level**
Residential landuse	F 400mg/kg
Recreational landuse	F 1200mg/kg
Commercial/industrial landuse	F 17000mg/kg

Soil investigation results for the samples taken from a grid formation across Parcel 9 have been compared against the commercial/ industrial land use screening level for fluoride in soils.

7 Results

7.1 Site Walkover

A site walkover was completed to identify areas of environmental concern, such as illegally dumped wastes and fill on all lots in Parcel 9. The main entrance road to the former smelter is Hart Road and this forms the western boundary of Parcel 9. Horton Road traverses the middle portion of the site (south to north) and Swamp Creek traverses the back portion of the site (south to north) and forms the lot boundary between Lot 13 and Lot 15, Lot 447, Lot 448 and Lot 449. The South Maitland Railway line extends north south across the site and forms the eastern site boundary. The new Hunter Expressway forms the northern boundary of the site and has resulted in the placement of fill on the front portion of Lot 15 and Lot 19.

The site comprises 14 lots comprising bush land and cleared paddocks on several of the lots. Remnants of former residential dwellings and associated sheds were apparent near the front of Lot 20, Lot 22, Lot 439, Lot 448, Lot 449 and near the eastern boundary and rear of Lot 447.

Anecdotal evidence from an interview with Kerry McNaughton, Environment Officer/Buffer Zone Supervisor, suggests that the front portion of Lot 436 was a former council operated municipal landfill.

The site walkover identified hummocky ground, small fill mounds and surface debris such as metal sheeting, ACM fragments, broken concrete, bricks, soil, old fence posts and wire; former residential and shed footprints with associated debris such as ACM fragments (fibro sheeting) broken tiles and bricks. A description of the areas of concern identified at each lot on Parcel 9 is outlined in **Table 5**.

The locations of areas of concern identified during the field investigations are shown in **Figure 3**.

Photographs are included in **Appendix B**.

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

Table 5 Summary of Areas of Concern Identified during Site Walkover

Lot	Building Footprints	Hummocky Ground	Fill Mounds	Waste Stockpiles	Samples Collected
Lot 435	Nil.	Nil.	Nil.	Nil.	1 Fluoride Sample
Lot 436	Nil.	Large area of hummocky ground in a cleared section in the middle portion of the lot. ***This is the site of the suspected former municipal landfill.***	Two small fill mounds with soil and some asphalt near the western boundary fence line of the lot.	Soil and some asphalt in fill mounds. Surface debris including old tyres near the southern boundary fence line at the rear of the lot from suspected flooding of the creek.	1 Fluoride Sample
Lot 437	Nil.	Nil.	Three small fill mounds with surface debris near the north western corner of the lot.	Surface debris in fill comprising metal sheeting, soil, bricks fence posts and wire. An old car body was sighted in the northern corner of the lot.	1 Fluoride Sample
Lot 438	Nil.	Nil.	Nil.	Nil.	1 Fluoride Sample
Lot 439	Cleared area exposing underlying sandy soils over the former footprint of the residence, Scattered ACM	Nil	Nil	Stockpiles on the house block site containing soils pushed up after house demolition. Small waste stockpile (<1m^3) containing demolition waste and ACM immediately outside the western house block fence. Exposed waste comprised ACM fragments, ACM sheeting, timber planks, broken concrete, bricks, corrugated iron, metal sheeting and pieces of pipe.	1 Fluoride Sample 5 Stockpile Samples (for asbestos fines) 1 test pit samples (for asbestos fines 3 ACM identification samples
Lot 447	Concrete footings for a small building (old bathroom?) at the rear of	Nil	Two small fill mounds near the pooled water at the rear of the lot.	Nil.	1 Fluoride Sample

Table 5 Summary of Areas of Concern Identified during Site Walkover

Lot	Building Footprints	Hummocky Ground	Fill Mounds	Waste Stockpiles	Samples Collected
	the lot on the middle portion of the site.		Fill from the construction of the Hunter Expressway has been placed on the front portion of the lot.		
Lot 448	One former residential building footprint with ACM fragments scattered across it. Two former shed footprints to the rear and immediately SSE of the former residential footprint. Stock fencing at the front of the Lot and immediately NE of the former resident footprint.	Nil.	Four areas of fill identified at the rear of the property near the south eastern corner of the property.	Waste stockpiles included metal building frames and fence posts, concrete pieces, small metal piping, bricks and metal sheeting.	1 Fluoride Sample 1 ACM identification sample
Lot 449	One former residential building footprint and old shed, 2 small ACM fragments	Nil.	Small surface fill mounds.	Waste materials including car bodies, concrete.	1 Fluoride Sample 1 ACM identification sample
Lot 13	Nil.	Nil.	One very small fill mound in the north eastern portion of the lot.	Nil.	1 Fluoride Sample
Lot 15	Nil.	Small area of hummocky ground in the middle portion of the lot, near the southern boundary fence line.	Fill from the construction of the Hunter Expressway has been placed on the front portion of the lot.	Nil.	1 Fluoride Sample
Lot 19	Nil.	Nil.	One large stockpile	Waste located in stockpiles	

Table 5 Summary of Areas of Concern Identified during Site Walkover

Lot	Building Footprints	Hummocky Ground	Fill Mounds	Waste Stockpiles	Samples Collected
			located on adjacent Hunter Expressway land identified near the north eastern corner of the Lot.	on Hunter Expressway land near the north eastern boundary of Lot 19, comprising old car bodies, timber, concrete pieces, metal sheeting, soil and plastic piping.	
Lot 20	Former building footprint now demolished exposing underlying sandy soils. ACM visible in surface	Nil.	Nil	At rear of former house footprint small stockpile of demolition waste, containing ACM including bagged ACM fragments (assumed to be from the demolition contractors)	1 Fluoride Sample 4 test pit samples (for asbestos fines 4 ACM identification samples
Lot 21	One dilapidated tin shed located on the edge of the internal gravel road on the lot.	Nil.	Nil.	Old metal sheeting near the old tin shed.	1 Fluoride Sample
Lot 22	One shed footprint at the front of the lot. Potential former residential building footprint behind the small dam at the front of the lot. A series of concrete building footings were also at the front of the lot. Anecdotal evidence from an interview with a neighbour suggests these were former dog kennels.	None identified	One large grass covered fill mound near the dam at the front of the lot.	Wastes included surface debris near the old shed footprint comprising broken ceramic pipes, metal rods, square concrete tank and old wire. One ACM fragment was found in the grass on the former residential building footprint.	1 Fluoride Sample 1 ACM identification sample

7.1.1 Lot 20 and Lot 439 Assessment

7.1.1.1 Surface ACM

Lots 20 and 349, where recent demolition of suspected ACM housing had taken place, were inspected in detail for the presence of ACM by inspecting the whole residential footprint area with a series of adjacent 10 by 10m grids (with a 90° direction change).

A total of 30, ten metre by ten metre grids were inspected for each of the Lots (ie, areas of 30m by 36m).

These contiguous areas were consecutively numbered and, within each area, suspected ACM fragments were collected and weighed.

The grids for each lot are presented in **Figures 4 and 5,** for Lots 20 and 439**,** respectively.

A summary of potential ACM encountered on each Lot is presented in the following tables:

Table 6 Lot 20 Grids

Grid No.	ACM Detected	Weight (g)	Comment
1	No	-	-
2	No	-	-
3	3-4 frags	1	Mostly grassed/undisturbed
4	4-5 frags	66	Mostly grassed/undisturbed
5	3-4 frags	11	Sl.hummocky/disturbed soil,
6	No	--	-
7	No	-	-
8	<10 small frags	31	Partially grassed/disturbed soil with building rubble
9	Too many to pick up	635	Partially grassed/disturbed soil with building rubble
10	1 frag	11	Some building rubble
11	No	-	-
12	No	-	-
13	No	-	-
14	>10 frags	152	Partially grassed with exposed disturbed soil
15	Too many to pick up	98	Disturbed exposed soil with building rubble
16	>10 frags	139	Disturbed exposed soil with building rubble
17	No	-	-
18	No	-	-
19	No	-	-
20	Too many to pick up	-	Disturbed exposed soil, building rubble and wrapped/stockpiled ACM from demolition
21	No	-	-
22	5-10 frags	67	Sl. Disturbed with some building rubble
23	5-10 frags	71	Sl. Disturbed with some building rubble
24	No	-	-

Table 6 Lot 20 Grids			
Grid No.	**ACM Detected**	**Weight (g)**	**Comment**
25	5-10 frags	29	Near old driveway, sl disturbed exposed soil
26	No	-	-
27	No	-	-
28	No	-	-
29	No	-	-
30	No	-	-

Table 7 Lot 439 Grids (stockpiles within Grids assessed separately)			
Grid No.	**ACM Detected**	**Weight (g)**	**Comment**
1	>10 frags	307	Cleared / exposed sand
2	>10 frags	144	Cleared / exposed sand
3	<10 frags	69	Cleared / exposed sand
4	<10 frags	67	Cleared / exposed sand
5	>10 frags	322	Cleared / exposed sand – stockpile in N cnr
6	<10 frags	66	Cleared / exposed sand includes grass area over fence– stockpile in NE cnr
7	no	-	-
8	>10 frags	268	Cleared / exposed sand – stockpile in NW cnr
9	>10 frags	99	Cleared / exposed sand
10	>10 frags	123	Cleared / exposed sand
11	>>10 frags	366	Cleared / exposed sand
12	>10 frags	294	Cleared / exposed sand
13	<5 frags	39	75% grassed ACM from exposed soil
14	<5 frags	19	65% grassed ACM from exposed soil
15	<5 frags	20	Cleared / exposed sand
16	<5 frags	30	Cleared / exposed sand - stockpile in NW cnr
17	<5 frags	105	Mostly stockpile
18	>10 frags	69	50% grassed outside fence
19	<5 frags	22	50% grassed outside fence
20	3 frag	18	Mainly stockpile
21	no	-	-
22	3 frag	63	Cleared / exposed sand
23	3 frag	13	75% grassed ACM from exposed soil
24	no	-	-
25	no	-	-
26	1 frag	11	65% grassed ACM from exposed soil
27	1 frag	12	50% grassed ACM from exposed soil
28	1 frag	10	25% grassed ACM from exposed soil

Table 7 Lot 439 Grids (stockpiles within Grids assessed separately)			
Grid No.	**ACM Detected**	**Weight (g)**	**Comment**
29	no	-	-
30	no	-	-

Outside of the former residential footprints, a series of 10m by 10 m grid walk-overs were undertaken on the balance of each Lot. A total of four additional grads were completed for Lot 20, to the north-east and north-west of the former residence. An additional 20 grids were completed for Lot 439 in the large paddock to the north-west of the former residence (**Figures 6** and **7**).

No visible ACM was detected in the grids outside the residential footprints of Lots 20 and 439.

7.1.1.2 Stockpiles on Lot 439

During the demolition works on Lot 439, the sandy surface soils, including some demolition debris, had been pushed up into stockpiles on the north-western area of the former residential footprint (**Figure 7**).

To assess the potential for ACM and asbestos fines within the stockpiles, a backhoe was used to excavate into the piles at 10 locations and representative 10L samples were collected.

Each sample was sieved through a 7mm sieve and the retained portion was examined for ACM (which was weighed).

The material passing the sieve was also examined for ACM and any found was also weighed.

Of the sieved material from the 10 stockpile sample locations, five samples were analysed for asbestos fines.

Table 8, below, presents the results of the stockpile sampling:

Table 8 Lot 439 Stockpiles Sampling			
Sample No.	**Weight ACM >7mm (g)**	**Weight ACM <7mm (g)**	**Analysis (asbestos fines)**
1	9	None	
2	None	None	
3	30	None	yes
4	17	None	yes
5	4	None	
6	1	None	

Table 8 Lot 439 Stockpiles Sampling			
Sample No.	**Weight ACM >7mm (g)**	**Weight ACM <7mm (g)**	**Analysis (asbestos fines)**
7	19	None	yes
8	66	None	yes
9	10	None	
10	11	None	yes

7.1.1.3 Test Pits on Lots 20 and 439

A total of 10 test pits were excavated across Lot 439 (PT1 to TP5) and Lot 20 (TP6 to TP10).

The pits on Lot 439 were located to the south-west of the former residence targeting the historical presence of suspected poultry sheds and the potential for buried ACM.

Test pits on Lot 20 were located across the residential footprint (TP6, 7 and 8) to assess examine the potential for ACM buried below the surface 0.1m. Test pits TP8 and 9 were located to the south-west of the residential footprint to investigate the potential for buried asbestos (from former demolition practices).

The typical soil profiles encountered in all pits, included: a silty topsoil layer (less than 150mm), overlying brown sand and silty sands interpreted to be alluvial sediments.

Representative 10L samples were collected from each test pit and sieved through a 7mm sieve and the retained portion was examined for ACM (which was weighed). The material passing the sieve was also examined for ACM and any found was also weighed.

Five samples (from TP2 - Lot 439 and TP6, 7, 8 and 9 from lot 20) were submitted for analysis for asbestos fines.

Test pit locations presented on **Figures 6 and 7** and results are summarized in **Table 9**, below:

Table 9 Test Pit Sampling Lots 20 and 439				
Test Pit.	**Lot**	**Weight ACM >7mm (g)[a]**	**Weight ACM <7mm (g)**	**Analysis (asbestos fines)**
1	439	None	None	
2	439	9	None	yes
3	439	None	None	
4	439	None	None	
5	439	None	None	

Table 9 Test Pit Sampling Lots 20 and 439				
Test Pit.	**Lot**	**Weight ACM >7mm (g)[a]**	**Weight ACM <7mm (g)**	**Analysis (asbestos fines)**
6	20	41	None	yes
7	20	16	None	yes
8	20	None	None	yes
9	20	None	None	yes
10	20	None	None	

[a] **NB** the ACM found in all cases was observed to come from the surface/near surface

7.1.2 Soil Results

Soil samples were collected for analysis for fluoride and for asbestos identification across Parcel 9.

Test pits were excavated into soils in Lot 439 and Lot 20 in stockpiles (Lot 439) and to investigate soil profiles in both Lots, as described above.

A summary of soil analytical results is presented in **Table 10** and fully outlined in **Tables A and B** in **Appendix D.**

Laboratory reports are included in **Appendix E.**

Table 10: Summary of Soil Results					
Analyte & units	**Lot No./s**	**No. of Samples**	**Maximum Concentration**	**No. exceeding Site Criteria**	**Criteria**
Fluoride (mg/kg)	All	12	20	0	17,000mg/kg
Bonded ACM building footprint	Lots 20, 439, 22, 448 and 449	10	presence	10	No visible asbestos for surface soil
Bonded ACM stockpiles (%w/w)	Lot 439	5	<0.01	0	0.05%
Bonded ACM subsurface testpits (%w/w)	Lots 20 and 439	5	<0.01	0	0.05%
Friable asbestos (<7mm) stockpiles (%w/w)	Lot 439	5	0.006	**2**	0.001%

Table 10: Summary of Soil Results					
Analyte & units	**Lot No./s**	**No. of Samples**	**Maximum Concentration**	**No. exceeding Site Criteria**	**Criteria**
Friable asbestos (<7mm) subsurface trenches (%w/w)	Lots 20 and 439	5	<0.001	0	0.001%

The results of surface soil sampling for fluoride demonstrate that the conditions at Parcel 9 were not impacted by stack particulate fallout from the Hydro Aluminium Kurri Kurri Smelter.

Asbestos was identified in the ACM fragments collected across Parcel 9.

Analysis confirmed asbestos fines in excess of the guideline in two of the five stockpile samples analysed for Lot 439.

Asbestos fines were not detected in soil in the test pits excavated across Lots 20 and 439.

7.2 Quality Assurance/ Quality Control

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

8 Discussion

8.1 Site Conceptual Model

Parcel 9 consists of residential properties (and former residential properties), and open bushland located in the Buffer Zone, south of the Aluminium Kurri Kurri Smelter. Parcel 9 is bordered in the north by the new Hunter Expressway, in the east by the South Maitland Railway line, the north-west by Hart Road, and in the south by other rural/residential properties. Swamp Creek runs west to east across the south-east part of Parcel 9.

Sampling and analysis has indicated Parcel 9 has not been affected by dust deposition of fluoride from the Hydro Aluminium Kurri Kurri Smelter, with fluoride concentrations in surface soil below the preliminary screening level for commercial/ industrial landuse. It is noted that there is currently no source of aerial fluoride emissions, as the smelter is in a care and maintenance mode.

Site history investigations indicate Parcel 9 formed part of the land that was divided into rural residential lots mainly associated with small scale poultry farming. Two large scale poultry farms were also located in this area.

Houses located in this Buffer Zone area have been demolished over the years, generally with remaining wastes potentially buried at the property.

Some of these areas have been impacted with ACM fragments resulting from onsite burial of wastes and/or poor demolition practices.

More recent demolition of existing structures occurred on Lots 20 and 439 in 2012 / 2013. This has resulted in the dispersion of ACM fragments across the ground surface of both these properties and asbestos fines were found to be present in the soil stockpiles on Lot 439.

All ACM was found to be at the ground surface.

Based on the investigation, lots affected by historical demolition practices resulting in dissemination of ACM (and other construction/demolition wastes) include:

- Lot 448, Lot 449 and Lot 22 show evidence of minor ACM on the site of previous structures (houses/sheds) and small demolition waste stockpiles;
- Lots 20 and 439 have undergone recent demolition of site structures (houses/sheds) and show extensive dispersion of ACM fragments across the former residential footprints of both properties. Stockpiled materials including demolition wastes and ACM are also present on both Lots, with large soil stockpiles (containing ACM), on Lot 439.

On the basis of the investigations undertaken, the presence of asbestos and asbestos-containing materials in surface and near-surface soils and in stockpiles on Lots 20 and 439, represent potential risks to human health or the environment under the proposed industrial/commercial land use.

The presence of this material requires remediation to render Parcel 9 suitable for the proposed future land use scenarios.

The potential presence of asbestos-containing materials and the unsuitable aesthetic characteristics of waste stockpiles on Lot 448, Lot 449 and Lot 22 also requires management/remediation.

Fill sourced from excavations undertaken for the Hunter Expressway construction works has been placed and compacted on Parcel 9, Lots 15 and 447 however is not considered to compromise the environmental condition of these lots. This is discussed further below.

Lots 435, 436 and 437 comprised the former Kurri Kurri municipal landfill which was operated and closed in the 1960s. This landfill was assessed separately and reported in a separate Phase 2 Environmental Site Assessment (ENVIRON (2014) "*Phase 2 Environmental Site Assessment, Former Kurri Kurri Municipal Landfill Hart Road, Loxford".*

Remediation of this landfill is required to make Parcel 9 suitable for commercial/industrial landuse. The landfill is discussed further below.

8.2 Former Kurri Kurri Municipal Landfill

The comprehensive investigation of the former landfill area is discussed in **Section 4**.

The investigation concluded that on the basis of the investigations undertaken, risks to human health from site contaminants (chiefly the presence of asbestos containing materials, and the unsuitable aesthetic and geotechnical characteristics of the site) were present in the area of the former municipal landfill. Remediation of this area is therefore required. Material volumes were estimated to comprise municipal waste/soil mix estimated to be approximately between 800T and 2500T.

A range of remediation options were considered. Options that were considered feasible and recommended be further studied further included:

- Excavation and encapsulation of all materials at another location within Hydro owned land; or
- Encapsulate and manage in-situ.

Consideration of these options will be undertaken in conjunction with an assessment of remedial options for all Hydro-owned land and in consideration of the future proposed land use.

The presence of the waste was not considered to represent a risk of harm under the current landuse i.e. fenced, inaccessible to the public and undeveloped.

8.3 Hunter Expressway Fill Placement

Approximately 40,000 m^3 of fill was placed on Lots 15 and 447, during construction of the new Hunter Expressway. The soil material comprised natural sands and clay soils from excavated from the Expressway alignment and was classified as virgin excavated natural

material (VENM), following assessments by a geotechnical/environmental consultant (VGT Pty Ltd).

ENVIRON's concurred with VGT's VENM classification, following review of this assessment.

As VENM, the presence of this material on Parcel 9, Lots 15 and 447 does not compromise the environmental condition of the Lots for the proposed land use.

Copies of the VENM certificates for this material are attached as **Appendix G**.

9 Remediation

Remediation and/or management will be required to render Parcel 9 suitable for the proposed use (commercial/industrial land use). It is further considered that Lots 20 and 439 of Parcel 9, are currently unsuitable for the current rural use.

9.1 Lot 20 and Lot 439

The estimated extent of remediation required is the essentially area occupied by the former residences on each lot and is shown in **Figures 4** and **5**.

A brief summary of potential remediation options is outlined in **Table 11** below. Any remediation will need to consider the proposed future uses of the land.

Table 11 Potential Remediation Options

Option	Description	Advantages	Disadvantages
1	Do nothing	Cost effective solution. Due to the presence of surface asbestos, the lots would still require suitable fencing to effectively restrict public access.	Does not address the aesthetic issues or risks from the presence of bonded asbestos fragments. Planning approval may be an issue. May require an Environment Protection Licence. Council may require review of documentation by a Contaminated Site Auditor.
2	Excavate surface soils (nominal 100mm) and stockpiles on Lot 439 and dispose to landfill.	Removes long term management requirement from site. Improves land value. Planning approval requirements comparatively straight forward.	Consumes off site landfill space. Disposal costs are high. Validation of remediated lands required.
3	Combined encapsulation of excavated surface soils and stockpiles at another location within Hydro owned land	Relocates long term management requirements. Improves land value of the subject site.	Planning approval required and could be lengthy. Timeline is reliant on a 'whole of site solution'.
5	Encapsulate and manage in-situ	Encapsulation allows for capping for the purpose of hardstand. Can be incorporated as part of commercial/industrial redevelopment.	Requires long term management and registration of an Environmental Management Plan with Council. May reduce property value.

As discussed above it is considered that the current condition of the former residential areas of Lots 20 and 439 are not suitable for the current land use and are also considered to be a potential risk to human health in their current condition. As an interim measure these areas should be securely fenced to prevent public access (and any illegal dumping).

9.2 Lot 448, Lot 449 and Lot 22

Minor ACM fragments were noted on these lots (from demolition of former structures) and small waste stockpiles of demolition waste and old car bodies.

ENVIRON considers that where ACM has been identified in the presumed former residential footprint of these lots, an appropriately qualified contractor should be engaged to remove surface ACM.

Dumped wastes across Parcel 9 should be removed and disposed of for aesthetic purposes.

9.3 Former Kurri Kurri Municipal Landfill

As discussed in **Sections 4** and **9.3,** and under separate cover ("*Phase 2 Environmental Site Assessment, Former Kurri Kurri Municipal Landfill Hart Road, Loxford"),* the following was recommended for remediation of the former landfill site:

A range of remediation options were considered. An option that is considered feasible and requires evaluation are:

- Excavation and combined encapsulation of all materials at another location within Hydro owned land.

Consideration of these options should be undertaken in conjunction with an assessment of remedial options for all Hydro-owned land and in light of the proposed use of the land.

Access to the area should be restricted until remediation or management is implemented.

10 Conclusions and Recommendations

This report presents the findings of a Phase 2 Environmental Site Assessment undertaken on part of the Hydro Aluminium Kurri Kurri (Hydro) owned land known as Parcel 9.

Parcel 9 are rural properties located within the Buffer Zone of the Hydro Aluminium Kurri Kurri Smelter, approximately 600m south of the Smelter to the south-east of Hart Road and the south-west of Scales Avenue.

The objectives of this Phase 2 ESA assessment were to assess the potential for contamination at Parcel 9 based on historical and current landuse and to assess the suitability of Parcel 9 for Business Park (B7) and environmental conservation (E2) landuse.

A Phase 1 Environmental Site Assessment has previously been completed for the Hydro owned lands including Parcel 9 (ENVIRON (22 October 2013) Phase 1 ESA, Hydro Kurri Kurri Aluminium Smelter). The Phase 1 identified that contamination of Parcel 9 may have occurred from dust deposition due to the proximity of the Hydro smelter, (1km to the north), and/or construction and demolition of dwellings which may have resulted in impacts from asbestos fragments resulting from onsite burial of wastes or poor demolition practices. The location of a former municipal landfill was identified covering three lots in the south-west portion of the site.

To assess the potential contaminants of concern on Parcel 9, a site walkover was conducted and surface soil samples were collected across the parcel. A More comprehensive investigation was completed at Lots 20 and 439, including rigorous walkovers, excavation of test pits in targeted areas, sampling and analysis of selected soil profiles and asbestos identification analyses of solid samples. Intrusive investigations were completed separately at the location of the former municipal landfill on Lots 435, 436 and 437 (reported separately).

The investigation identified six lots that are or were previously used for residential purposes and had asbestos containing materials on the surface and in near surface soils:

- Lot 439: Scattered ACM over footprint of former residence. Stockpiles containing soil pushed up after house demolition including wastes and ACM fragments;
- Lot 448: Scattered ACM over footprint of former residence. Waste stockpiles included metal building frames and fence posts, concrete pieces, small metal piping, bricks and metal sheeting;
- Lot 449: Two small ACM fragments on footprint of former residence. Waste materials include car bodies and concrete;
- Lot 20: ACM visible in soils at footprint of former building. Small stockpile of demolition waste at rear of house footprint, including bagged ACM fragments;
- Lot 22: One ACM fragment found in grass on former residential building footprint. Wastes in surface debris near old shed footprint comprising broken ceramic pipes, metal rods, square concrete tank and old wire.

The ACM fragments on these lots are considered to pose a risk to human health and these lots are not considered suitable for the current landuse or future Business Park (B7) and environmental conservation (E2) landuse.

Lots 435, 436 and 437 are not considered suitable for the current landuse or the proposed landuse due to the presence of buried wastes including ACM at the former municipal landfill. This contamination is considered to present a low risk currently as the waste materials are generally buried, the area is fenced and is not generally accessed by the public.

The remaining lots (Lots 438, 447, 448 and 449 in DP755231 and Lots 13, 15 and 21 in DP 1082569) are considered suitable for the current landuse and the proposed Business Park (B7) and environmental conservation (E2) landuse.

Parcel 9 will be suitable for the proposed Business Park (B7) and environmental conservation (E2) landuse subject to the completion of the following remedial actions:

- Lots impacted by ACM fragments should be evaluated for feasible remediation options including excavation and combined encapsulation at another location within Hydro-owned land.
- Lots impacted by buried wastes associated with the former Kurri Kurri municipal landfill should be similarly evaluated for feasible remediation options which including excavation and combined encapsulation of all materials at another location within Hydro-owned land.
- For aesthetic reasons, other wastes across Parcel 9 should be removed and recycled as appropriate.

ENVIRON consider that Parcel 9 can be made suitable for the proposed Business Park (B7) and environmental conservation (E2) landuse following remediation. A Remedial Action Plan will be completed to assess the remedial options and outline the requirements for remediation and validation.

Hydro has 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 landuse.

11 References

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

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

ENVIRON (2014) "Phase 2 Environmental Site Assessment, Former Kurri Kurri Municipal Landfill, Hart Road, Loxford".

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

NEPC (2013) National Environmental Protection Council (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.

VGT (2013a) "Re: Material Inspection - Validation for Road Works at Kurri Kurri, Site Ref: Chainage 15160 to 15330", VGT Environmental Compliance Solutions, 9 May 2013;

VGT (2013b) "Re: Material Inspection - Validation of Site NW from Horton Road, Loxford NSW", VGT Environmental Compliance Solutions, 13 July 2013;

12 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 25 June 2012 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 Employment Land Subarea 9. 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 Employment Land Subarea 9 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.

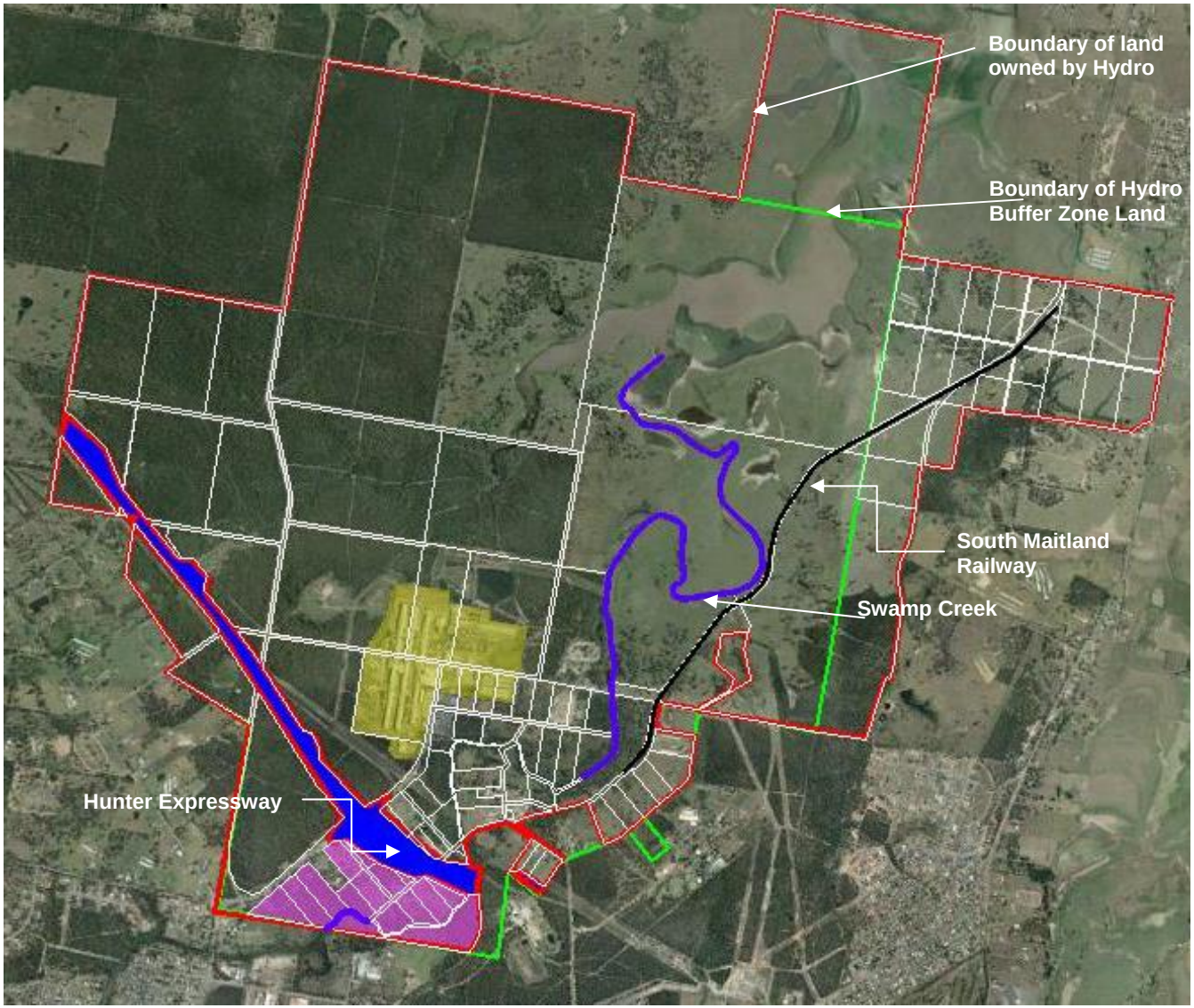
ENVIRON did not independently verify all of the written or oral information provided to ENVIRON during the course of this investigation. While ENVIRON has no reason to doubt the accuracy of the information provided to it, the report is complete and accurate only to the extent that the information provided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

12.1 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 Zone

Land not owned by Hydro

Parcel 9

N

Hydro Aluminium Kurri Kurri – Phase 2 Environmental Site Assessment Parcel 9

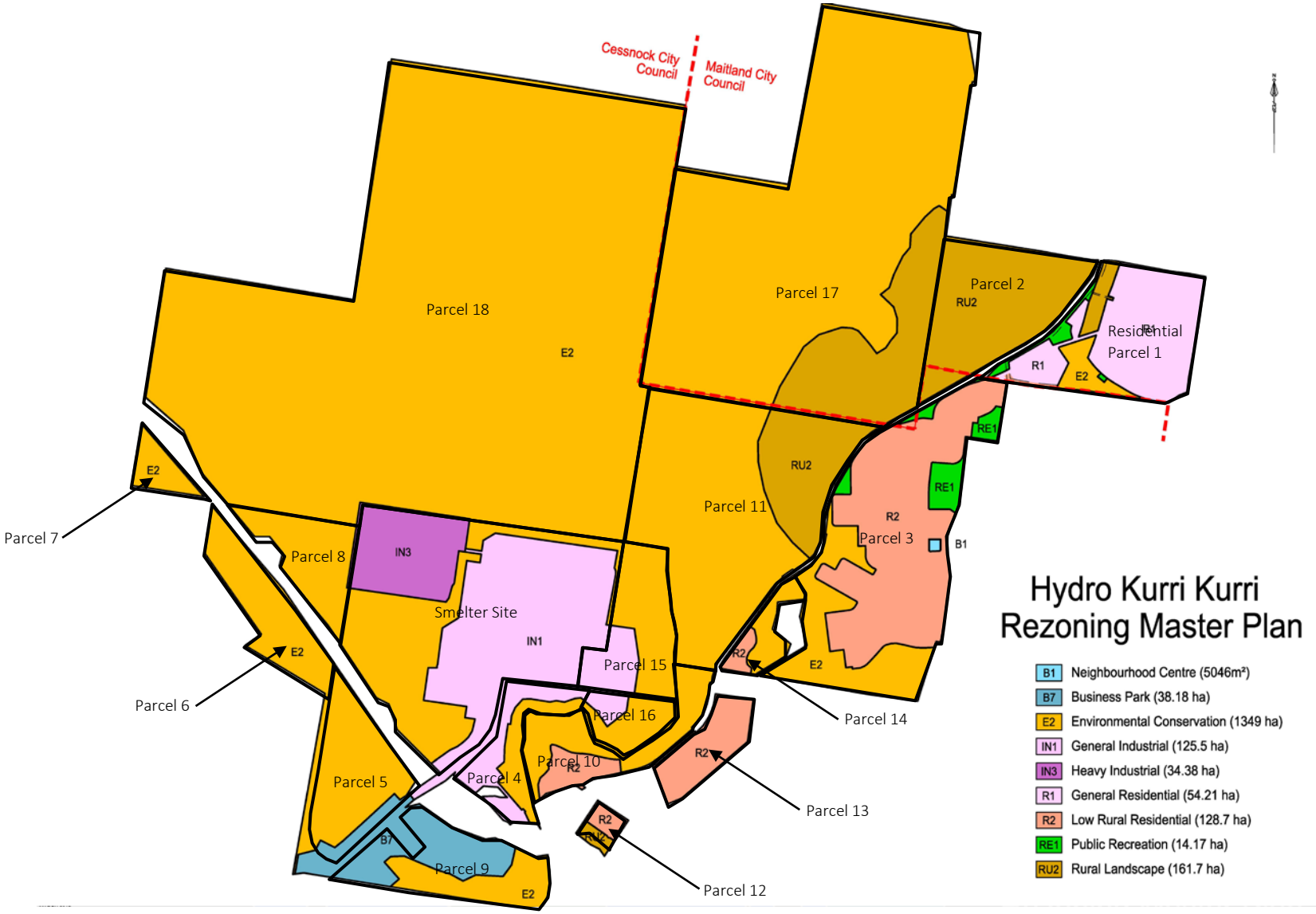
Parcel 9 - Site Location

ENVIRON

JOB NO: AS130347

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

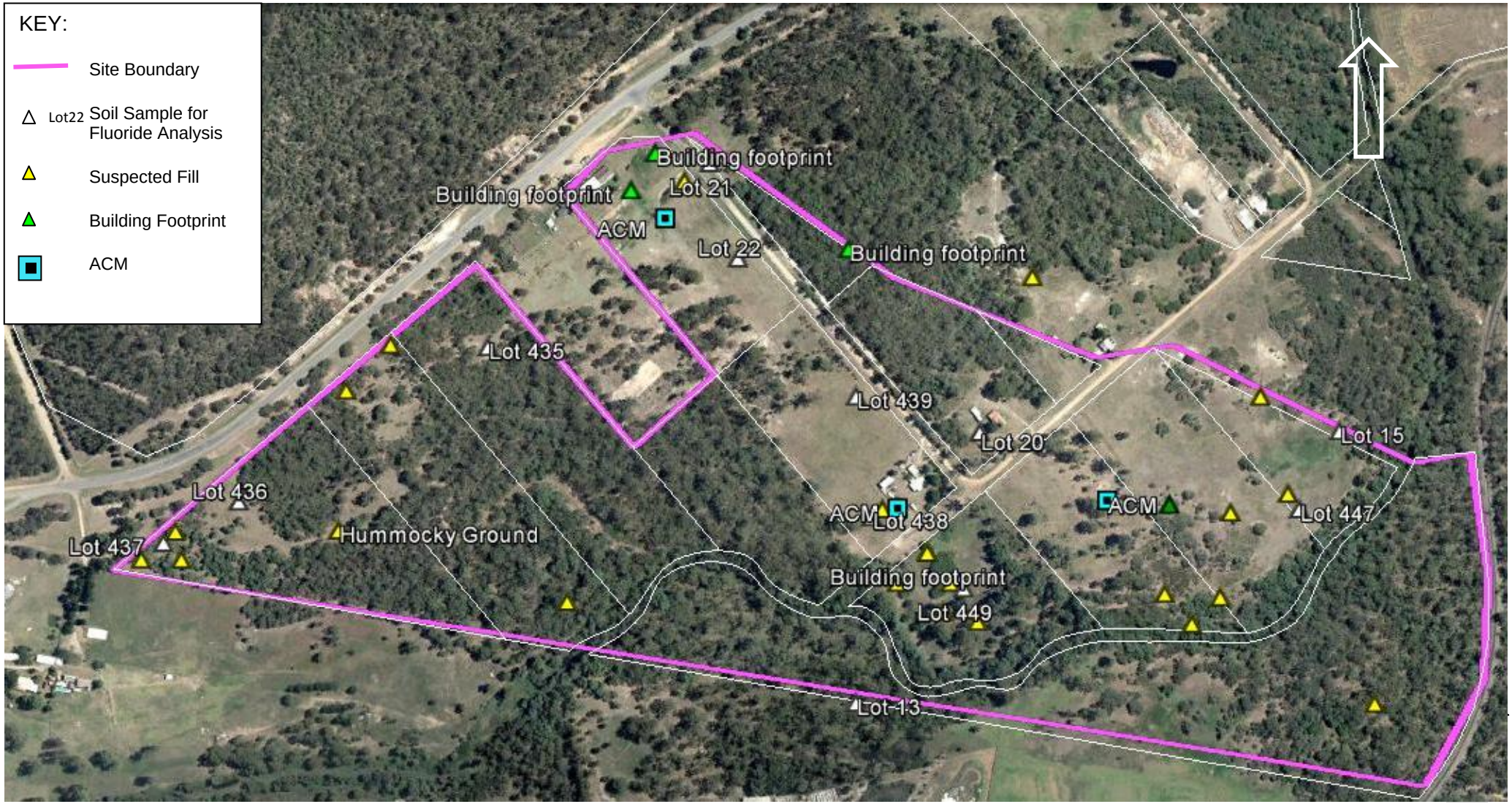
Land Parcels and Proposed Land Zoning

ENVIRON

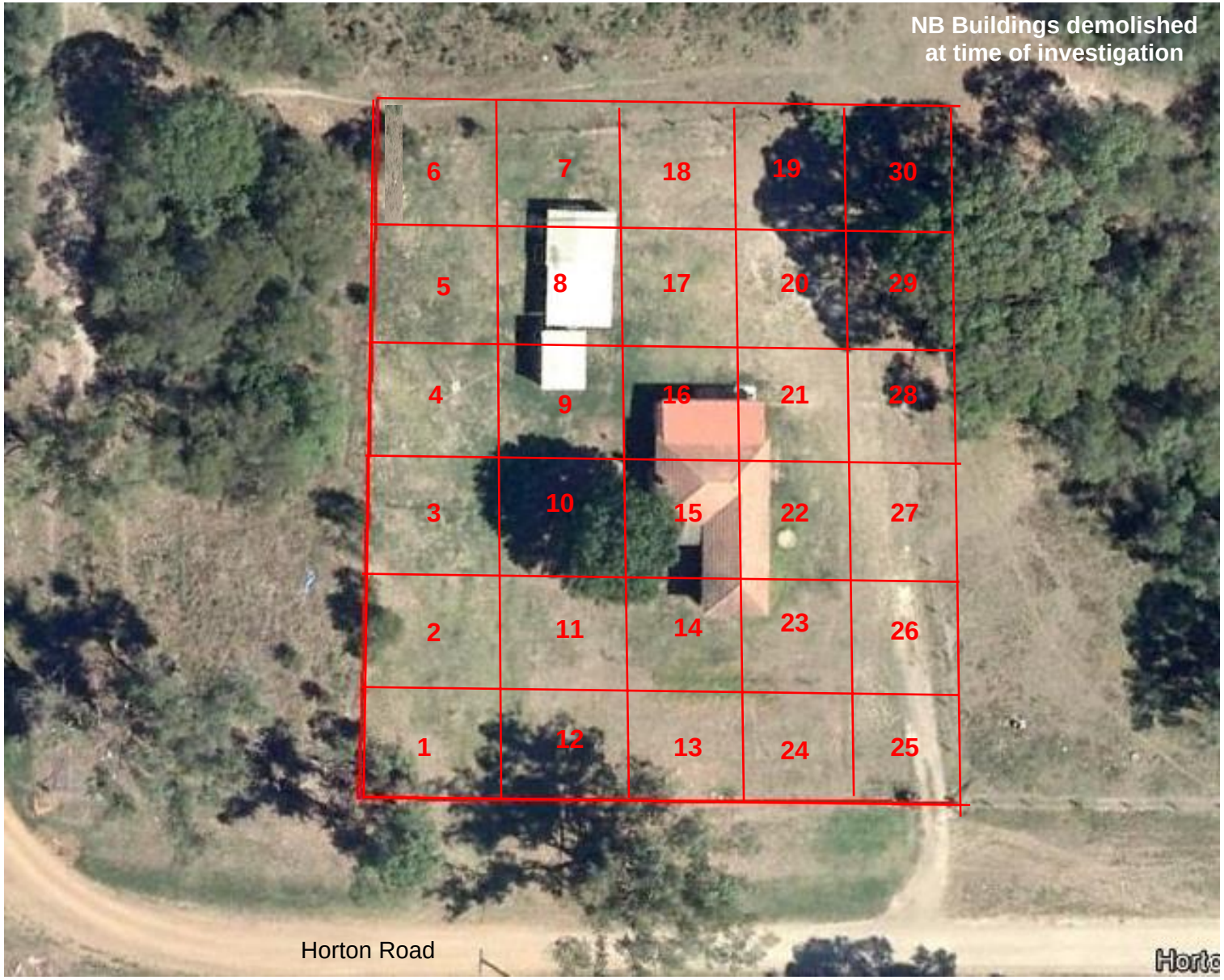
JOB NO: AS 130348

DATE: March 2015

FIGURE 2



Hydro Aluminium Kurri Kurri – Phase 2 Environmental Site Assessment Parcel 9		Site Layout and Surface Soil Locations/Areas of Concern
ENVIRON	JOB NO: AS130347	DATE: May 2014	FIGURE 3



Hydro Aluminium Kurri Kurri – Phase 2 Environmental Site Assessment Parcel 9

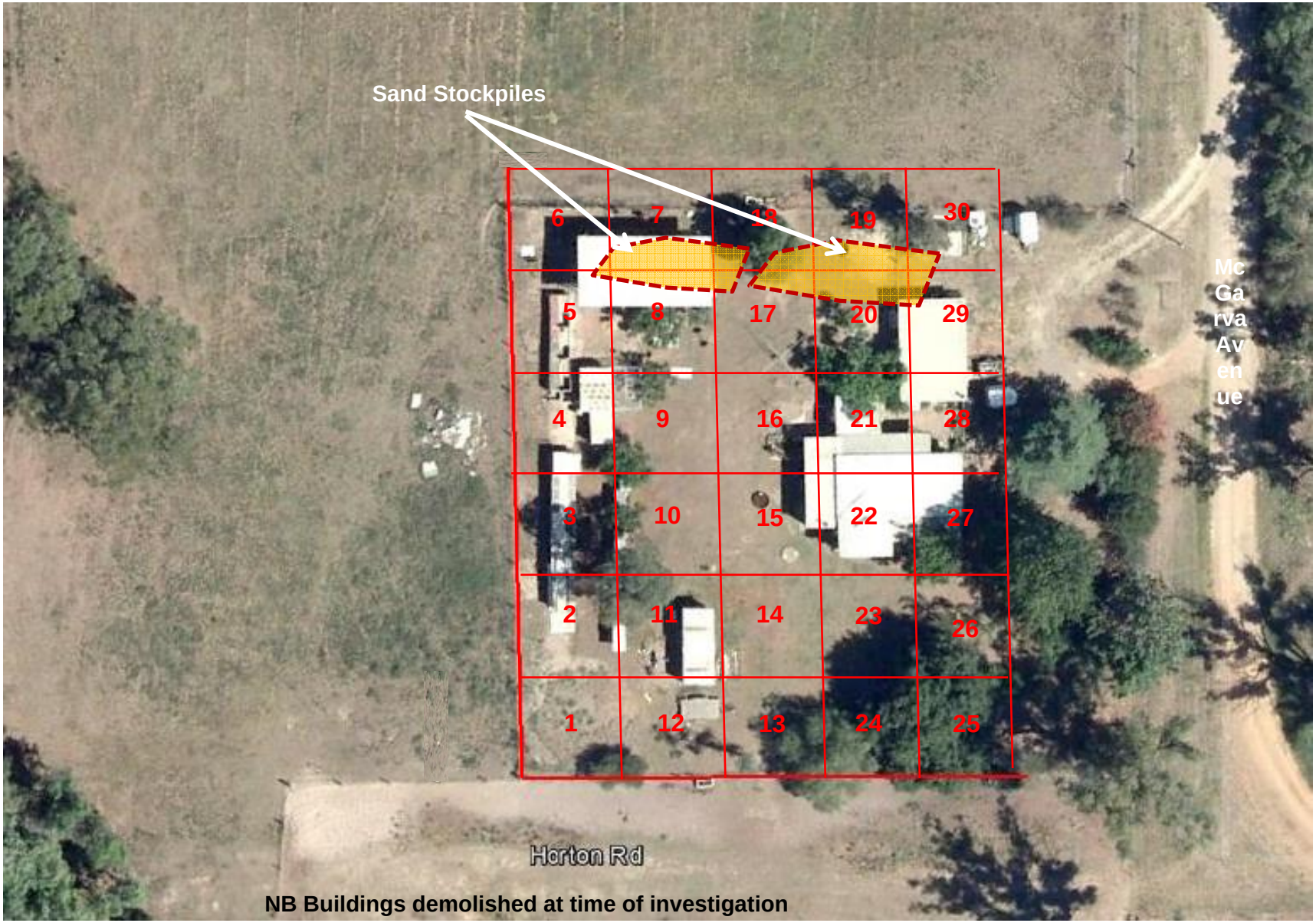
Lot 20 Grids

ENVIRON

JOB NO: AS130347

DATE: May 2014

FIGURE 4

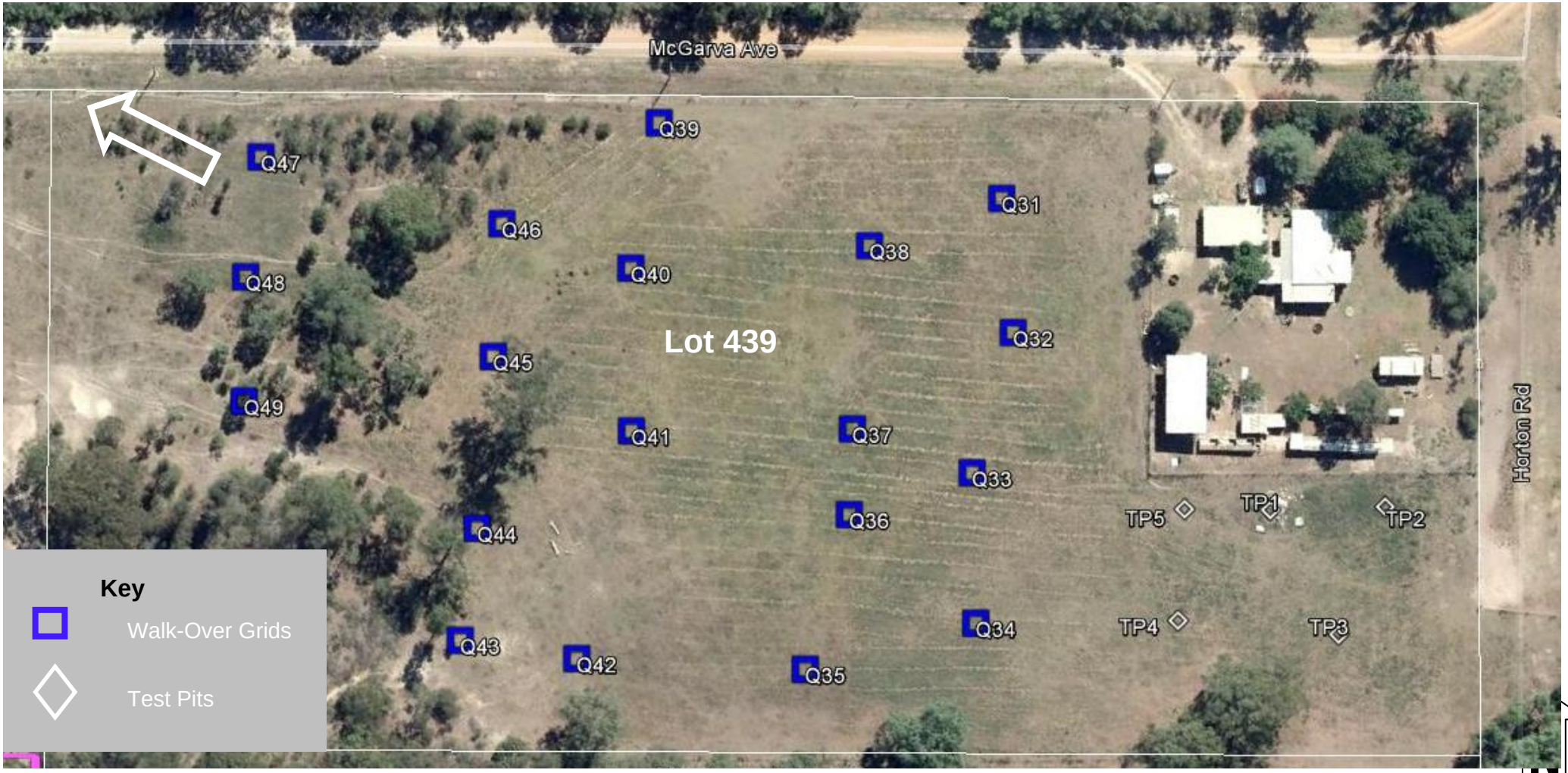


NB Buildings demolished at time of investigation

Hydro Aluminium Kurri Kurri – Phase 2 Environmental Site Assessment Parcel 9		Lot 439 Grids
ENVIRON	JOB NO: AS130347 DATE: May 2014	FIGURE 5

NB Buildings demolished at time of investigation

Hydro Aluminium Kurri Kurri – Phase 2 Environmental Site Assessment Parcel 9		Lot 20 Sampling Locations
ENVIRON	JOB NO: AS130347 DATE: May 2014	FIGURE 6



NB Buildings demolished at time of investigation

Hydro Aluminium Kurri Kurri – Phase 2 Environmental Site Assessment Parcel 9	Lot 439 Sampling Locations

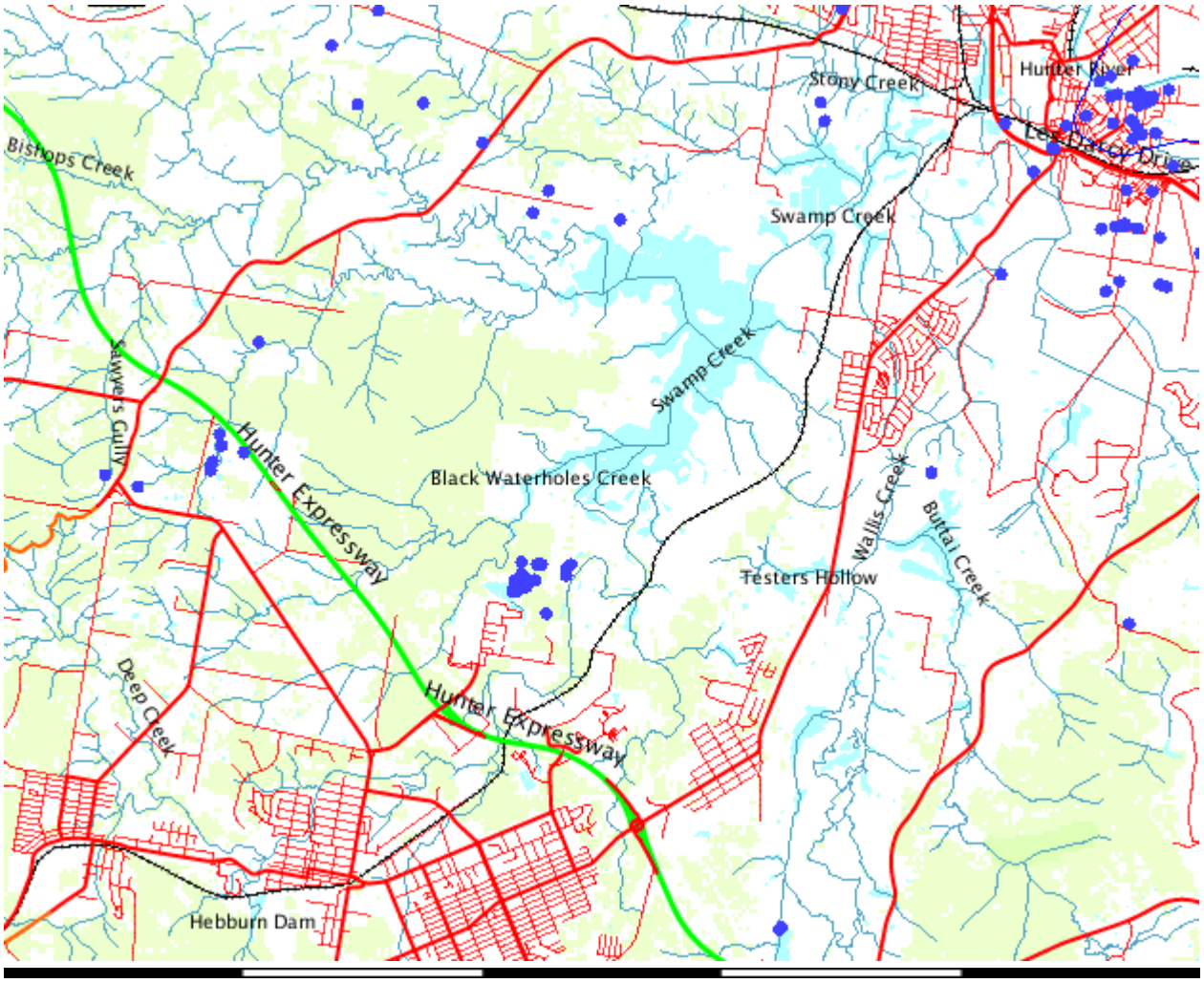
ENVIRON | JOB NO: AS130347 | DATE: May 2014 | FIGURE 7

Appendix A

Surrounding Groundwater Bores

Groundwater Bores near Parcel 9

Map created with NSW Natural Resource Atlas - http://www.nratlas.nsw.gov.au
Tuesday, January 07, 2014



0 13 Km

Legend

Symbol	Layer	Custodian
	Cities and large towns	
Cowra	Populated places	
	Towns	
	Groundwater Bores	
	Catchment Management Authority boundaries	
	Major rivers	
Primary/arterial road Motorway/freeway Railway Runway Contour Background	Topographic base map	

Groundwater Works Summary

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

Print Report

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

Work Requested -- GW079088

Works Details (top)

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

Site Details (top)

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

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

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

Print Report

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

Work Requested -- GW079090

Works Details (top)

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

Site Details (top)

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

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

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

Print Report

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

Work Requested -- GW079092

Works Details (top)

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

Site Details (top)

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

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

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

Print Report

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

Work Requested -- GW079093

Works Details (top)

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

Site Details (top)

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

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

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

Print Report

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

Work Requested -- GW079094

Works Details (top)

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

Site Details (top)

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

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

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

Print Report

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

Work Requested -- GW079096

Works Details (top)

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

Site Details (top)

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

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

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

Print Report

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

Work Requested -- GW079097

Works Details (top)

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

Site Details (top)

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

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

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

Print Report

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

Work Requested -- GW079099

Works Details (top)

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

Site Details (top)

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

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

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

Print Report

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

Work Requested -- GW079101

Works Details (top)

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

Site Details (top)

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

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

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

Print Report

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

Work Requested -- GW079102

Works Details (top)

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

Site Details (top)

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

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Groundwater Works Summary

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

Print Report

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

Work Requested -- GW079103

Works Details (top)

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

Site Details (top)

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

AMG-ZONE	56
COORD-SOURCE	
REMARK	

Form-A (top)

no details

Licensed (top)

no details

Water Bearing Zones (top)

no details

Drillers Log (top)

no details

Appendix B

Site Photographs

Photo 1: 9/10/13 Photograph of ACM fragments scattered across the concrete slab of the former building on Lot 448.

Photo 2: 9/10/13 Photograph of the concrete slab of the former building on Lot 448.

Photo 3: 9/10/13 Photograph showing the stock fences and old material stockpiles at the front of Lot 448.

Photo 4: 9/10/13 Photograph of a fill mound at the back of Lot 448.

Photo 5: 9/10/13 Photograph of a fill mound with broken concrete pieces visible at the back of Lot 448.

Photo 6: 10/10/13 Photograph of a fill mound and surface debris including old metal sheeting and a water tank on the middle portion of Lot 449.

Photo 7: 10/10/13 Photograph of an old car body in a gully near the creek at the rear of Lot 449.

Photo 8: Photograph of concrete pavers in what appears to be a garden area of the former residential dwelling at the front of Lot 449.

Photo 9: 10/10/13 Photograph of the front of Lot 449 where 2 ACM fragments were found on the area likely to be the former residential building footprint.

Photo 10: 10/10/13 Photograph looking towards Lot 439 from the front of Lot 449.

Photo 11: 9/10/13 Photograph of the front of Lot 447 where fill from adjacent construction of the Hunter Expressway has been placed on the Lot.

Photo 12: 9/10/13 Photograph taken at the rear of Lot 447 looking at small concrete building footings (foreground) and the fill that has been placed on the front of the Lot (background).

Photo 13: 9/10/13 Photograph of pooled water and grassed covered fill mounds at the rear of Lot 447.

Photo 14: 9/10/13 Photograph of a concrete slab for a former building at the rear of Lot 448 on the eastern boundary fenceline.

Photo 15: 9/10/13 Photograph of a large grassed over fill mound at the rear of Lot 447.

Photo 16: 10/10/13 Photograph of surface debris at the rear of Lot 438.

Photo 17: 10/10/13 Photograph of building rubble including ACM sheeting and fragments on Lot 439.

Photo 18: Lot 449?

Photo 19: 11/10/13 Photograph of old tyres from suspected flooding of the creek at the rear of Lot 436.

Photo 20: 11/10/13 Photograph of old timber and bricks in a fill mound at the front of Lot 437.

Photo 21: 11/10/13 Photograph of the extent of hummocky ground (extending to the vehicle in the background) on Lot 436 at the suspected location of the former municipal landfill.

Photo 22: 11/10/13 Photograph of an old car body in a gully on Lot 436.

Photo 23: 11/10/13 Photograph of metal scrap in a gully on Lot 436.

Photo 24: 11/10/13 Photograph of the front of Lot 15 where fill from adjacent construction of the Hunter Expressway has been placed.

Photo 25: 11/10/13 Photograph of the middle portion of Lot 15 where grassed over hummocky ground is evident.

Photo 26: 11/10/13 Photograph of the dilapidated tin shed on Lot 21.

Photo 27: 11/10/13 Photograph of surface debris on the front of Lot 21.

Photo 28: 10/10/13 Photograph of concrete slabs of suspected former kennels on the front of Lot 22.

Photo 29: 10/10/13 Photograph of a grassed over fill mound on the front of Lot 22.

Photo 30: 10/10/13 Photograph from the suspected former building footprint looking towards the front of Lot 22.One ACM fragment was found on the building footprint.

Appendix C

Field Information Sheets

Site Walkover Checklist

Project No.:	**Date and Time:** 11/10/13 13:55
Land Parcel: HPP	**Weather:**
Lot and DP: Lot 435 & 436 & 437	**Environ Personnel:** KW

Site Description

Topography	gentle slope towards creek @ rear of property but also undulating in part S/for slope towards Hart Rd for part of site.
Surface Geology	
Fill evident?	some
Hummocky ground?	yes lot 435 &/or 436? → larger area (bricks & metal sheet partially buried)
Structures on site?	–
Location of structures	–
Building materials used in structures	–
Asbestos debris on site?	–
Location of asbestos debris?	–
Volume of asbestos debris?	–

0-02m dry silt bracken, topsoil

→ ③F sample taken lot 436 – 151.46991°E, 32.80166°S

GPS Locations of Interest

Point of Interest	Easting	~~Northing~~ S
very small, old fill mounds, some asphalt →	151.47153°E	32.80026°S
old car body (4m accuracy) →	151.47083°E	32.80104°S
very old potential fill – soil → ↓ covered with bracken (photos also of fill mound ① & ②)	151.47106	32.80067°S

Description of Photographs Taken

large hummocky ground	151.47156	32.80141°S
metal scrap near gully	151.47097	32.80192
	151.47144	32.80198
tyres, debris along lot 437 S ~ boundary fence	151.47340	32.80256

(large area of hummocky ground) (24m, 20m)

lot 437 resident stated debris is from flooding

Miscellaneous Field Comments

Lot ~~436~~ 435

① F sample taken – 151.47256°E, 32.80028°S

0-01m – topsoil dry silt, light brown

② Lot 437 F-S sample – 151.46910°E, 32.80203°S 0-02m topsoil, dry silt, bracken

Small fill mound ① at surface on Lot 437 151.46929°E 32.80218°S metal sheeting, soil fence posts & wire (metal)

near trees ○ potential fill – very minor 151.46923°E 32.80193°S

bricks, soil, timber, fence wire, metal sheet ←

Small fill mound ② corner of Lot 437 near Hart Rd. 151.46886°E 32.80218°S

Site Walkover Checklist

Project No.:	**Date and Time:** 10/10/13 13:30
Land Parcel: 1	**Weather:** hot, strong wind
Lot and DP: ELP 9 Lot 438	**Environ Personnel:** KW

Site Description

Topography	gentle slope towards creek at rear of property
Surface Geology	
Fill evident?	Surface debris (1) bricks, tyres, metal sheet & (2) see below
Hummocky ground?	–
Structures on site?	–
Location of structures	–
Building materials used in structures	–
Asbestos debris on site?	yes surface debris (2)
Location of asbestos debris?	Immediately adjacent to Lot 439 fence
Volume of asbestos debris?	

GPS Locations of Interest

Point of Interest	Easting	~~Northing~~ S
Surface debris (1)	151.47692°	32.80239°
Surface debris (2) ACM fragments, ACM sheeting, timber planks, broken concrete bricks, pipe pieces, corrugated iron, metal roof sheet	151.47676	32.80173

Description of Photographs Taken

Surface debris (1) & (2)

Miscellaneous Field Comments

F Sample taken 0.02m – 151.47665°E 32.80180°S
topsoil – silt, brown, dry

Site Walkover Checklist

Project No.:	AS130347	**Date and Time:**	1/11/13
Land Parcel:	ELP 9	**Weather:**	Sunny
Lot and DP:	Lot 13 Pt2 finished	**Environ Personnel:**	KW, Glen (Hydro

Site Description	
Topography	Slope to creek at rear of lot
Surface Geology	
Fill evident?	
Hummocky ground?	yes - natural mound
Structures on site?	No
Location of structures	–
Building materials used in structures	–
Asbestos debris on site?	Not sighted
Location of asbestos debris?	–
Volume of asbestos debris?	–

GPS Locations of Interest		
Point of Interest	Easting	~~Northing~~ S
* natural mound near swamp reeds at the back of weston aluminium	151.47707°E	32.80375°S
* potential fill in gully near E creek (not on hydro land)	151.47439°E	32.80302°S

Description of Photographs Taken

Miscellaneous Field Comments

F sample – SF2 → 151.47648°E (4m accuracy)
32.80347°S
→ silty sand, brown with orrange mottling fine – topsoil

Site Walkover Checklist

Project No.: ~~AS~~	**Date and Time:** 9/10/13 13:40
Land Parcel: EL P9	**Weather:** Sunny, warm
Lot and DP: Lot 448	**Environ Personnel:** KW

Site Description	
Topography	gentle slope towards the creek at the near of the lot
Surface Geology	
Fill evident?	none observed -
Hummocky ground?	none observed
Structures on site?	former house & sheds (x2?) immediately SSE of house, fence structure immed. NE of house, stock fencing to the front of house
Location of structures	adjacent & NW of Horton Rd. (approx. 30m from Rd)
Building materials used in structures	fibro, tiles, bricks, hardstand & some floor surfaces still visible
Asbestos debris on site?	possibly
Location of asbestos debris?	house footprint
Volume of asbestos debris?	

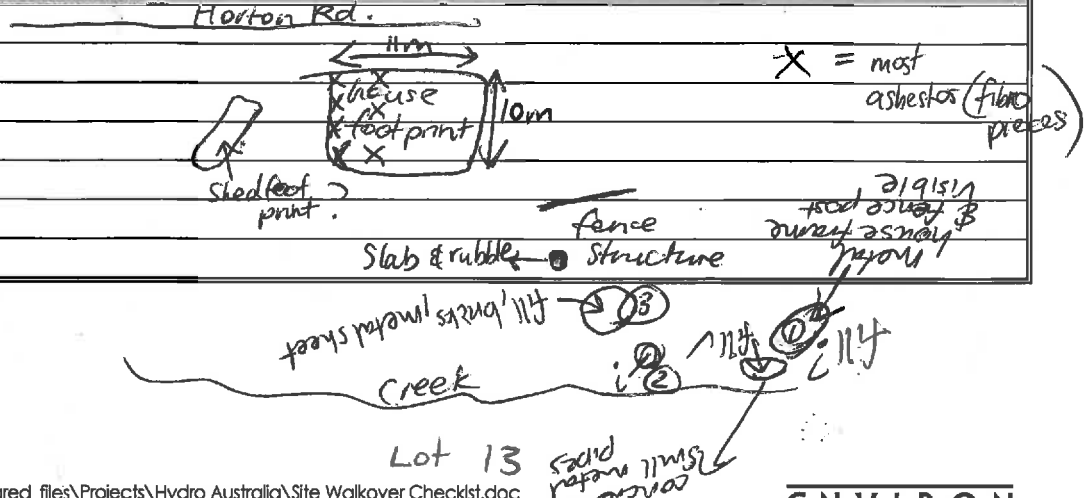
GPS Locations of Interest

Point of Interest	Easting	~~Northing~~ South
house footprint 5m accuracy	151.47916°E	32.80166°S
fill mound? (1)	151.48037	32.80252°
fill mound? (2)	151.48007	32.80276
fill mound (3) → 4m accuracy	151.47978	32.80249°S
→ slab & rubble	151.47983	32.80169

Description of Photographs Taken

shed (former)
fence structure
house footprint
demolition debri
Stock gates
fill mounds @ rear of property
Slab and rubble - (see GPS photos)

Miscellaneous Field Comments



ENVIRON

Site Walkover Checklist

Project No.:	**Date and Time:** 9/10/13
Land Parcel:	**Weather:**
Lot and DP: Lot 13	**Environ Personnel:** KW

Site Description	
Topography	steep embankment to creek, gentle upslope from creek
Surface Geology	
Fill evident?	possible – water pipes? or just tyre marks
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
fill / water pipes 9m accuracy	151·48070°	32·8087°S
small fill mound 4m accuracy	151·48201°	32·80347°S

Description of Photographs Taken

water access cement seals on adj. property
filled ground (suspected) or tyre tracks (wood chopping evident)
small fill mound – rail way visible here

Miscellaneous Field Comments

Site Walkover Checklist

Project No.:	**Date and Time:** 9/10/13 16:13
Land Parcel: EP 9	**Weather:**
Lot and DP: Lot 447	**Environ Personnel:** KW

Site Description

Topography	partially filled site by fwy. ~~Rear of property~~ inspected
Surface Geology	slopes towards creek @ rear
Fill evident?	yes
Hummocky ground?	yes
Structures on site?	former structures evident
Location of structures	immed. east of (rear of) fwy fill mound (near fill mound)
Building materials used in structures	concrete footings apparent
Asbestos debris on site?	none observed
Location of asbestos debris?	
Volume of asbestos debris?	

GPS Locations of Interest

Point of Interest	Easting	~~Northing~~ S.
concrete footings (5m accuracy)	~~32~~ 151.48048	32.80176
fill mound (P)		
pooled water & fill	151.48109	32.80159
~~fill & slab & rubble~~		

Description of Photographs Taken

Miscellaneous Field Comments

11/10/13 F sample taken & QA1
151.48121°E
32.80173°S
0-0.2m dry silt, topsoil, brown

Site Walkover Checklist

Project No.:	**Date and Time:** 10/10/13
Land Parcel: ELP 9	**Weather:** hot, sunny, very windy 12:00
Lot and DP: Lot 449	**Environ Personnel:** KW

Site Description	
Topography	gentle slope to creek at rear of property
Surface Geology	
Fill evident?	old car bodies
Hummocky ground?	yes
Structures on site?	yes
Location of structures	garden gate - mid rear of site in dense bracken fern area
Building materials used in structures	
Asbestos debris on site?	2 pieces - may have blown over from Lot 439
Location of asbestos debris?	-
Volume of asbestos debris?	-

GPS Locations of Interest

Point of Interest	Easting	~~Northing~~ S
Old car bodies 6m accuracy	151.47811	32.80293
Small or med fill mound (may extend S)	151.47741	32.80265
fill mound & gully	151.47778	32.80274
concrete paver/pipe 5m accuracy	151.47709	32.80218
old shed	151.47724	32.80212
very small fill mound	151.47749	32.80239

Description of Photographs Taken

old car bodies
fill mounds
concrete pavers
old shed? hardstand
very small fill mound under dense trees
house site seems to have been filled

Miscellaneous Field Comments

house footprint 10m x 10m 151.4778 (239) E 32.80189 S
2 pieces asbestos found

F sample taken → 32.802 44° S
151.4763° E

Appendix D

Results Tables

TABLE A: Soil Analytical Results - Grid Sampling

Sample Depth: 0.01m - 0.02m

Laboratory PQL: 1 mg/kg

Site Specific HIL - Fluoride: 17000mg/kg

Sampling Date	Sample Identification	Soluble Fluoride mg/kg (1:5 soil:water)
11/10/2013	ELP 9 - Lot 15	2
11/10/2013	ELP 9 - Lot 439	3
10/10/2013	ELP 9 - Lot 22	2
11/10/2013	ELP 9 - Lot 437	3
11/10/2013	ELP 9 - Lot 20	3
11/10/2013	ELP 9 - Lot 435	2
11/10/2013	ELP 9 - QA1	2
11/10/2013	ELP 9 - Lot 436	3
11/10/2013	ELP 9 - Lot 21	3
11/10/2013	ELP 9 - Lot 447	2
10/10/2013	ELP 9 - Lot 438	2
10/10/2013	ELP 9 - Lot 439	2
1/11/2013	ELP9 - Lot 13 SF2	20

Table B Soil Analytical Results - Asbestos

				Lot 439 Stockpile					Lot 439 Testpits					Lot 439 Stockpiles - Surface ACM	Lot 439 Quadrants - Surface ACM			Lot 448 - Building Footprint	Lot 22 Building Footprint - Surface ACM	Lot 449 Building Footprint - Surface ACM	Lot 20 Quadrants - Surface ACM			
Sample Identificatior	PQL	Guideline		ELP 9 - SP3	ELP 9 - SP4	ELP 9 - SP7	ELP 9 - SP8	ELP 9 - SP10	ELP 9 - TP2 (0-0.15)	ELP 9 - TP6 (0-0.15)	ELP 9 - TP7 (0-0.15)	ELP 9 - TP8 (0-0.15)	ELP 9 - TP9 (0-0.15)	ELP 9 Lot 439 - Stockpiles	ELP 9 Lot 439 - Q5	ELP 9 Lot 439 - Q1	ELP 9 Lot 439 - Q11	ELP 9 Lot 448-2	ELP 9 Lot 22 - 3	ELP 9 Lot 449 - 1	LP 9 Lot 20 - C	P 9 Lot 20 - C	LP 9 Lot 20 - Q1	ELP 9 Lot 20 - Q16
Sample Depth (m)																								
Date		HIL 'D' [A]		15/10/2013	15/10/2013	15/10/2013	15/10/2013	15/10/2013	15/10/2013	15/10/2013	15/10/2013	15/10/2013	15/10/2013	15/10/2013	14/10/2013	11/10/2013	14/10/2013	30/10/2013	10/10/2013	10/10/2013	10/10/2013	10/10/2013	10/10/2013	10/10/2013
Identification of Asbestos in bulk samples																								
Asbestos Detected				**Yes**	**Yes**	No	No	No	No	No	No	No	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Asbestos Type				Ch + Am + Cr	Ch + Am + Cr	-	-	-	-	-	-	-	-	**Ch + Am + Cr**	**Ch + Am + Cr**	**Ch + Am + Cr**	**Ch + Am + Cr**	**Ch + Am**	**Ch + Am**	**Ch + Am + Cr**	**Ch + Am + Cr**	**Ch + Am**	**Ch**	**Ch + Am + Cr**
Sample weight (dry)																								
Asbestos Quantification																								
Weight Used for % Calculation kg				0.486	0.452	0.553	0.484	0.558	0.509	0.426	0.457	0.478	0.434	-	-	-	-	-	-	-	-	-	-	-
Asbestos Containing Material - g				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-	-	-
Fibrous Asbestos - g				0.005	0.025	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	-	-	-	-	-	-	-	-	-	-
Asbestos Containing Material (as 15% Asbestos in ACM >7mm) - %		0.05%		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-	-	-	-	-	-	-	-
Asbestos Fines and Fibrous Asbestos (<7mm) - %		0.001%		**0.001**	**0.006**	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	-	-	-	-
Trace Asbestos Detected - %				No	No	No	No	No	No	No	No	No	No	-	-	-	-	-	-	-	-	-	-	-

All results are in mg/kg

[A] HIL D - commercial/industrial

Results shaded grey are in excess of the investigation criteria.

TABLE C: Soil Quality Assurance/ Quality Control Results

Sample Identification	ELP 9 - Lot 447	ELP 9 - QA1	RPD %
Sample Depth (m)	0-0.01		
Duplicate Type	Intralaboratory		
Sample Profile	TOPSOIL		
Sample collected by	KW		
Non Metallic Inorganics			
Fluoride	2	2	0

Note all units in mg/kg

BOLD identifies where RPD results

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

BOLD identified where blanks >0

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

Appendix E

Laboratory Reports

Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EN1303917**	Page	: 1 of 9
Amendment	: **1**		
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	: AS130347	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 24-OCT-2013
Sampler	: SC	Issue Date	: 19-FEB-2014
Site	: ----		
		No. of samples received	: 32
Quote number	: SY/433/13	No. of samples analysed	: 32

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Christopher Owler	Team Leader - Asbestos	Newcastle - Asbestos

General Comments

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

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

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

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

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

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

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

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

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	ELP 9 - SP3	ELP 9 - SP4	ELP 9 - SP7	ELP 9 - SP8	ELP 9 - SP10
				Client sampling date / time	15-OCT-2013 15:00	15-OCT-2013 15:00	15-OCT-2013 15:00	15-OCT-2013 15:00	15-OCT-2013 15:00
Compound	CAS Number	LOR	Unit		EN1303917-001	EN1303917-002	EN1303917-003	EN1303917-004	EN1303917-005
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples									
Asbestos Detected	1332-21-4	0.1	g/kg		**Yes**	**Yes**	**No**	**No**	**No**
Asbestos Type	1332-21-4	-	--		**Ch + Am + Cr**	**Ch + Am + Cr**	**-**	**-**	**-**
Sample weight (dry)	----	0.01	g		**486**	**452**	**553**	**484**	**558**
APPROVED IDENTIFIER:	----	-	--		**C.OWLER**	**C.OWLER**	**C.OWLER**	**C.OWLER**	**C.OWLER**
EA200Q: Asbestos Quantification (non-NATA)									
Weight Used for % Calculation	----	0.0001	kg		**0.486**	**0.452**	**0.553**	**0.484**	**0.558**
Asbestos Containing Material	1332-21-4	0.1	g		<0.1	<0.1	<0.1	<0.1	<0.1
Fibrous Asbestos	----	0.002	g		**0.005**	**0.025**	<0.002	<0.002	<0.002
Asbestos Containing Material (as 15% Asbestos in ACM >7mm)	1332-21-4	0.01	%		<0.01	<0.01	<0.01	<0.01	<0.01
Asbestos Fines and Fibrous Asbestos (<7mm)	1332-21-4	0.001	%		**0.001**	**0.006**	<0.001	<0.001	<0.001
Trace Asbestos Detected	----	5	Fibres		**No**	**No**	**No**	**No**	**No**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	ELP 9 - TP2 (0-0.15)	ELP 9 - TP6 (0-0.15)	ELP 9 - TP7 (0-0.15)	ELP 9 - TP8 (0-0.15)	ELP 9 - TP9 (0-0.15)
				Client sampling date / time	15-OCT-2013 15:00	15-OCT-2013 15:00	15-OCT-2013 15:00	15-OCT-2013 15:00	15-OCT-2013 15:00
Compound	CAS Number	LOR	Unit		EN1303917-006	EN1303917-007	EN1303917-008	EN1303917-009	EN1303917-010
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples									
Asbestos Detected	1332-21-4	0.1	g/kg		**No**	**No**	**No**	**No**	**No**
Asbestos Type	1332-21-4	-	--		**-**	**-**	**-**	**-**	**-**
Sample weight (dry)	----	0.01	g		**509**	**426**	**457**	**478**	**434**
APPROVED IDENTIFIER:	----	-	--		**C.OWLER**	**C.OWLER**	**C.OWLER**	**C.OWLER**	**C.OWLER**
EA200Q: Asbestos Quantification (non-NATA)									
Weight Used for % Calculation	----	0.0001	kg		**0.509**	**0.426**	**0.457**	**0.478**	**0.434**
Asbestos Containing Material	1332-21-4	0.1	g		<0.1	<0.1	<0.1	<0.1	<0.1
Fibrous Asbestos	----	0.002	g		<0.002	<0.002	<0.002	<0.002	<0.002
Asbestos Containing Material (as 15% Asbestos in ACM >7mm)	1332-21-4	0.01	%		<0.01	<0.01	<0.01	<0.01	<0.01
Asbestos Fines and Fibrous Asbestos (<7mm)	1332-21-4	0.001	%		<0.001	<0.001	<0.001	<0.001	<0.001
Trace Asbestos Detected	----	5	Fibres		**No**	**No**	**No**	**No**	**No**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	ELP 9 Lot 22 - 3	ELP 9 Lot 449 - 1	ELP 9 Lot 20 - Q9	ELP 9 Lot 20 - Q14	ELP 9 Lot 20 - Q22
				Client sampling date / time	10-OCT-2013 15:00	10-OCT-2013 15:00	10-OCT-2013 15:00	10-OCT-2013 15:00	10-OCT-2013 15:00
Compound	CAS Number	LOR	Unit		EN1303917-012	EN1303917-013	EN1303917-014	EN1303917-015	EN1303917-016
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples									
Asbestos Detected	1332-21-4	0.1	g/kg		**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Asbestos Type	1332-21-4	-	--		**Ch + Am**	**Ch + Am + Cr**	**Ch + Am + Cr**	**Ch + Am**	**Ch**
Sample weight (dry)	----	0.01	g		**7.99**	**303**	**628**	**145**	**61.7**
APPROVED IDENTIFIER:	----	-	--		**C.OWLER**	**C.OWLER**	**C.OWLER**	**C.OWLER**	**C.OWLER**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	ELP 9 Lot 20 - Q16	ELP 9 Lot 439 - Stockpiles	ELP 9 Lot 439 - Q5	ELP 9 Lot 439 - Q1	ELP 9 Lot 439 - Q11
				Client sampling date / time	10-OCT-2013 15:00	15-OCT-2013 15:00	14-OCT-2013 15:00	11-OCT-2013 15:00	14-OCT-2013 15:00
Compound	CAS Number	LOR	Unit		EN1303917-017	EN1303917-018	EN1303917-019	EN1303917-020	EN1303917-021
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples									
Asbestos Detected	1332-21-4	0.1	g/kg		**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Asbestos Type	1332-21-4	-	--		**Ch + Am + Cr**	**Ch + Am + Cr**	**Ch + Am + Cr**	**Ch + Am + Cr**	**Ch + Am + Cr**
Sample weight (dry)	----	0.01	g		**134**	**153**	**308**	**5.83**	**351**
APPROVED IDENTIFIER:	----	-	--		**C.OWLER**	**C.OWLER**	**C.OWLER**	**C.OWLER**	**C.OWLER**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	ELP 9 - Lot 15	ELP 9 - Lot 439	ELP 9 - Lot 22	ELP 9 - Lot 437	ELP 9 - Lot 20
			Client sampling date / time	11-OCT-2013 15:00	11-OCT-2013 15:00	10-OCT-2013 15:00	11-OCT-2013 15:00	11-OCT-2013 15:00
Compound	CAS Number	LOR	Unit	EN1303917-022	EN1303917-023	EN1303917-024	EN1303917-025	EN1303917-026
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	**1.2**	**1.6**	<1.0
EK040S: Fluoride Soluble								
Fluoride	16984-48-8	1	mg/kg	**2**	**3**	**2**	**3**	**3**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	ELP 9 - Lot 435	ELP 9 - QA1	ELP 9 - Lot 436	ELP 9 - Lot 21	ELP 9 - Lot 447
				Client sampling date / time	11-OCT-2013 15:00	11-OCT-2013 15:00	11-OCT-2013 15:00	11-OCT-2013 15:00	11-OCT-2013 15:00
Compound	CAS Number	LOR	Unit		EN1303917-027	EN1303917-028	EN1303917-029	EN1303917-030	EN1303917-031
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1.0	%		**1.8**	**1.1**	<1.0	**2.0**	**1.5**
EK040S: Fluoride Soluble									
Fluoride	16984-48-8	1	mg/kg		**2**	**2**	**3**	**3**	**2**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	ELP 9 - Lot 438	ELP 9 - Lot 439	----	----	----
			Client sampling date / time	10-OCT-2013 15:00	10-OCT-2013 15:00	----	----	----
Compound	CAS Number	LOR	Unit	EN1303917-032	EN1303917-033	----	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	**1.5**	**1.5**	----	----	----
EK040S: Fluoride Soluble								
Fluoride	16984-48-8	1	mg/kg	**2**	**2**	----	----	----

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	ELP 9 - SP3 - 15-OCT-2013 15:00	Pale grey - brown sandy soil with one small friable and degraded fragment of asbestos fibre board approximately 5 x 3 x 2 mm.
EA200: Description	ELP 9 - SP4 - 15-OCT-2013 15:00	Pale grey - brown sandy soil with two small friable and degraded pieces of asbestos fibre board approximately 5 x 3 x 3 mm.
EA200: Description	ELP 9 - SP7 - 15-OCT-2013 15:00	Pale brown sandy soil with a trace of charcoal and vegetation.
EA200: Description	ELP 9 - SP8 - 15-OCT-2013 15:00	Pale brown sandy soil with a trace of charcoal and vegetation.
EA200: Description	ELP 9 - SP10 - 15-OCT-2013 15:00	Pale brown sandy soil with a trace of charcoal and vegetation.
EA200: Description	ELP 9 - TP2 (0-0.15) - 15-OCT-2013 15:00	Mid grey - brown sandy soil with some slag grains and a trace of vegetation.
EA200: Description	ELP 9 - TP6 (0-0.15) - 15-OCT-2013 15:00	Mid grey sandy soil with some charcoal plus a trace of vegetation
EA200: Description	ELP 9 - TP7 (0-0.15) - 15-OCT-2013 15:00	Pale brown sandy soil with some vegetation
EA200: Description	ELP 9 - TP8 (0-0.15) - 15-OCT-2013 15:00	Pale grey sandy soil plus a trace of charcoal and vegetation
EA200: Description	ELP 9 - TP9 (0-0.15) - 15-OCT-2013 15:00	Pale brown clay soil with a trace of charcoal and vegetation
EA200: Description	ELP 9 Lot 22 - 3 - 10-OCT-2013 15:00	Two pieces of heavily degraded organic fibre board plus one piece of bonded asbestos cement sheeting approximately 30 x 25 x 5 mm.
EA200: Description	ELP 9 Lot 449 - 1 - 10-OCT-2013 15:00	Several pieces of bonded asbestos cement sheeting approximately 120 x 100 x 5 mm with one piece of cement sheeting.
EA200: Description	ELP 9 Lot 20 - Q9 - 10-OCT-2013 15:00	Several pieces of bonded asbestos cement sheeting approximately 140 x 55 x 5 mm.
EA200: Description	ELP 9 Lot 20 - Q14 - 10-OCT-2013 15:00	Several pieces of bonded asbestos cement sheeting approximately 82 x 75 x 5 mm.
EA200: Description	ELP 9 Lot 20 - Q22 - 10-OCT-2013 15:00	Several pieces of bonded asbestos cement sheeting approximately 75 x 50 x 7 mm plus one piece of white plaster board.
EA200: Description	ELP 9 Lot 20 - Q16 - 10-OCT-2013 15:00	Several pieces of bonded asbestos cement sheeting approximately 60 x 45 x 5 mm.
EA200: Description	ELP 9 Lot 439 - Stockpiles - 15-OCT-2013 15:00	Several pieces of bonded asbestos cement sheeting approximately 95 x 90 x 6 mm plus several pieces of organic fibre board.
EA200: Description	ELP 9 Lot 439 - Q5 - 14-OCT-2013 15:00	Several pieces of bonded asbestos cement sheeting approximately 170 x 100 x 5 mm.
EA200: Description	ELP 9 Lot 439 - Q1 - 11-OCT-2013 15:00	Two pieces of bonded asbestos cement sheeting approximately 35 x 25 x 5 mm.
EA200: Description	ELP 9 Lot 439 - Q11 - 14-OCT-2013 15:00	Several pieces of bonded asbestos cement sheeting approximately 90 x 70 x 5 mm plus several pieces of cement sheeting.

Environmental

QUALITY CONTROL REPORT

Work Order	: **EN1303917**	Page	: 1 of 4
Amendment	: **1**		
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	: AS130347	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 24-OCT-2013
Sampler	: SC	Issue Date	: 19-FEB-2014
Order number	: ----		
		No. of samples received	: 32
Quote number	: SY/433/13	No. of samples analysed	: 32

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*
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
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%.

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: 3127412)									
EN1303917-024	ELP 9 - Lot 22	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	1.2	1.5	28.5	No Limit
ES1323204-002	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	16.1	16.7	3.7	0% - 50%
EK040S: Fluoride Soluble (QC Lot: 3137258)									
EN1303917-022	ELP 9 - Lot 15	EK040S: Fluoride	16984-48-8	1	mg/kg	2	2	0.0	No Limit
EN1303917-031	ELP 9 - Lot 447	EK040S: Fluoride	16984-48-8	1	mg/kg	2	2	0.0	No Limit

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EK040S: Fluoride Soluble (QCLot: 3137258)								
EK040S: Fluoride	16984-48-8	1.0	mg/kg	<1	25.0 mg/kg	115	69	117

Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK040S: Fluoride Soluble (QCLot: 3137258)							
EN1303917-022	ELP 9 - Lot 15	EK040S: Fluoride	16984-48-8	25.0 mg/kg	113	70	130

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

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

Sub-Matrix: **SOIL**

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	MSD	Low	High	Value	Control Limit
EK040S: Fluoride Soluble (QCLot: 3137258)										
EN1303917-022	ELP 9 - Lot 15	EK040S: Fluoride	16984-48-8	25.0 mg/kg	113	----	70	130	----	----

Environmental

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EN1303917**	Page	: 1 of 6
Amendment	: **1**		
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	: AS130347	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 24-OCT-2013
Sampler	: SC	Issue Date	: 19-FEB-2014
Order number	: ----		
		No. of samples received	: 32
Quote number	: SY/433/13	No. of samples analysed	: 32

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) ELP 9 - Lot 22, ELP 9 - Lot 438, ELP 9 - Lot 439	**10-OCT-2013**	**----**	----	----	**25-OCT-2013**	24-OCT-2013	×
Pulp Bag (EA055-103) ELP 9 - Lot 15, ELP 9 - Lot 439, ELP 9 - Lot 437, ELP 9 - Lot 20, ELP 9 - Lot 435, ELP 9 - QA1, ELP 9 - Lot 436, ELP 9 - Lot 21, ELP 9 - Lot 447	**11-OCT-2013**	**----**	----	----	**25-OCT-2013**	25-OCT-2013	✓
EA200: AS 4964 - 2004 Identification of Asbestos in bulk samples							
Pulp Bag (EA200) ELP 9 Lot 22 - 3, ELP 9 Lot 449 - 1, ELP 9 Lot 20 - Q9, ELP 9 Lot 20 - Q14, ELP 9 Lot 20 - Q22, ELP 9 Lot 20 - Q16	**10-OCT-2013**	**---**	08-APR-2014	----	**04-NOV-2013**	03-MAY-2014	✓
Pulp Bag (EA200) ELP 9 Lot 439 - Q1	**11-OCT-2013**	**---**	09-APR-2014	----	**04-NOV-2013**	03-MAY-2014	✓
Pulp Bag (EA200) ELP 9 Lot 439 - Q5, ELP 9 Lot 439 - Q11	**14-OCT-2013**	**---**	12-APR-2014	----	**04-NOV-2013**	03-MAY-2014	✓
Pulp Bag (EA200) ELP 9 Lot 439 - Stockpiles	**15-OCT-2013**	**---**	13-APR-2014	----	**04-NOV-2013**	03-MAY-2014	✓
Soil Glass Jar - Unpreserved (EA200) ELP 9 - SP3, ELP 9 - SP4, ELP 9 - SP7, ELP 9 - SP8, ELP 9 - SP10, ELP 9 - TP2 (0-0.15), ELP 9 - TP6 (0-0.15), ELP 9 - TP7 (0-0.15), ELP 9 - TP8 (0-0.15), ELP 9 - TP9 (0-0.15)	**15-OCT-2013**	**---**	13-APR-2014	----	**04-NOV-2013**	03-MAY-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
EK040S: Fluoride Soluble							
Pulp Bag (EK040S) ELP 9 - Lot 22, ELP 9 - Lot 438, ELP 9 - Lot 439	**10-OCT-2013**	**04-NOV-2013**	17-OCT-2013	×	**04-NOV-2013**	02-DEC-2013	✓
Pulp Bag (EK040S) ELP 9 - Lot 15, ELP 9 - Lot 439, ELP 9 - Lot 437, ELP 9 - Lot 20, ELP 9 - Lot 435, ELP 9 - QA1, ELP 9 - Lot 436, ELP 9 - Lot 21, ELP 9 - Lot 447	**11-OCT-2013**	**04-NOV-2013**	18-OCT-2013	×	**04-NOV-2013**	02-DEC-2013	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Fluoride - Soluble	EK040S	2	12	**16.7**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Moisture Content	EA055-103	2	19	**10.5**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Fluoride - Soluble	EK040S	1	12	**8.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Fluoride - Soluble	EK040S	1	12	**8.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Fluoride - Soluble	EK040S	1	12	**8.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

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

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

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

Regular Sample Surrogates

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

Outliers : Analysis Holding Time Compliance

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

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
EA055: Moisture Content						
Pulp Bag ELP 9 - Lot 22, ELP 9 - Lot 438, ELP 9 - Lot 439	----	----	----	25-OCT-2013	24-OCT-2013	**1**
EK040S: Fluoride Soluble						
Pulp Bag ELP 9 - Lot 22, ELP 9 - Lot 438, ELP 9 - Lot 439	04-NOV-2013	17-OCT-2013	**18**	----	----	----
Pulp Bag ELP 9 - Lot 15, ELP 9 - Lot 439, ELP 9 - Lot 437, ELP 9 - Lot 20, ELP 9 - Lot 435, ELP 9 - QA1, ELP 9 - Lot 436, ELP 9 - Lot 21, ELP 9 - Lot 447	04-NOV-2013	18-OCT-2013	**17**	----	----	----

Outliers : Frequency of Quality Control Samples

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

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

Appendix F

QA/QC Assessment

APPENDIX F

DATA QUALITY OBJECTIVES

To ensure that reliable data of adequate type was collected and assessed for the investigation, the seven-step Data Quality Objective (DQO) approach, endorsed in the NSW DEC (2006) Guidelines for the NSW Site Auditor Scheme 2nd Edition, will be adopted. The DQOs set quality assurance and quality control parameters for the field and laboratory programs to ensure data of appropriate reliability will be used to assess the environmental conditions at Parcel 9.

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

Step 1 – State the Problem

The Phase 1 ESA, indicate that Parcel 9 formed part of the land that was divided into 25 acre lots for returned soldiers prior to the construction of the smelter. The main farming activity on the rural residential properties was small scale poultry farming. Two large scale poultry farms were also located in this area. Houses located in the Buffer Zone have been demolished over the years, generally with remaining wastes buried at the property. These areas may be impacted with asbestos fragments resulting from onsite burial of wastes or poor demolition practices. This use of Parcel 9 requires confirmation via a site walkover and potentially 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 9 consistent with site observations?
- Has Parcel 9 been impacted by fluoride from dust deposition from the Hydro smelter?
- Has Parcel 9 been impacted by other contaminants?
- Is Parcel 9 suitable for Business Park (B7) and environmental conservation (E2) landuse?

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

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

- A site walkover, including collection of field notes and photographs;
- Results of surface soil samples collected for fluoride analysis;

- Results of other soil samples from fill/ hummocky ground collected for suitable analysis during the site walkover;
- Proposed land use;
- Appropriate NSW contamination guidelines.

Step 4 – Define the Study Boundaries

Spatial boundaries - the study boundaries have been defined as the spatial boundary of Parcel 9, as shown on Figure 1.

Vertical boundaries – as areas of concern at Parcel 9 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.

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 9 for Business Park (B7) and environmental conservation (E2) landuse, then an assessment of the suitability of Parcel 9 for Business Park (B7) and environmental conservation (E2) 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 9 for Business Park (B7) and environmental conservation (E2) 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 9.

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 5.3. 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 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)

Table A: Data Quality Indicators			
DQI	**Field**	**Laboratory**	**Acceptability Limits**
Representativeness	Appropriate media sampled Relevant media sampled	All samples analysed according to SOPs	
Precision	Collection of duplicate samples Sampling methodologies appropriate and complied with	Analysis of: Blind duplicate samples at rate of 1 in 10 samples Split duplicate samples at rate of 1 in 20 samples Laboratory duplicate samples	 RPD of 30 to 50% RPD of 30 to 50% RPD of 30 to 50%
Accuracy	Sampling methodologies appropriate and complied with.	Analysis of: Method blanks Matrix spikes Surrogate spikes Laboratory control samples Reagent blanks Reference material	 Non-detect 70 to 130% 70-130% 70 to 130%

QUALITY ASSURANCE AND QUALITY CONTROL

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

Table A: QA/QC – Sampling and Analysis Methodology Assessment	
Sampling Methodology	**ENVIRON Assessment**
Sampling Pattern and Locations	Surface soil sampling was undertaken on a grid pattern across Parcel 9 to assess the impact of particulate fallout from Hydro Aluminium Smelter. Across Lots 20 and 439, a total of 10 test pits were excavated around the former residential footprints and samples taken from the top 200mm for analysis for asbestos fines. A further 10 samples were taken from the soil stockpiles on Lot 439. Five samples from the stockpiles and five shallow soil samples from the test pits were analysed for asbestos fines.
Sampling Density	12 soil samples were collected for soluble fluoride analysis from a grid across the entire area of Parcel 9 which is approximately 43 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. Ten samples were collected from the Lot 439 stockpile (approx

Table A: QA/QC – Sampling and Analysis Methodology Assessment	
Sampling Methodology	**ENVIRON Assessment**
	150m^3).
Sample depths	Surface soil samples were collected from a grid across the entire of Parcel 9 from the soil surface. Samples were collected from stockpiles up to 1 to 1.5m depth (in stockpile) and from 0 to 0.2m depth.
Sample Collection Method	Surface soil fluoride samples across Parcel 9 were collected directly from the ground surface 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 paper bags laboratory supplied, acid rinsed glass jars. Asbestos soil samples were collected from backhoe pits using a trowel to excavate samples from the pit wall. Stockpile samples were collected from the centre of the backhoe bucket (away from the sides of the bucket). Soil samples were collected into laboratory supplied, acid rinsed glass jars.
Decontamination Procedures	Surface soil samples across Parcel 9 were collected directly from the ground surface using dedicated disposable gloves and a hand trowel. The hand trowel was brushed clean prior to sample collection. A hand trowel was also used to collect samples for asbestos analysis from backhoe pits. The hand trowel was brushed clean prior to sample collection.
Sample handling and containers	All soil samples were placed into laboratory-supplied paper bags (fluoride) or laboratory supplied, acid rinsed glass jars asbestos). 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 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 B: 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 fluoride analysed for the grid samples across the

Table B: QA/QC – Field and Lab Quality Assurance and Quality Control	
Field and Lab QA/QC	**ENVIRON Comments**
	entire of Parcel 9. No rinsate blank samples were collected.
Field quality control results	Intra-laboratory duplicate results are presented in Table B. There were no RPD exceedences for the intra-laboratory duplicates collected for this assessment.
NATA registered laboratory and NATA endorsed methods	ALS was used as the primary laboratory. ALS laboratory certificates are NATA stamped and the lab is accredited for the analyses performed for this assessment.
Analytical methods	A summary of analytical methods were included in the laboratory test certificates.
Holding times	Review of the COCs and laboratory certificates indicate that holding times were met.
Practical Quantitation Limits (PQLs)	PQLs for all soil analytes were below Parcel 9 assessment criteria.
Laboratory quality control samples	Laboratory quality control samples including duplicates, laboratory control samples, matrix spikes, surrogate spikes and blanks were undertaken by the laboratories at appropriate frequencies.
Laboratory quality control results	All results for laboratory soil duplicates, laboratory control samples, matrix spikes and surrogates were acceptable and no detections were made in blank samples.

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

Appendix G

VENM Assessment

ORIGINAL: to be completed by landowner and given to waste transporter

- NOTICE UNDER SECTION 143 –

PROTECTION OF THE ENVIRONMENT OPERATIONS ACT 1997

Warning: If you sign this notice it could be used as a defence by a transporter if they deposit waste on your land. It does not give you a defence.

1. I (*full name*) .....

am the owner and occupier (*delete if not applicable*) of (*insert address and folio identification number of place*):

Horton Road Stockpile (refer to attached drawings)

PARCELID = 446 & 447//755231
TYPE = 013
LOT = 446 & 447
PLAN = 755231
NAME = Hydro Aluminium Kurri Kurri Pty Ltd

I certify that this place can lawfully be used as a waste facility for the **types** and **amounts** of waste and the **uses** set out in the table below. (*Note that you must clearly state the exact type and amount. Do not use terms like "fill" or "clean fill".*)

TYPE e.g. uncontaminated soil	**AMOUNT** e.g. less than 50 tonnes	**USES** e.g. storage, disposal
..... Virgin Excavated Natural Material	..... 40000BCM	..... Permanent Stockpile

2. The place can lawfully be used for the types and amounts of waste described in 2. above BECAUSE (*Delete if not applicable*):

A. This use is permitted by EPA waste facility licence number ..... in force until .....

This use is permitted by EPA waste activity licence number ..... in force until .....

An EPA waste facility or waste activity licence is not required.

AND BECAUSE (*Delete if not applicable*):

B. The place has development consent from the local council for the uses described in 2. above.

The place can be used as a waste facility without development consent.

BEFORE SIGNING THIS NOTICE YOU SHOULD READ THE BACK OF THIS FORM FOR IMPORTANT INFORMATION ABOUT OFFENCES.

Signature (s) .....

Name .....

Date .....

* Approved 8 July 1999

Information about this notice

Waste is a very broad concept under the law and covers many types of materials you may not think of as waste; for example, it covers used tyres, construction and demolition materials and clean fill.

Similarly, a waste facility under the law includes any premises used for storage, treatment, reprocessing, sorting or disposal of waste. If for example you are planning to build a road or dam, or fill a gully, this could involve using your place as a waste facility.

If you sign a section 143 notice under the Protection of the Environment Operations Act, the notice could be used as a defence by a transporter if they illegally dump waste on your land. It does not give you a defence and could make you liable under the Act.

A signed notice should be given to the transporter or displayed at the place referred to in the notice. If you sign and give a transporter this notice, the transporter should keep the original and you should keep a copy.

If the landowner or occupier providing this notice is a company, the full name of the company should be used and the notice must be certified in accordance with the Corporations Law.

Waste that can be accepted without an EPA waste facility or waste activity licence

You do not need an EPA waste facility or waste activity licence to store, treat, reprocess, sort or dispose of virgin excavated natural material being: clay, gravel, sand, rock or soil that is not contaminated or mixed with any other type of waste. You may still require development consent from your local council to do this.

If you are not sure of what is in the waste, don't accept it. Note, contamination is not always apparent; for example, biological contamination.

If you want to accept building and demolition waste you should first check with your local council **and** the EPA about their requirements for your site. Most sites, particularly in the Sydney metropolitan area, require a licence from the EPA **and** consent from the local council to accept building and demolition waste. This applies even when the building and demolition material is being used for landscaping and site works.

If you operate an unlicensed landfill site for business or commercial purposes you should contact the EPA to discuss reporting requirements.

If you are not sure if you require an EPA licence you can ring Pollution Line on 131 555.

If you are not sure if you require development consent you can contact your local council.

PROTECTION OF THE ENVIRONMENT OPERATIONS ACT 1997

It is an offence against the Protection of the Environment Operations Act to:

1. Occupy a scheduled waste facility without a waste facility licence

2. Carry out a scheduled waste activity without a waste activity licence

Offences carry a maximum penalty of $120,000 for an individual and $250,000 for a corporation.

COPY: **to be completed by landowner and kept for records**

- NOTICE UNDER SECTION 143 –

PROTECTION OF THE ENVIRONMENT OPERATIONS ACT 1997

Warning: If you sign this notice it could be used as a defence by a transporter if they deposit waste on your land. It does not give you a defence.

3. I (*full name*) .....

am the owner and occupier (*delete if not applicable*) of (*insert address and folio identification number of place*):

Horton Road Stockpile (refer to attached drawings)

PARCELID = 446 & 447//755231
TYPE = 013
LOT = 446 & 447
PLAN = 755231
NAME = Hydro Aluminium Kurri Kurri Pty Ltd

I certify that this place can lawfully be used as a waste facility for the **types** and **amounts** of waste and the **uses** set out in the table below. (*Note that you must clearly state the exact type and amount. Do not use terms like "fill" or "clean fill".*)

TYPE e.g. uncontaminated soil	**AMOUNT** e.g. less than 50 tonnes	**USES** e.g. storage, disposal
..... Virgin Excavated Natural Material	..... 40000BCM	..... Permanent Stockpile

4. The place can lawfully be used for the types and amounts of waste described in 2. above BECAUSE (*Delete if not applicable*):

C. This use is permitted by EPA waste facility licence number ..... in force until .....

This use is permitted by EPA waste activity licence number ..... in force until .....

An EPA waste facility or waste activity licence is not required.

AND BECAUSE (*Delete if not applicable*):

D. The place has development consent from the local council for the uses described in 2. above.

The place can be used as a waste facility without development consent.

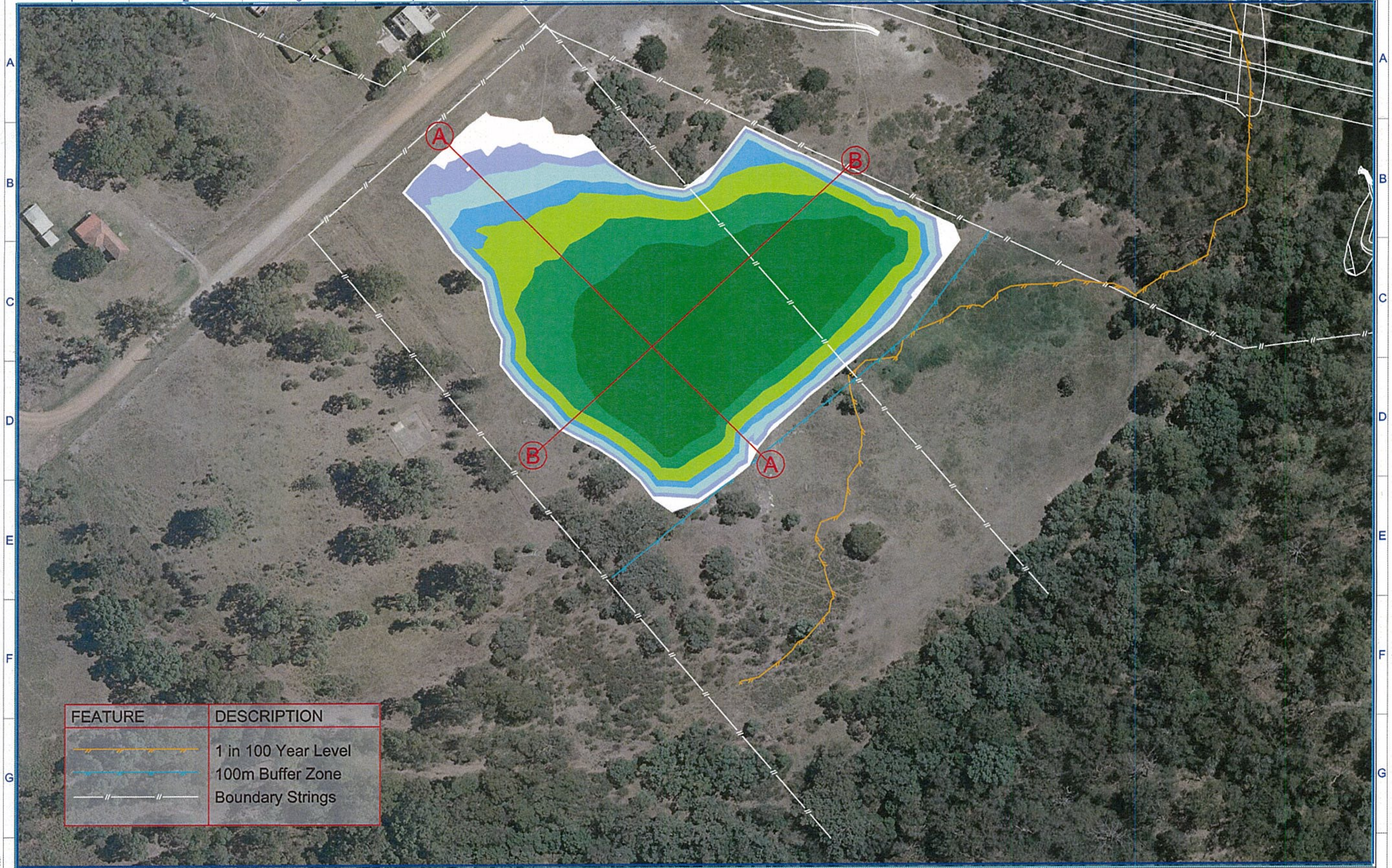
BEFORE SIGNING THIS NOTICE YOU SHOULD READ THE BACK OF THIS FORM FOR IMPORTANT INFORMATION ABOUT OFFENCES.

Signature (s) .....

Name .....

Date .....

*** Approved 8 July 1999**



REV	ZONE	AMENDMENTS	APP'D	DATE	GENERAL NOTES / REFERENCES
					© Abigroup

ABIGROUP CONTRACTORS
Hunter Expressway D&C
1054 Old Maitland Road, Sawyers Gully, NSW, 2326
Ph 02 4015 4000 Fax 02 4015 4001

SURVEYED / DRAWN BY: Dan Ripley
CHECKED:
VERIFIED:
SCALE: 1200

PLOT DATE: Thu Aug 22 16:31:15 2013
LOCATION:

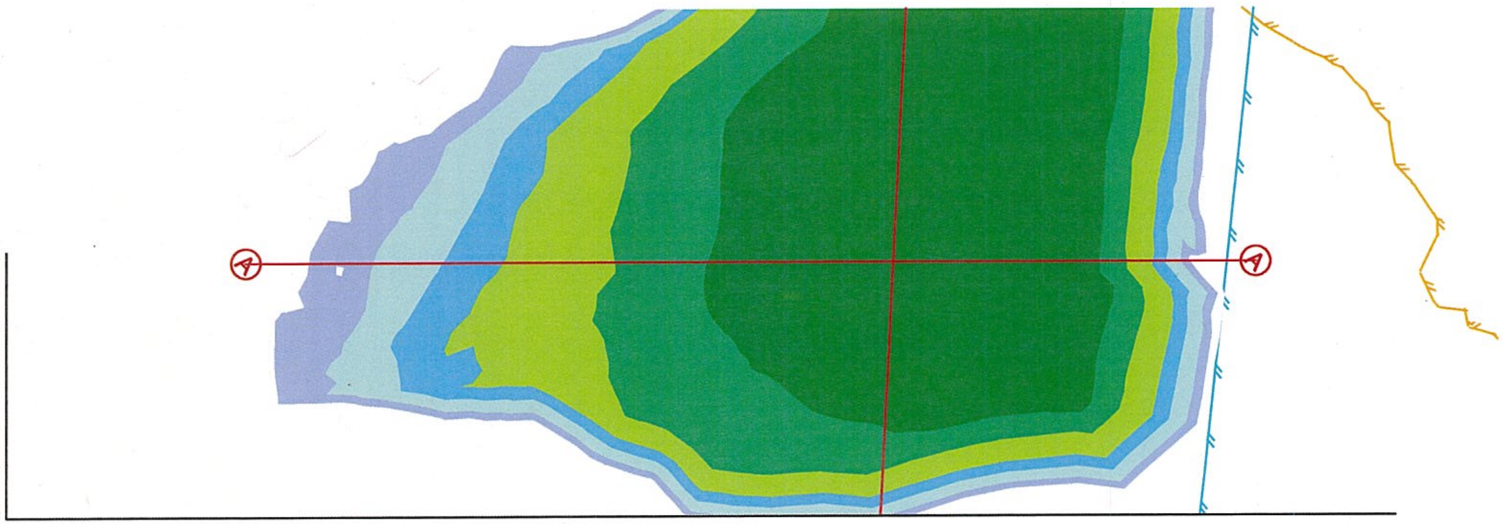
Hunter Expressway

40,000 bcm Horton Pile

DRAWING STATUS:
DRAWING No.: DR-HEX-375
REV.:

Project: 130822 Horton 40000 pile

ABIGROUP STANDARD DRAWING (DATUM 13/06/2007)



Datum 5

Chainages	Height	Foundation
0		17.049
5	0.025	16.919
10	0.197	16.779
15	0.213	16.803
20	0.475	16.581
25	0.809	16.286
30	0.924	16.211
35	1.195	15.981
40	1.449	15.766
45	1.724	15.531
50	2.049	15.246
55	2.305	15.030
60	2.570	14.805
65	2.993	14.422
70	3.247	14.208
75	3.559	13.935
80	3.807	13.727
85	3.986	13.588
90	4.265	13.349
95	4.551	13.102
100	4.769	12.924
105	4.909	12.824
110	5.083	12.691
115	5.267	12.552
120	5.475	12.388
125	5.656	12.251
130	5.339	12.236
135	3.968	12.211
140	2.774	12.080
145	1.589	11.956
150	0.463	11.783
155	-0.030	11.113
160		10.755
162		10.780

Section A - A

HRZ SCALE 1 : 550

VERT SCALE 1 : 550

REV	ZONE	AMENDMENTS	APP'D	DATE

GENERAL NOTES / REFERENCES

Abigroup
ABIGROUP CONTRACTORS
Hunter Expressway D&C
1054 Old Maitland Road, Sawyers Gully, NSW, 2326
Ph 02 4015 4000 Fax 02 4015 4001

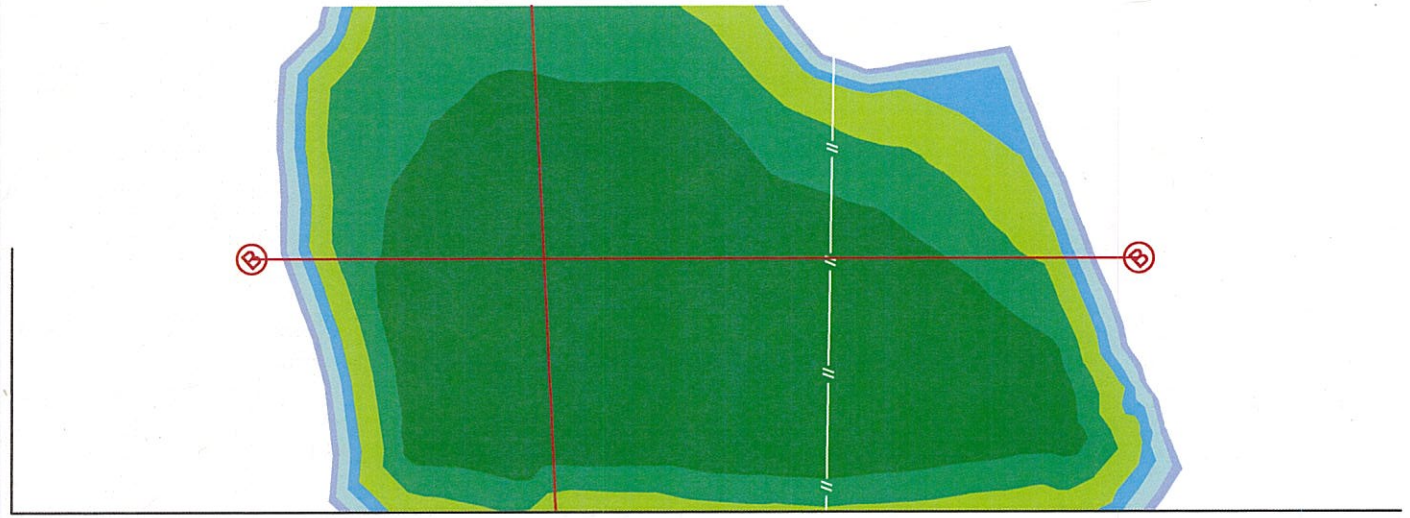
SURVEYED / DRAWN BY: Dan Ripley
CHECKED:
VERIFIED:
SCALE: 1500

PLOT DATE: Thu Aug 22 16:49:15 2013
LOCATION :

Hunter Expressway
Section A - A

DRAWING STATUS:
DRAWING No.: DR-HEX-375
REV.:

Project: 130822 Horton 40000 pile



Datum 7

Chainages	Height	Foundation
0		14.299
5	0.226	14.120
10	1.513	13.955
15	2.859	13.733
20	3.487	13.624
25	3.826	13.466
30	4.137	13.318
35	4.381	13.153
40	4.629	13.023
45	4.839	12.884
50	4.943	12.796
55	5.081	12.691
60	5.259	12.547
65	5.211	12.628
70	5.128	12.744
75	4.938	12.823
80	4.781	12.824
85	4.727	12.835
90	4.645	12.953
95	4.464	13.123
100	4.170	13.318
105	3.867	13.519
110	3.604	13.679
115	3.258	13.921
120	2.866	14.214
125	2.500	14.481
130	1.581	14.583
135	0.293	14.595
140		14.653
142		14.668

Section B - B

HRZ SCALE 1 : 550

VERT SCALE 1 : 550

REV	ZONE	AMENDMENTS	APP'D	DATE

GENERAL NOTES / REFERENCES

ABIGROUP CONTRACTORS
Hunter Expressway DAC
1064 Old Maitland Road, Sawyers Gully, NSW, 2329
Ph 02 4015 4000 Fax 02 4015 4001

SURVEYED / DRAWN BY: Dan Ripley
CHECKED:
VERIFIED:
SCALE: 1500

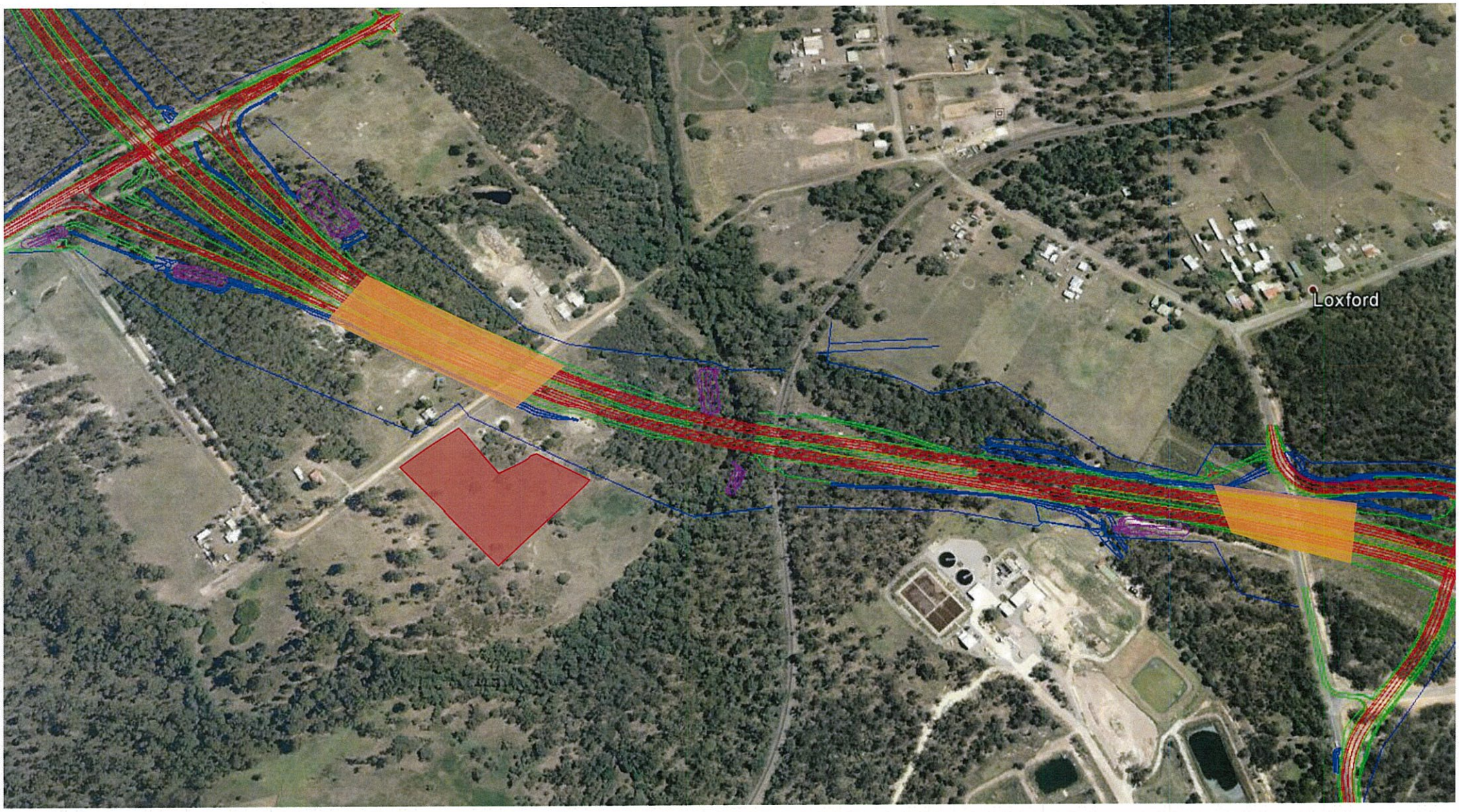
PLOT DATE: Thu Aug 22 16:51:27 2013 LOCATION :

Hunter Expressway
Section B - B

DRAWING STATUS:
DRAWING No.: DR-HEX-375
REV.

ABIGROUP STANDARD DRAWING EDITION 13/04/2007

Project: 130022 Horton 40000 pile



Abigroup Constructing Australia's Future Hunter Expressway Kurri Kurri to Branxton	Date: 26-11-13 Rev: 1	**Drawing Description:** Traceability diagram of VENM to Horton Road Stockpile (Hydro Aluminium)	**Key:** Source of Excavated Natural Material sent to Horton Road Stockpile (Hydro Aluminium) Location of Horton Road Stockpile (Hydro Aluminium)

Friday, 13 July 2012

Environmental
Compliance
Solutions

PO Box 2335 Greenhills NSW 2323
P (02) 4028 6412 F (02) 4028 6413 E mail@vgt.com.au
www.vgt.com.au ABN 79 103 636 353

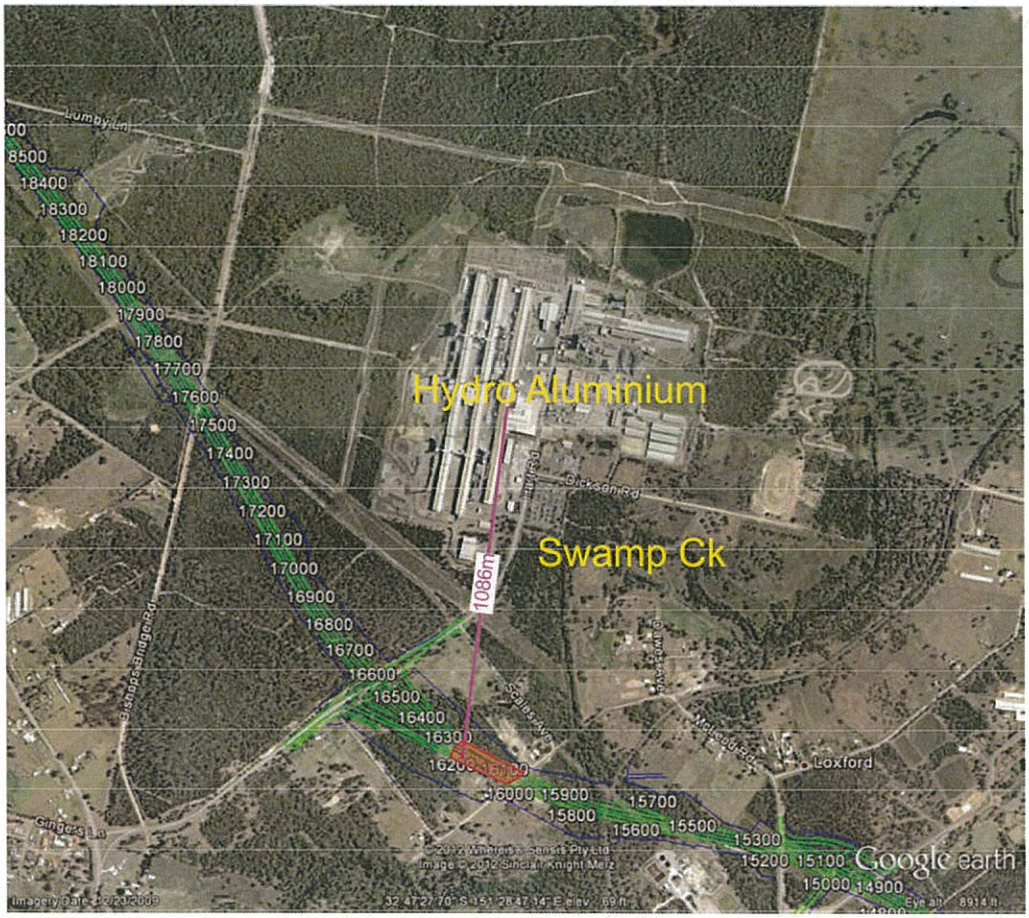
Abigroup Contractors Pty Ltd
PO Box 47
Greta NSW 2334
ATTN: Mr Hari Corliss

RE: MATERIAL INSPECTION-VALIDATION OF SITE NW FROM HORTON RD, LOXFORD, NSW.

Dear Mr Corliss,

As requested, VGT Pty Ltd has inspected the above site on the 11th July 2012, to evaluate the status of the insitu material for the purposes of determining whether it comprises of Virgin Excavated Natural Material (VENM).

The site is a section of land north west from Horton Road, Loxford, NSW that had been cleared for the purpose of constructing the Hunter Expressway by Abigroup Contractors Pty Ltd.



1. Site Location (red)

According to the topography map (Cessnock Sheet), the site is within the alluvial sediments of Swamp Creek. Geologically the site is mapped as Quaternary sands, from a dune or beach environment. (Geology Sheet) (Thomson, 2012).

The material observed at the site was a yellow-gold sand, unconsolidated and highly erodible. This corroborates the mapping data and confirms that the material observed is in-situ. The soil profile is clear and developed. The established and mature nature of the surrounding vegetation indicates that the material is undisturbed. Access to the site was limited due to recent rainfall and an excavator was not available for test pits.

1. Soil Profile

2. Soil Profile and Sand

3. Approx. Area to be Excavated

4. Close up of In-situ Sand

Given the nature of the activities onsite, it is possible that contamination of the VENM could occur during excavation and loading activities. Care should be taken to ensure no ENM or any imported material becomes mixed in the truck used to relocate the VENM material.

In summary, whilst no formal sampling and analysis was conducted, VGT Pty Ltd has identified the sand material to be Virgin Excavated Natural Material (VENM). This is acceptable according to the EPA's "Waste Classification Guidelines- Part 1: Classifying Waste'.

We trust the above meets with your requirements. Should you have any questions please don't hesitate to contact me on 02 4028 6412.

Regards,

Lisa Thomson

for VGT Pty Ltd

BAppSc (Chem) Hons.

Works Cited

Cessnock Sheet. (n.d.). Cessnock 1:25,000 sheet 9132-2N, NSW.
Geology Sheet. (n.d.). Newcastle Coalfields Regional Geology 1:100,000 Sheet 9231, NSW.
Thomson, G. (2012, July 13). Geology of Site.
Google Maps

Thursday, 9th May 2013

vgt
Environmental
Compliance
Solutions

PO Box 2335 Greenhills NSW 2323 E mail@vgt.com.au
P (02) 4028 6412 F (02) 4028 6413 www.vgt.com.au ABN 79 103 636 353

Abigroup Contractors Pty Ltd
Hunter Expressway group
PO Box 47
Greta NSW 2334
ATTN: John Wiggers de Vries

Our Ref: AH130509

RE: MATERIAL INSPECTION-VALIDATION FOR ROAD WORKS AT KURRI KURRI, SITE REF CHAINAGE 15160 TO 15330.

Dear John,

Background: As requested, Terry Walker from VGT Pty Ltd has inspected the above site on the 9th May 2013. The client was advised that geologist Greg Thomson was unavailable and due to time constraints our technician inspected the site, then liaised with Greg to evaluate the stratum, for the purposes of determining whether it comprises of Virgin Excavated Natural Material (VENM).

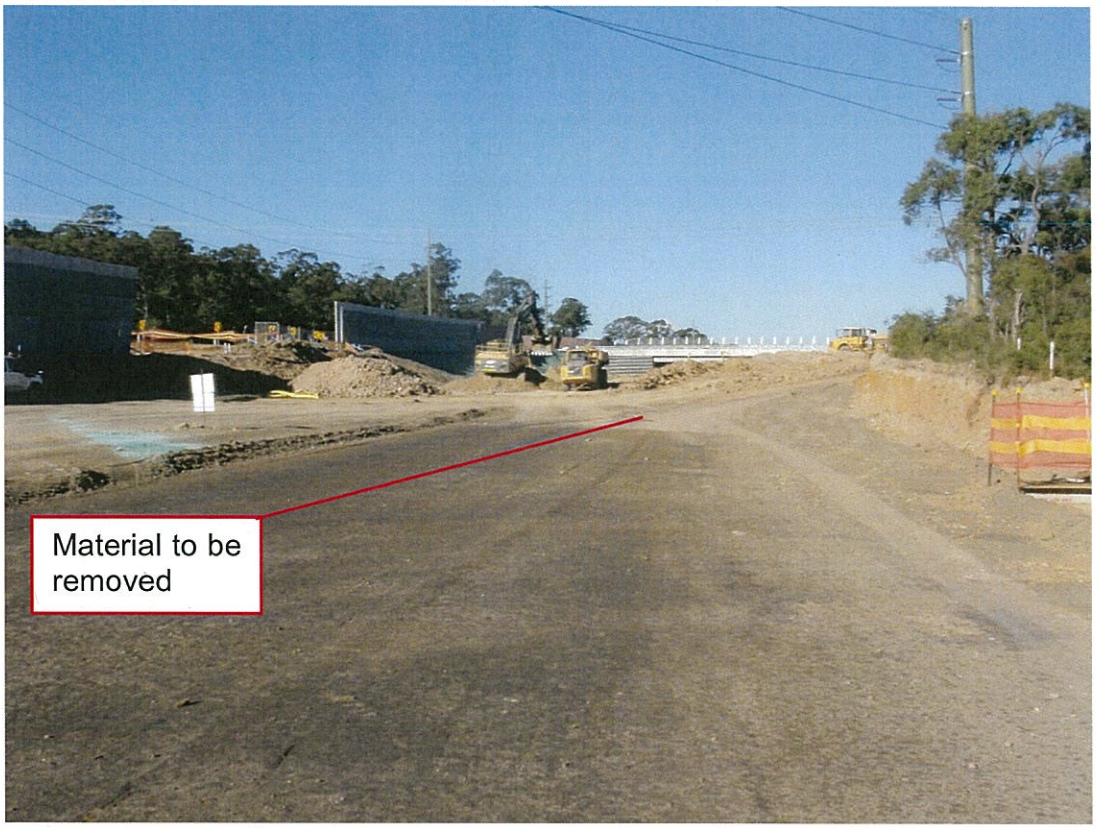
Location: The site is located approximately 2Km north of Kurri Kurri and west of Heddon Greta. The site is identified by Abigroup as Chainage 15160 to 15330 and is adjacent to McLeod Rd between Bowditch Ave to the north and the entrance to Kurri Kurri TAFE.

Geology: The site is underlain by the claystones and sandstones of the Dalwood group, which were laid down around 250 million years ago. The site is not highlighted on the Cessnock City Council Acid Sulphate Soils maps.

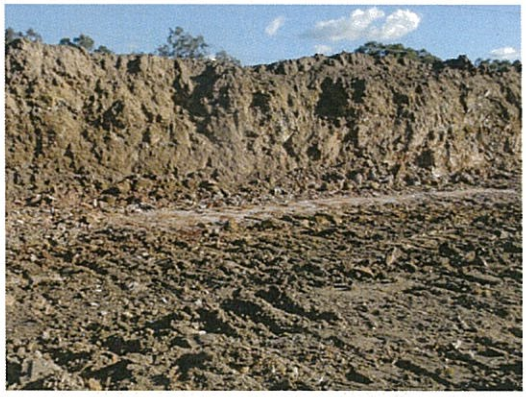
Purpose of VENM Assessment: The material is required to be removed to enable an underpass to be constructed. The site is approximately 100 metres long and 40 metres wide and up to 4m high, with a total of 2,000 BCM's of clay, shale and sandstone remaining to be extracted. The material is to be used elsewhere on the site.

Site Observations: The area is currently being excavated as such it is highly disturbed, surrounded by road work activities, and is constrained by side batters, and road floor, see *Photoplates 1* and 2 below.

Photoplate One: Site layout



Photoplate Two: Material to be removed



Assessment: No test pits were required for this site, as a visual assessment could be made, due to the existing earth movements which showed both sides of the area to be excavated. The material currently being excavated was seen to be of VENM in nature with no visual external contamination and no discernible foreign odours or discolouration. Prior to the roadworks, the site was a powerline easement and Google Air shows no occupation from 2004 until roadworks began.

There was plastic gas piping found on the area, see Photoplate 3.

Photoplate Three: Piping to be Removed

Discussion:

The site is highly disturbed with all top soil and any possible surface contaminants removed. The only issues for this site relate to housekeeping to ensure that the receiver of the material does not receive any deleterious material such as those found on and around the site.

In summary, based upon the visual assessment, VGT Pty Ltd has identified clay, shale and sandstone material to be Virgin Excavated Natural Material (VENM). This is acceptable according to the EPA's "Waste Classification Guidelines- Part 1: Classifying Waste'.

If any deleterious material is found then this should be removed off site immediately.

We trust the above meets with your requirements. Should you have any questions please don't hesitate to contact us.

Yours Sincerely,

Greg Thomson
Geologist VGT Pty Ltd
M AusIMM, FIQA