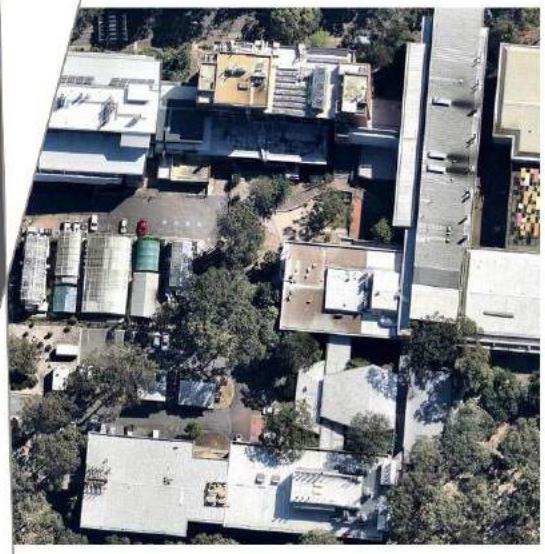
Preliminary Site Investigation

University of Newcastle Proposed Bio-Resources Facility

82218015



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1 Introduction

1.1 Background

Cardno (NSW/ACT) Pty Ltd (Cardno) was engaged by University of Newcastle ("the client") to prepare a Preliminary Site Investigation (PSI) for the proposed STEM+M Bio-resources facility upgrade project at the University of Newcastle, Callaghan ("the Site") as shown in the figure below. The nominated Site comprises one (1) allotment, Lot 1 DP 1188100. For site locality, refer to Drawing 1, attached in **Appendix A**.

Figure 1-1 Site location accessed from Nearmap dated 26-09-2017.

It is understood that the new, rectangular-shaped STEM+M Bio-resources facility is proposed to be situated in the location of the existing Biological Sciences Glass Houses and associated facilities with approximate dimensions' footprint of 27m by 69m.

The current PSI comprised of a desktop study and site inspection, along with intrusive sampling and laboratory testing within the subject Site. It must be appreciated that the assessment is limited to the subject area as shown within the above figure. Data searches may refer to the allotment in its entirely; however, review will be limited to nominated subject site within the lot.

The PSI was prepared in accordance with the scope presented in Cardno's proposal 48980518-0123.1.0, dated 21 July 2017, accepted by the client on 2 August 2017.

The assessment was undertaken with reference to NSW EPA "*Guidelines for Consultants Reporting on Contaminated Sites*" [1] and *National Environment Protection Measure (NEPM) for the Assessment of Site Contamination, 2013* [2].

The assessment was undertaken to assess potential for contamination to constrain the proposed STEM+M Bio-resources facility upgrade. The findings and results are presented herein.

1.2 Purpose and Objectives

1.2.1 Preliminary Site Investigation

The purpose of this PSI is to provide the client with preliminary advice on the contamination status of the current Site conditions and the consequent implications for its intended use. The PSI reviews current and historical activities undertaken at the Site and provides a preliminary environmental assessment of the potential for soil and/or groundwater contamination to be present on the Site.

The objectives of the PSI are to:

> Identify the potential for past or present activities at the Site and, to the extent practicable, surrounding the Site to cause contamination of soil or groundwater at the Site

> Identify potential areas and contaminants of concern at the Site

> Identify potential receptors of concern and assess the potential for the protected beneficial uses of the land to be impacted due to contamination

> Assess the requirement, if any for further environmental investigation to assess or make the Site suitable for the proposed use

The investigation and reporting is preliminary in nature and is undertaken in general accordance with the National Environment Protection (Assessment of Site Contamination) Measure NEPM 2013 guidelines [2] adopted by NSW EPA. The report is not considered to be a Detailed Site Investigation (as defined in NEPM) and as such has not been prepared as the basis of a Site Audit (there is no known requirement for an audit).

1.3 Scope

1.3.1 Preliminary Site Investigation

This Preliminary Site Investigation comprised of the following:

> Desktop study of NSW EPA Records conducted by Lotsearch Pty Ltd and compiled in *"Environmental Risk and Planning Report, 130 University Drive, Callaghan, NSW 2308, dated 17 October 2017*" [3], the S149 Planning certificate and review of historical aerial photographs.

> Site inspection, limited intrusive sampling and testing. Sampling comprised the collection of seven (7) samples utilising both hand augers and a truck mounted rig.

2 Site Identification

The subject site details are presented in the table below. For location site please refer to Figure 1-1 in Section 1.

Table 2-1 Site Details

Site Address	130 University Drive Callaghan
Lot Number and Deposited Plan	Lot 1 on DP 1188100
Site Area	Approx. 0.12 ha
Local Government Area	Newcastle City Council
Current Zoning	SP2 Infrastructure

3 Site Inspection and Surrounding Environment

3.1 Site Condition

A site inspection was undertaken by a Geotechnical Scientist from Cardno on 29 September 2017 in order to map salient features of the site and the surrounding area. The inspection comprised a walkover assessment with no restrictions to onsite access. Site photographs are attached as Appendix A. Access to subsurface profile was limited due to the existing structures and concrete foot paths within the green house.

Overall, the site is rectangular in shape and is situated east of Ring Rd, Callaghan in the western portion of the University of Newcastle, Callaghan Campus. The site is bounded by;

> An existing carpark, paved access road and associated multistorey Medical Science buildings to the north;

> An existing carpark, access road and small structures to the south;

> Existing multistorey concrete structures to the east including the biological sciences building and Auchumuty Library; and

> Ring road to the west.

At the time of inspection, features and observations within the site include the following:

> Topographically, the site is situated within regionally gentle undulating terrain, locally being positioned adjacent to an intersection of an east-west and north-south trending ridgelines. The site is situated on the north facing slopes associated with the east-west trending ridgeline with slope gradients generally in the range of approximately 3 and 7◦.

> The site comprised six biological sciences glass houses utilised by the University of Newcastle.

> Concrete paths were located between buildings with isolated regions of grass cover, surficial soil and gravel.

> A filled area behind a small retaining wall is located in the south-eastern corner of the site.

> Various tools and equipment were located on concreted areas and around buildings, including cement mixer, motorised conveyor belt, wheel barrows and bins

> Drainage comprises both underground stormwater drains and surficial runoff following the existing contours of the site which drain into a small channel that runs in a north easterly direction into Bowinbah Creek.

> Bowinbah Creek drains into Boatman Creek, which joins Iron bark creek approximately 3km to the north which joins the South Channel of the Hunter River.

3.2 Surrounding Environment and Land uses

The site is located within the University of Newcastle Callaghan Campus. Land uses around the site are detailed in the table below.

Table 3-1 Surrounding Land Use

Direction	Land Use or Activity
North	Existing carpark, paved access road and associated multistory Medical Science buildings.
West	Main Road (Newcastle Inner City Bypass) (approx. 50m from site). Residential development beyond Main Road.
East	Existing multistory concrete structures to the east associated with the University of Newcastle campus.
South	An existing carpark, access road and small structures.

The area is serviced by public roads and access to the Site is available from Ring Road.

4 Published Data

4.1 Regional Geology

The Newcastle 1:100,000 Geology Map, Geological Series Sheet 9232 [4], indicates the site is situated within the Tomago Coal Measures which is known to comprise Late Permian Age deposits of siltstone, sandstone, claystone, coal and tuff and soils derived from the weathering of these rock types.

Referring to the Soil Landscapes of the Newcastle 1:100 000 Sheet (Sheet 9232) indicates that the Site is underlain by the Beresfield (be) landscape comprising undulating low hills and rises on Permian sediments in the East Maitland Hills region. Slope gradients are in the range of 3-15% with local relief of up to 50m and elevation of 20-50m. Soils usually consist of moderately deep, moderately well to imperfectly drained Yellow Podzolic Soils, Brown Podzolic soils and brown Soloths occurring on crests. Moderately deep, well-drained Red Podzolic Soils and red Soloths occur on upper slopes. Moderately well to imperfectly drained brown Soloths and yellow Soloths occur on sideslopes. Deep, imperfectly to poorly drained Yellow Podzolic Soils, yellow Soloths and Gleyed Podzolic Soils occur on lower slopes.

Hazards include water erosion, waterlogging and high run-on on localised lower slopes. Soils are highly acidic and of low fertility.

4.2 Acid Sulfate Soils

Review of available published data, indicates that the subject site is situated within no known occurrence of acid sulfate soil materials with reference to the “Department of Land and Water Conservation, Wallsend Acid Sulfate Soil Risk Map”, Edition 2, dated December 1997 [5].

Further review of the “Newcastle Local Environmental Plan 2012, Acid Sulfate Soils Map”, Sheet ASS_02, dated 2014 [6], indicates that the site is classified as Class 5 land for potential occurrence of ASS. Class 5 indicates that development consent is required for works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum and by which the water table is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.

Based on review data Acid Sulfate Soils are unlikely to be encountered onsite.

4.3 Hydrogeology

A search of the NSW Groundwater Database from Department of Primary Industries – Office of Water NSW conducted by Lotsearch [3] identified seventeen (17) bores within a 2 km radius of the Site. The 17 bores are summarised in the table below. Copy of the licensed bore information is presented in the Lotsearch report in **Appendix D**.

Table 4-1 Registered Groundwater Bore Search Summary

Well Number	Intended Purpose	Coordinates	Depth of Bore (m)	SWL (m)	Water Bearing Zone (m)	Proximity to Site (m)
GW202512	Monitoring	32° 53' 22.2" S 151° 41' 49.3" E	18.00	-	16.60-18.00	305 m north
GW202509	Monitoring	32° 53' 20.2" S 151° 41' 54.8" E	11.60	-	10.60-11.60	384 m north
GW202510	Monitoring	32° 53' 18.7" S 151° 41' 55.1" E	12.80	-	11.70-12.80	429 m north
GW202511	Monitoring	32° 53' 16.3" S 151° 41' 55.1" E	9.80	-	9.20-9.80	503 m north
GW202513	Monitoring	32° 53' 17.1" S 151° 41' 59.9" E	4.60	-	3.20-4.60	517 m north-east
GW053186	Recreation	32° 54' 03.3" S 151° 41' 21.1" E	32.00	-	31.00-32.00	1108 m south-west
GW202754	Monitoring	32° 54' 4.6" S 151° 41' 9.2" E	3.00	0.88	-	1340 m south-west

Well Number	Intended Purpose	Coordinates	Depth of Bore (m)	SWL (m)	Water Bearing Zone (m)	Proximity to Site (m)
GW202755	Monitoring	32° 54' 5.3" S 151° 41' 9.7" E	3.40	1.47	-	1346 m south-west
GW202756	Monitoring	32° 54' 5.8" S 151° 41' 9.8" E	3.50	1.79	-	1357 m south-west
GW202753	Monitoring	32° 54' 5.6" S 151° 41' 8.7" E	4.20	1.62	-	1372 m south-west
GW080250	-	32° 52' 44.2" S 151° 42' 7.7" E	4.50	-	-	1541 m north
GW080251	-	32° 52' 39.8" S 151° 41' 37.5" E	10.50	-	-	1620 m north
GW202025	Monitoring	32° 54' 23.1" S 151° 41' 8" E	10.00	2.00	-	1806 m south-west
GW201029	Monitoring	32° 53' 11.7" S 151° 40' 40.4" E	2.00	-	0.90-2.00	1821 m west
GW202024	Monitoring	32° 54' 22.5" S 151° 41' 4.5" E	4.30	1.00	-	1839 m south-west
GW202023	Monitoring	32° 54' 24.6" S 151° 41' 5.4" E	5.30	3.00	-	1879 m south-west
GW201030	Monitoring	32° 53' 10" S 151° 40' 34.4" E	2.00	-	0.80-2.00	1985 m west

4.4 EPA records Search

4.4.1 Contaminated Land Record of Notices

A search of NSW EPA Record of Notices on 16th October 2017 revealed no notices listed within 1 km of the site.

Search results are provided in **Appendix D.**

4.4.2 PoEO Public Register

The PoEO Public Register under Section 308 of the Protection of the Environment Operations (PoEO) Act 1997 contains Environment Protection Licences (EPLs), applications and notices issued by the EPA.

The Public Register was searched on the 16th October 2017 to identify any issues of relevance to the Site. The search revealed two licensed activities within a 1 km radius of the site. These are summarised in **Table 4-2**, below.

Table 4-2 Licensed Activities under the PoEO Act 1997

EPL	Organisation	Name	Address	Suburb	Activity	Distance	Direction
5583	Newcastle City Council	Waterways of Newcastle City	-	Newcastle	Other activities	45m	North-east
1683	Hunter Water Corporation	Newcastle Sewerage System including Shortland Wastewater Treatment Plant	Off Scenic Drive	Merewether	Sewage treatment processing by large plants	973m	South

Additionally, six licensed activities now revoked or surrendered were found within 1 km of the site. These are displayed in the table below.

Table 4-3 Former Licensed Activities under the PoEO Act 1997, now revoked or surrendered

EPL	Organisation	Location	Date Issued	Activity	Distance
12249	The University of Newcastle	Groundwater Remediation Test Site (GRTS), University of Newcastle, University Drive, Callaghan	04/01/2005	Non-thermal treatment of hazardous and other waste	Not within subject site
12249	The University of Newcastle	Groundwater Remediation Test Site (GRTS), University of Newcastle, University Drive, Callaghan	04/01/2005	Waste storage – hazardous, restricted solid, liquid, clinical and related waste and asbestos waste	Not within subject site
4653	Luhrmann Environment Management Pty Ltd	Waterways throughout NSW	-	Application of herbicides	37m
4838	Robert Orchard	Waterways throughout NSW	-	Application of herbicides	37m
6630	Sydney Weed and Pest Management Pty Ltd	Waterways throughout NSW	-	Application of herbicides	37m
12054	BHP Billiton Innovation Pty Ltd	Off Vale Street, Shortland, NSW 2307	06/02/2004	Chemical production waste generation; chemical storage waste generation	276m North

Search results are provided in **Appendix D**.

4.4.3 List of NSW Contaminated Sites Notified to the EPA

A searched of the List of NSW Contaminated Sites Notified to the EPA on 16th October 2017 revealed one (1) site listed on the list of notified sites within 1 km of the site:

> 298-302 Sandgate Road, Shortland – 7-Eleven (former BP) service station.

Search results are provided in **Appendix D**.

5 Site History

5.1 General

The site history was based on the information in the following documents.

The site history comprised:

> Review of Section 149 Planning Certificate of Newcastle City Council (NCC)

> Review of historical aerial photos

> Review of Title Deeds.

> Review of NSW EPA database.

5.1.1 Newcastle City Council (NCC) Section 149 Planning Certificate - Lot 1 DP 1188100

The complete S149 certificate is attached within **Appendix F** and is summarised below:

> Newcastle Development Control Plan applies to the land

> Newcastle LEP 2012 identifies the zone applying to land as SP2 Infrastructure – Education Establishment.

> The land does not comprise of a critical habitat

> The land is not within a Heritage Conservation Area

> The land is not affected by Coastal Protection

> The land is not within a proclaimed Mine Subsidence District

> The land is not affected by a road widening or realignment

> The land is either in whole or in part, “bushfire prone land”, for the purposes of the *Environmental Planning and Assessment Act 1979.*

> Development on this land is subjected to flood related development controls

> No environmental planning instrument applies to land for the acquisition of the land by a public authority

> Contribution plans apply to the land

> The land is not affected by the Native Vegetation Act 2003

> Council has not been notified that an order has been made under the Order Under Trees (Disputes Between Neighbours) Act 2006

> Council is unaware of whether a valid site compatibility certificate has been issued

> Council has not been notified that the land includes any residential premises that are registered on the register of loose-fill asbestos insulation.

> Council records indicate that this land has been identified as being affected by soil or groundwater contamination.

> Council records indicate the following potentially contaminating landuse(s) may have been carried out on the land: waste storage activities

5.1.2 Historical Title Deeds Search

A Land Title Search was undertaken by Advance Legal Searches Pty Ltd for Lot 1 DP 1188100. Results of the search are provided in Appendix E. Review of the title deed searches indicates that the site has only been Crown Land and owned by the University of Newcastle.

Table 5-1 Historical Title Deed Search Results

Date of Acquisition	Registered Proprietor(s) & Occupations where available	Reference to Title at Acquisition and sale	Occupation / Possible land Use
	Crown Land		
29.10.1954	Dedicated for University and Teachers College Site	Government Gazette 29.10.1954	
18.01.1963	Acquired for Technical Education and University vide Resumption	Government Gazette 18.01.1963	
	Lots 2,3 & 4 DP 216528		
1964	The Minister for Education	Vol. 9812 Fol. 210	University Campus
1964	The University of New South Wales	Vol. 9812 Fol. 210	University Campus
1968	# The University of Newcastle	Vol. 9812 Fol. 210	University Campus
	Lot 11 DP 531665 & Lots 3 & 4 DP 216528		
1971	# The University of Newcastle	Vol. 11573 Fol. 117	University Campus
	Lot 11 DP 531665		
1991	# The University of Newcastle	F / I 11 / 531665	University Campus
	Lot 7 DP 804087		
1991	# The University of Newcastle	F / I 7 / 804087	University Campus
	Lot 16 DP 817507		
1991	# The University of Newcastle		University Campus
	Lot 1 DP 1188100		
2000	# The University of Newcastle	F / I 1 / 1188100	University Campus

# Denotes Current Registered Proprietors (Current at 2017)

5.1.3 Review of the Historical Aerial Photos

Cardno has conducted a review of historical aerial photographs supplied by Lotsearch Pty Ltd.

Overall, Cardno's historical aerial review was based on historical aerial imagery, current site inspection, previous investigations and knowledge of the area.

A summary of the interpreted site features is provided in Table 5-2 below.

Table 5-2 Aerial Imagery Review

Date	Reference	Observations
April 1954	Black and White NSW 252-2052	Onsite: The conditions of the site generally consisted of undeveloped land comprising moderately dense bushland. Offsite: The surrounding land uses comprised residential premises within 150m to the west of the site. Surrounding bushland extends approximately 500m to the south, 900m to the north and 1km to the east. A rail line is located 1.4km to the east. A golf course is located beyond the bushland to the north. The bushland is bounded by a road to the south, beyond which is cleared grassland with sporadic trees.
May 1965	Black and White NSW 1410-5017	Onsite: Generally consistent with the 1954 photograph detailed above. Tree cover is slightly less dense. Offsite:

		Several buildings have been constructed approximately 100m to 200m south of the site and 400m to the north of the site. These buildings appear to be consistent with current buildings utilised by the University of Newcastle. Several new buildings and sports fields appear to be under construction approximately 1km to the east. Increase in residential development to the west of the site, including newly constructed roads and dwellings. Decrease in density of tree cover surrounding the site, with small areas of cleared land to the east and south. Land beyond 300m to the south of the site not visible.
19/10/1974	Black and White NSW 2266-95	Onsite: The site has been cleared of some trees, with roads and carparks constructed around the boundary of the site. Offsite: Several buildings, roads and paths have been constructed to the east of the site within the University of Newcastle campus. Two large carparks have been constructed to the south within the University of Newcastle campus. Trees have been cleared for the above mentioned construction, with remnant trees retained between newly constructed buildings, roads and paths. Increase in residential development to the west of the site, including newly constructed roads and dwellings. Increase in commercial development to the south-west of the site, including newly constructed buildings and structures Land beyond 200m to the east of the site not visible.
October 1976	Colour NSW 2404-96	Onsite: Further clearing of trees has occurred on the site to accommodate expansion of the existing carpark on to the site. Offsite: Generally consistent with the 1974 photograph detailed above. Trees have been cleared to north of the site. Several new buildings have been constructed to the south and east within the University of Newcastle campus.
September 1983	Colour NSW 3334-33	Onsite: Several buildings have been constructed on the site. Trees have been cleared in the north west corner of the site to accommodate the new building and a grassed area. Offsite: Generally consistent with the 1976 photograph detailed above. New buildings have been constructed immediately to the north of the site, within the University of Newcastle campus.
November 1993	Colour NSW 92	Onsite: Generally consistent with the 1983 photograph detailed above with two new buildings constructed on the western portion of the site. Offsite: Generally consistent with the 1986 photograph detailed above. The Newcastle Inner City Bypass has been constructed approximately 50m to the west of the site. Wastewater treatment plant constructed approximately 1.5km to the north-west of the site. Electrical sub-station constructed approximately 1.2km to the east of the site.
10/01/2007	Colour	Onsite:

	Google Earth	Generally consistent with the 1993 photograph detailed above with two new buildings constructed on the central and western portions of the site. Offsite: Generally consistent with the 1993 photograph detailed above. Several new buildings have been constructed to the south and east within the University of Newcastle campus. Increase of residential development towards to the south-west a number of newly constructed dwellings.
28/09/2009	Colour Google Earth	Onsite: Generally consistent with the 2007 photograph detailed above. Offsite: Generally consistent with the 2007 photograph detailed above.
31/10/2014	Colour Google Earth	Onsite: Generally consistent with the 2009 photograph detailed above with trees cleared and one new building constructed on the western portion of the site. Offsite: Generally consistent with the 2009 photograph detailed above.

5.2 Summary of Site History

Based on the available historical data, Cardno site inspections and public searches, the current subject site comprised of crown land until it formed part of the Newcastle of University campus from 1964 to present day.

The University Campus encompasses a large area with mixed use ranging from residential to commercial/industrial including a wide variety of activities. Portions of the Site have been filled with slag material which were encountered during the intrusive investigation. The Site has been used as a university since its initial development in 1964. The Newcastle Institute for Energy and Resources (located approximately 300m to the north) has had potentially contaminating activities conducted historically on the site. The NIER Site has been redeveloped in recent years and just north of the NIER building an aged care residential development is currently being constructed.

6 Areas and Contaminants of Potential Concern

The assessment has identified several potential sources of contamination which are summarized in Table 6-1 below.

Table 6-1 Site Activities and Potential Contaminants of Concern

Area of Environmental Concern	Site Activity / Potential Source	Contaminants of Potential Concern	Comments
Onsite Sources			
Surficial disturbance and filling	Potential minor cut and fill operations	Possible contaminants include: Metals Petroleum hydrocarbons (Polycyclic Aromatic Hydrocarbons [PAHs], Total Recoverable Hydrocarbons [TRH], Benzene, Toluene, Ethyl-benzene, Xylenes [BTEX]) Organochlorine and Organophosphate Pesticides (OCP/OPP) asbestos	Uncontrolled fill material may be present onsite (for site levels and construction of dams) and offsite (excavated drainage channel).
Under the concrete slab and buildings	It is possible that imported fill has been placed in the footprint of the buildings and carpark areas for the purpose of levelling the site.	TRH/BTEXN/PAHs/Metals, asbestos, OCP/OPPTRH/BTEXN/PAHs/Metals/OCP OPP and asbestos.	Contaminated soils and waste products were commonly used for filling purposes in the time period in which the site was developed.
Buildings	Potential hazardous building materials and storage of chemicals	ACM (asbestos containing materials) and lead paint. Potential storage of pesticides and chemicals.	Age of the structures indicate that ACM may have been used in construction materials
Greenhouses	Pesticide use in operation of greenhouse	Organochlorine and Organophosphate Pesticides (OCP/OPP)	
Offsite Sources			
Service Stations in Shortland	Hydrocarbon storage/lubricants and solvents	TRH/BTEXN/PAH, metals	Potential hydrocarbon storage, lubricants for vehicle maintenance. Service stations approximately 2km north of subject site. The service stations appear to be down gradient from the subject site
Former Waste Land Fill	Waste	Metals/TRH/PAH/PCB/alkanes/ sulphides/nutrients/ammonia, landfill gas	149 certificate indicates that land filling may have been conducted within the boundary of the University site. No details are given. However; it is unlikely the landfill is within the subject site due to the current land use, locality and topography of the subject site.

7 Site Investigation Methodology

7.1 Fieldwork Scope

Filed investigation was undertaken on 29 September 2017 and comprised the following:

> Site walkover by a geotechnical scientist from Cardno to identify potential Environmental Areas of Concern (EAC).

> Drilling of six (6) shallow bore holes (HA01-HA06) using hand auger tools. Bore holes were targeted with the identified potential Areas of Concern (AEC) and distributed across the site to characterise the overall site subsurface conditions

> Drilling of two (2) boreholes (BH01- BH02) with a truck mounted scout rig using a combination of 300mm solid flight augers, 150mm solid flight augers with a TC bit and NMLC rock coring techniques. Auguring using solid flight auger techniques was performed to 4.2 and 3.3 m below ground level (BGL) in BH01 and BH02 m respectively. Following, NMLC rock coring techniques were conducted to depths of approximately 10.2 m and 7.1 m BGL respectively.

> Logging of the subsurface profile.

> Sampling of material considered representative of subsurface profile encountered across the site.

> Environmental samples of selected materials were collected for the purpose of laboratory testing. Samples were recovered in accordance with Cardno protocols and were immediate placed into cold storage.

> Backfilling of holes with the excavation spoil materials.

All fieldwork including logging of subsurface profiles and collecting of samples was carried out by a geotechnical scientist from Cardno. Bores were located by reference to the site features as shown on Figure 1, attached in **Appendix A.** Subsurface conditions are detailed in engineering bores attached in Appendix B, together with explanatory notes.

7.2 Laboratory Testing

Laboratory testing on selected samples recovered during fieldwork comprised the following:

> Eight (8) samples including duplicate and triplicate sample for quality assurance and control soil contamination tests. The samples were analysed for eight metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn), organochlorine pesticides (OCPs) and organophosphate pesticides (OPPs), Total Recoverable Hydrocarbons (TRH), BTEXN (Benzene, Toluene, Ethyl-benzene, Xylenes and Naphthalene), Polycyclic Aromatic Hydrocarbons (PAH) and Polychlorinated Biphenyls (PCB);

> One (1) sample collected from the slag materials analysed for TRH, PAH, BTEX and 8 heavy metals;

> One (1) triplicate sample analysed for BTEXN;

> One (1) trip spike sample analysed for BTEXN; and

> One (1) rinsate sample analysed for 8 heavy metals.

Environmental and chemical testing was carried out on soil samples by SGS Australia Pty Ltd, which holds current accreditation with the National Association of Testing Authorities, Australia (NATA) for the analysis performed.

Results of laboratory testing are in the laboratory reports attached in **Appendix C**.

7.3 Sampling Methodology and Decontamination Procedures

Environmental sampling was performed according to Cardno standard operating procedures with sampling data recorded on Chain of Custody sheets.

The methodology utilised is as follows:

> The use and changing of disposable gloves between each sampling event to prevent cross contamination;

> A Photo Ionisation Detector (PID) was used to screen each sample using a headspace method with the readings recorded on engineering logs;

> Decontamination of all sampling equipment using a 3% solution of phosphate free detergent (Decon 90) and distilled water prior to each bore;

> Samples were collected from a fresh face of the bore hole side wall and not directly off the auger, using a stainless steel trowel;

> Soil sample storage for all sampling events was via sample containers supplied by SGS laboratories;

> Sufficient samples with zero headspace into laboratory prepared sampling jars with the sample details added to the label on the jar.

> Collection of a blind duplicate sample for quality assurance and control (QA/QC);

> Samples were sent to the laboratory with recommended holding times; and

> The sample jars were preserved in a chilled esky containing ice immediately after sampling and during transport to the laboratories. The laboratory chain of custody documentation was completed and accompanied the samples during shipment (a copy of the COC is attached to the laboratory test results).

The samples were collected at the intrusive testing locations. A plan (Figure f1) showing the location of each environmental sample is attached in **Appendix A**.

8 Criteria for Contamination Assessment

8.1 General

It should be appreciated that the assessment was preliminary in nature with limited intrusive sampling to address identified areas of environmental concern.

8.1.1 NEPM – NATIONAL ENVIRONMENT PROTECTION (ASSESSMENT OF SITE CONTAMINATION) MEASURE (2013)

The current assessment criteria used in NSW to evaluate soil analytical results are based on the NSW DEC Guidelines for the NSW Site Auditor Scheme 2nd Edition 2006 [7] and National Environment Protection Measure (NEPM) for the Assessment of Site Contamination, 2013 [2] and was used as the criteria for the assessment of the soil on site. Table 5A of Schedule B (1) Guideline on Investigation Levels for Soil and Groundwater provides limits on investigation concentrations for contaminants based on human health and certain exposure scenarios due to site use.

The proposed site use is a mix of commercial and residential and as such the conservative criteria has been adopted . For the purpose of this assessment the following guidelines have been adopted:

> Health Investigation Levels (HIL's) "Residential A", Residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry), also includes childcare centres, preschools and primary schools;

> Soil Health Screening Levels (HSL) for vapour intrusion recommended for Residential A land use (HSL A).

> Management Limits for TPH fractions F1-F4 in soil for Residential, Parkland and Open Space land use;

> Ecological Screening Levels (ESLs) for TPH fractions F1-F4, BTEX and Benzo(a)Pyrene in soil for Residential A land use; and

> Ecological Investigation Levels (EILs) for urban residential/public open space limits. The thresholds adopted are the mid-range ACL values from Table 1B(1) to 1B(3) NEPM 2013. ACL are generally calculated using pH and cation exchange capacity values. As these analytes were not included in the suite, EIL vales for analytes requiring ACL's have been assumed using the based on site conditions of an old suburb (40+ years old) and high traffic area at peak hour (within 50m of Newcastle Inner City Bypass)

9 Laboratory Analytical Results

Chemical testing was carried out on soil samples using SGS Australia Pty Ltd, which holds current accreditation with the National Association of Testing Authorities, Australia (NATA). The initial testing of the soil was undertaken as a preliminary assessment.

All testing was undertaken within the terms of their accreditation. Copies of the testing laboratory reports are shown in Appendix C. The results of laboratory analysis for inorganic and organic contaminants in the soil samples are summarised in the following tables:

Table 9-1 - Results of Laboratory Analysis for Heavy Metals, results in mg/kg

Table 9-2- Results of Laboratory Analysis for PAH, OPP and PCB, results in mg/kg

Table 9-3 - Results of Laboratory Analysis for TRH, Naphthalene and BTEX, results in mg/kg

Table 9-4 - Results of Laboratory Analysis for Organochlorine Pesticides, results in mg/kg

Table 9-1 Results of Laboratory Analysis for Heavy Metals, results in mg/kg

Location	Depth (m)	Date Sampled	Filling (F) / Natural (N)	Material Description			Heavy Metals							
				Secondary Constituent	Primary Constituent	Contaminant Observations	As	Cd	Cr	Cu	Pb	Hg	Ni	Zn
							mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
HA1 0.4-0.5	0.4-0.5	29/09/2017	N	Silty	CLAY	-	<3	<0.3	3.8	8.2	7	<0.05	3.1	22
HA2 0.05-0.15	0.05-0.15	29/09/2017	F	Silty	SAND	Steel fragment	3	<0.3	40	11	20	<0.05	6.8	200
HA3 0.7-0.8	0.7-0.8	29/09/2017	N	Silty	CLAY	-	46	<0.3	7.9	20	15	<0.05	2.9	25
HA4 0.05-0.15	0.05-0.15	29/09/2017	F	Silty	SAND	Trace slag	4	<0.3	16	36	14	<0.05	4.8	120
HA5 0.05-0.15	0.05-0.15	29/09/2017	F	Silty	SAND	Trace slag	6	<0.3	13	24	30	<0.05	8.3	230
HA6 0.4-0.5	0.4-0.5	29/09/2017	N	Silty	CLAY	-	6	<0.3	9.1	8.2	15	<0.05	2.2	43
DUP	0.05-0.15	29/09/2017	F	Silty	SAND	Steel fragment	3	<0.3	26	11	20	<0.05	6.5	210
TRIP	0.05-0.15	29/09/2017	F	Silty	SAND	Steel fragment	3.6	< 0.4	39	17	28	< 0.1	9.8	260
BH001 0.1-0.3	0.01-0.3	29/09/2017	F	-	SLAG	Steel fragment	<3	<0.3	2.7	0.5	<1	< 0.1	<0.5	1.7
Guideline Values						**SGS LOR**	3	0.3	0	1	1	0.1	1	1
						EUROFINS LOR	2	0.4	5	5	5	0.1	5	5
NEPM (2013) HILs for Residential A Land-Use (HIL A)							100	20	100	6000	300	40	400	7400
NEPM (2013) EIL[1] for Urban Residential/Public Open Space[2]							100 [3]	NC	250 [4]	60[4]	1100 [3]	NC	270[4]	400[4]
NSW EPA (2014) General Solid Waste Contaminant Threshold Concentrations (CT1)							100	20	100	NC	100	4	40	NC
NSW EPA (2014) Restricted Solid Waste Contaminant Threshold Concentrations (CT2) [5]							400	80	400	NC	400	16	160	NC

Notes to Table 9-1:

Residential A - residential land-use with garden/accessible soil (home grown produce <10% fruit and vegetable uptake (no poultry)), also includes childcare centres, preschools and primary schools

1 - The EIL is calculated by summing the ACL and the ABC. In the absence of pH, CEC and/or % clay content testing, the most conservative ACL value from Tables 1B(1) to 1B(3) NEPM (2013) is adopted as the EIL.

2 - Urban residential/public open space is broadly equivalent to the Residential A, Residential B and Recreational C land-use criteria

3 - Generic EIL

4 - EIL is assumed based on Site conditions(Age,Traffic volume). Value adopted from Table 1B(1) to 1B(3) NEPM 2013 in the absence of pH, CEC and/or % clay content testing

5 - Where the contaminant threshold value set for restricted solid waste (CT2) is exceeded, a TCLP test must be carried out to determine the leachable concentration of that contaminant and the class of waste.

DUP and TRIP are the QA samples of HA2 0.05-0.15

Contaminant Exceedance Indicators:

Bold - Indicates exceedance of NEPM (2013) HIL A criteria values for Residential A Land-use

Italics **-** Indicates exceedance of NEPM (2013) EIL criteria values for Urban Residential/Public Open Space Land-use

	Indicates material is classified as General Solid Waste in accordance with NSW EPA (2014), i.e. > CT1 and ≤ SCC1 and ≤ TCLP1
	Indicates material is classified as Restricted Solid Waste in accordance with NSW EPA (2014), i.e. ≤ CT2 and ≤ SCC2 and ≤ TCLP2
	Indicates material is classified as Hazardous Solid Waste in accordance with NSW EPA (2014), i.e. > SCC2 and > TCLP2

Table 9-2 Results of Laboratory Analysis for PAH, OPP and PCB, results in mg/kg

Location	Depth (m)	Date Sampled	Filling (F) / Natural (N)	Material Description			TRH						Naphth-alene	BTEX			
				Secondary Constituent	Primary Constituent	Contaminant Observations	C_6 - C_9	C_{10} - C_{36}	F1 C_6 - C_9	F2 > C_{10} - C_{16}	F3 > C_{16} - C_{34}	F4 > C_{34} - C_{40}		Benzene	Toluene	Ethyl Benzene	Total Xylenes
							mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
HA1 0.4-0.5	0.4-0.5	29/09/2017	N	Silty	CLAY	-	<20	<110	<20	<25	<90	<120	<0.1	<0.1	<0.1	<0.1	<0.3
HA2 0.05-0.15	0.05-0.15	29/09/2017	F	Silty	SAND	Steel fragment	<20	<110	<20	<25	<90	<120	<0.1	<0.1	<0.1	<0.1	0.4
HA3 0.7-0.8	0.7-0.8	29/09/2017	N	Silty	CLAY	-	<20	<110	<20	<25	<90	<120	<0.1	<0.1	<0.1	<0.1	<0.3
HA4 0.05-0.15	0.05-0.15	29/09/2017	F	Silty	SAND	Trace slag	<20	<110	<20	<25	<90	<120	<0.1	<0.1	<0.1	0.2	1.5
HA5 0.05-0.15	0.05-0.15	29/09/2017	F	Silty	SAND	Trace slag	<20	<110	<20	<25	<90	<120	<0.1	<0.1	<0.1	0.3	2.8
HA6 0.4-0.5	0.4-0.5	29/09/2017	N	Silty	CLAY	-	<20	<110	<20	<25	<90	<120	<0.1	<0.1	<0.1	<0.1	<0.3
DUP	0.05-0.15	29/09/2017	F	Silty	SAND	Steel fragment	<20	<110	<20	<25	<90	<120	<0.1	<0.1	<0.1	<0.1	0.4
TRIP	0.05-0.15	29/09/2017	F	Silty	SAND	Steel fragment	<20	119	<20	<50	<100	<100	<0.1	<0.1	<0.1	<0.1	<0.3
BH001 0.1-0.3	0.01-0.3	29/09/2017	F	-	SLAG	Slag	<20	<110	<20	<50	<100	<100	<0.1	<0.1	<0.1	<0.1	<0.3
Guideline Values						**SGS LOR**	20	110	20	25	90	120	0	0.1	0	0	0
						EUROFINS LOR	20	50	20	50	100	100	0	0.1	0.1	0.1	0.3
NEPM (2013) HSL A & B - Sand from 0 m to <1 m bgl							NC	NC	45	110	NC	NC	3	0.5	160	55	40
NEPM (2013) HSL A & B - Silt from 0 m to <1 m bgl							NC	NC	40	230	NC	NC	4	0.6	390	NL	95
NEPM (2013) HSL A & B - Clay from 0 m to <1 m bgl							NC	NC	50	280	NC	NC	5	0.7	480	NL	110
NEPM (2013) EIL for Urban Residential/Public Open Space[1]							NC	NC	NC	NC	NC	NC	170[2]	NC	NC	NC	NC
NEPM (2013) ESL[3] for Urban Residential/Public Open Space[1] - Course Grained Soils							NC	NC	180 *	120 *	300	2,800	NC	50	85	70	105
NEPM (2013) ESL[3] for Urban Residential/Public Open Space[1] - Fine Grained Soils							NC	NC	180 *	120 *	1300	5,600	NC	65	105	125	45
NEPM (2013) Management Limits[4] for Residential, Parkland and Open Space[1] - Course Grained Soils							NC	NC	700	1000	2500	10,000	NC	NC	NC	NC	NC
NEPM (2013) Management Limits[4] for Residential, Parkland and Open Space[1] - Fine Grained Soils							NC	NC	800	1000	3500	10,000	NC	NC	NC	NC	NC
NSW EPA (2014) General Solid Waste Contaminant Threshold Concentrations (CT1)							650	10,000[5]	NC	NC	NC	NC	NC	10	288	600	1,000
NSW EPA (2014) Restricted Solid Waste Contaminant Threshold Concentrations (CT2)[6]							2,600	40,000[5]	NC	NC	NC	NC	NC	40	1152	2,400	4,000

Notes to Table 9-2:

Residential A - residential land-use with garden/accessible soil (home grown produce <10% fruit and vegetable uptake (no poultry)), also includes childcare centres, preschools and primary schools

1 - Urban residential/public open space is broadly equivalent to the Residential A, Residential B and Recreational C land-use criteria

2 - Generic EIL

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

4 - Management limits are applied after consideration of relevant ESLs and HSLs

5 - Contaminants only assessed using the SCC (Specific Contaminant Concentration)

6 - Where the contaminant threshold value set for restricted solid waste (CT2) is exceeded, a TCLP test must be carried out to determine the leachable concentration of that contaminant and the class of waste.

DUP and TRIP are the QA samples of HA2 0.05-0.15

Contaminant Exceedance Indicators:

Bold - Indicates exceedance of NEPM (2013) HIL A criteria values for Residential A Land-use

Italics - Indicates exceedance of NEPM (2013) EIL/ESL criteria values for Urban Residential/Public Open Space Land-use

Double Underline - Indicates exceedance of NEPM (2013) Management Limits for Residential, Parkland and Open Space Land-use

Indicates material is classified as General Solid Waste in accordance with NSW EPA (2014), i.e. > CT1 and ≤ SCC1 and ≤ TCLP1

Indicates material is classified as Restricted Solid Waste in accordance with NSW EPA (2014), i.e. ≤ CT2 and ≤ SCC2 and ≤ TCLP2

Indicates material is classified as Hazardous Solid Waste in accordance with NSW EPA (2014), i.e. > SCC2 and > TCLP2

Table 9-3 Results of Laboratory Analysis for TRH, Naphthalene and BTEX, results in mg/kg

Location	Depth (m)	Date Sampled	Filling (F) / Natural (N)	Material Description			PAH			OPP		Total PCB
				Secondary Constituent	Primary Constituent	Contaminant Observations	Total	B(a)P	B(a)P TEQ (Upper)	Total	Chlor-pyrifos	
							mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
HA1 0.4-0.5	0.4-0.5	29/09/2017	N	Silty	CLAY	-	<0.8	<0.1	<0.3	<1	<0.2	<1
HA2 0.05-0.15	0.05-0.15	29/09/2017	F	Silty	SAND	Steel fragment	5.8	0.5	0.8	<1	<0.2	<1
HA3 0.7-0.8	0.7-0.8	29/09/2017	N	Silty	CLAY	-	<0.8	<0.1	<0.3	<1	<0.2	<1
HA4 0.05-0.15	0.05-0.15	29/09/2017	F	Silty	SAND	Trace slag	5.1	0.3	0.6	<1	<0.2	<1
HA5 0.05-0.15	0.05-0.15	29/09/2017	F	Silty	SAND	Trace slag	1.9	0.2	0.3	<1	<0.2	<1
HA6 0.4-0.5	0.4-0.5	29/09/2017	N	Silty	CLAY	-	<0.8	<0.1	<0.3	<1	<0.2	<1
DUP	0.05-0.15	29/09/2017	F	Silty	SAND	Steel fragment	3	0.2	0.4	<1	<0.2	<1
TRIP	0.05-0.15	29/09/2017	F	Silty	SAND	Steel fragment	1.2	<0.5	1.2	<1.2	<0.2	0.5
BH001 0.1-0.3	0.01-0.3	29/09/2017	F	-	SLAG	Slag	<0.8	<0.1	<0.3	<1	<0.2	<1
Guideline Values						**SGS LOR**	0.80	0.10	0.3	1.0	0.2	1.0
						EUROFINS LOR	0.50	0.50	0.5	1.2	0.2	0.5
NEPM (2013) HILs for Residential A Land-Use (HIL A)							300	NC	3	NC	160	1
NEPM (2013) EIL for Urban Residential/Public Open Space[1]							NC	NC	NC	NC	NC	NC
NEPM (2013) ESL[3] for Urban Residential/Public Open Space[1] - Course Soils							NC	0.7	NC	NC	NC	NC
NEPM (2013) ESL[3] for Urban Residential/Public Open Space[1] - Fine Soils							NC	0.7	NC	NC	NC	NC
NSW EPA (2014) General Solid Waste Contaminant Threshold Concentrations (CT1)							200 [4]	0.8	NC	250 [4]	4	< 50 [4]
NSW EPA (2014) Restricted Solid Waste Contaminant Threshold Concentrations (CT2) [5]							800 [4]	3.2	NC	1,000 [4]	16	< 50 [4]

Notes to Table 9-3:

Residential A - residential land-use with garden/accessible soil (home grown produce <10% fruit and vegetable uptake (no poultry)), also includes childcare centres, preschools and primary schools

1 - Urban residential/public open space is broadly equivalent to the Residential A, Residential B and Recreational C land-use criteria

2 - Generic EIL

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

4 - Contaminants only assessed using the SCC (Specific Contaminant Concentration)

5 - Where the contaminant threshold value set for restricted solid waste (CT2) is exceeded, a TCLP test must be carried out to determine the leachable concentration of that contaminant and the class of waste.

DUP and TRIP are the QA samples of HA2 0.05-0.15

Contaminant Exceedance Indicators:

Bold - Indicates exceedance of NEPM (2013) HIL A criteria values for Residential A Land-use

Italics **-** Indicates exceedance of NEPM (2013) EIL/ESL criteria values for Urban Residential/Public Open Space Land-use

	Indicates material is classified as General Solid Waste in accordance with NSW EPA (2014), i.e. > CT1 and ≤ SCC1 and ≤ TCLP1
	Indicates material is classified as Restricted Solid Waste in accordance with NSW EPA (2014), i.e. ≤ CT2 and ≤ SCC2 and ≤ TCLP2
	Indicates material is classified as Hazardous Solid Waste in accordance with NSW EPA (2014), i.e. > SCC2 and > TCLP2

Table 9-4 Results of Laboratory Analysis for Organochlorine Pesticides, results in mg/kg

Location	Depth (m)	Date Sampled	Filling (F) / Natural (N)	Material Description			OCP									
				Secondary Constituent	Primary Constituent	Contaminant Observations	Total	DDT+DDE+ DDD	DDT	Aldrin + Dieldrin	Chlor-dane	Endo-sulfan	Endrin	Hepta-chlor	HCB	Methoxy-chlor
							mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
HA1 0.4-0.5	0.4-0.5	29/09/2017	N	Silty	CLAY	-	<1.7	<0.3	<0.1	<0.3	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1
HA2 0.05-0.15	0.05-0.15	29/09/2017	F	Silty	SAND	Steel fragment	<1.7	<0.3	<0.1	<0.3	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1
HA3 0.7-0.8	0.7-0.8	29/09/2017	N	Silty	CLAY	-	<1.7	<0.3	<0.1	<0.3	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1
HA4 0.05-0.15	0.05-0.15	29/09/2017	F	Silty	SAND	Trace slag	<1.7	<0.3	<0.1	<0.3	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1
HA5 0.05-0.15	0.05-0.15	29/09/2017	F	Silty	SAND	Trace slag	<1.7	<0.3	<0.1	<0.3	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1
HA6 0.4-0.5	0.4-0.5	29/09/2017	N	Silty	CLAY	-	<1.7	<0.3	<0.1	<0.3	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1
DUP	0.05-0.15	29/09/2017	F	Silty	SAND	Steel fragment	<1.7	<0.3	<0.1	<0.3	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1
TRIP	0.05-0.15	29/09/2017	F	Silty	SAND	Steel fragment	<2.0	<0.05	<0.05	<0.1	<0.1	<0.15	<0.05	<0.05	<0.05	<0.05
BH001 0.1-0.3	0.01-0.3	29/09/2017	F	Silty	SAND	Steel fragment	<2.0	<0.05	<0.05	<0.1	<0.1	<0.15	<0.05	<0.05	<0.05	<0.05
Guideline Values						**SGS LOR**	1.7	0.3	0.1	0.3	0.2	0.2	0.2	0.2	0.1	0.1
						EUROFINS LOR	2.00	0.05	0.1	0.10	0.1	0.15	0.05	0.05	0.05	0.05
NEPM (2013) HILs for Residential A Land-Use (HIL A)							NC	240	NC	6	50	270	10	6	10	300
NEPM (2013) EIL for Urban Residential/Public Open Space[1]							NC	NC	180 [2]	NC	NC	NC	NC	NC	NC	NC
NEPM (2013) ESL[3] for Urban Residential/Public Open Space[1] - Course Soils							NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
NEPM (2013) ESL[3] for Urban Residential/Public Open Space[1] - Fine Soils							NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
NSW EPA (2014) General Solid Waste Contaminant Threshold Concentrations (CT1)							< 50 [4]	NC	NC	NC	NC	60	NC	NC	NC	NC
NSW EPA (2014) Restricted Solid Waste Contaminant Threshold Concentrations (CT2) [5]							< 50 [4]	NC	NC	NC	NC	240	NC	NC	NC	NC

Notes to Table 9-4:

Residential A - residential land-use with garden/accessible soil (home grown produce <10% fruit and vegetable uptake (no poultry)), also includes childcare centres, preschools and primary schools

1 - Urban residential/public open space is broadly equivalent to the Residential A, Residential B and Recreational C land-use criteria

2 - Generic EIL

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

4 - Contaminants only assessed using the SCC (Specific Contaminant Concentration)

5 - Where the contaminant threshold value set for restricted solid waste (CT2) is exceeded, a TCLP test must be carried out to determine the leachable concentration of that contaminant and the class of waste.

DUP and TRIP are the QA samples of HA2 0.05-0.15

Contaminant Exceedance Indicators:

Bold - Indicates exceedance of NEPM (2013) HIL A criteria values for Residential A Land-use

Italics **-** Indicates exceedance of NEPM (2013) EIL/ESL criteria values for Urban Residential/Public Open Space Land-use

	Indicates material is classified as General Solid Waste in accordance with NSW EPA (2014), i.e. > CT1 and ≤ SCC1 and ≤ TCLP1
	Indicates material is classified as Restricted Solid Waste in accordance with NSW EPA (2014), i.e. ≤ CT2 and ≤ SCC2 and ≤ TCLP2
	Indicates material is classified as Hazardous Solid Waste in accordance with NSW EPA (2014), i.e. > SCC2 and > TCLP2

9.2 Quality Assurance

It was considered that the field and laboratory QA/QC criteria were generally within acceptable limits indicating field sampling, storage, handling and decontamination procedures and laboratory preparation and analysis procedures were adequate for the purposes of the environmental investigation. Full details are provided in the QA/QC report in Appendix G.

10 Analysis of Results and Field Investigation

The objectives of the PSI was to identify any past or present potentially contaminating activities and to provide a preliminary assessment of the overall site contamination. The PSI comprised an assessment of the available historical data, site investigation, and limited laboratory analysis.

This section summarises the investigation findings and provides comments and recommendations regarding the contamination status of the site and requirements for further assessment.

10.1 Soil Contamination Assessment

10.1.1 Heavy Metals

Appraisal of the results indicates that the concentration levels of metals within the samples tested were below the threshold limits as detailed in National Environment Protection Measure (NEPM) for the Assessment of Site Contamination, 2013 [2], “Residential A”. Comparison to the NEPM 2013 EIL’s indicate all samples are below the EIL criteria for the Site.

10.1.2 Total Petroleum Hydrocarbons (TPH) and BTEX

Appraisal of the results indicates TPH’s and BTEX were below the threshold limits as detailed in the National Environment Protection Measure for the Assessment of Site Contamination, 2013 [2] “Residential A”.

10.1.3 Polycyclic Aromatic Hydrocarbon (PAH)

Appraisal of the results indicates PAH’s were below the threshold limits as detailed in the National Environment Protection Measure for the Assessment of Site Contamination, 2013 [2] “Residential A”.

10.1.4 Organophosphorus & Organochlorine Pesticides (OPP/OCP) & Polychlorinated Biphenyls (PCB)

Appraisal of the results indicates that the levels of OPP, OCP and PCB within the samples tested were below the threshold limits as detailed in National Environment Protection Measure for the Assessment of Site Contamination, 2013 [2] “Residential A”.

10.1.5 Acid Sulfate Soils

Review of available published data, indicates that the site is situated within no known occurrence of acid sulfate soil materials with reference to the “Department of Land and Water Conservation, Walsend Acid Sulfate Soil Risk Map”, Edition 2, dated December 1997 [5].

Due to the available data indicating no known presence of acid sulfate soils, no intrusive sampling and testing was undertaken on the subject site. Based on the available data, the presence of acid sulfate soils onsite is considered highly unlikely.

10.2 Subsurface Conditions

The subsurface conditions encountered in the bore holes are detailed on the report log sheets attached in **Appendix B** together with explanatory notes and bore location plans are attached in **Appendix A**.

The subsurface profile encountered within hand auger bores (HA1-HA6) advanced within the vicinity of the existing building structures generally comprised of silty sand fill materials overlying residual silty clay.

Fill depths were 0.40m, 0.70m and 0.20m below existing surface levels (bsl) within HA2, HA3 and HA6, respectively. Fill encountered in HA1 comprised gravel on surface to 0.05m bsl, overlying residual silty clay.

HA4 and HA5 were terminated at 0.30m due to the presence of services. Fill depths within HA4 and HA5 were to the termination depth of 0.30m. The depth of fill at these locations is unknown as the depth of fill was not penetrated.

No indication of staining or olfactory indication of hydrocarbons, nor fibrous sheeting was observed within the bore holes. Traces of slag were encountered within HA4 and HA5 and traces of steel fragments were encountered in HA2.

Two (2) boreholes (BH01 & BH02) were advanced within the existing pavement formation and the subsurface profile are summarised below:

> PAVEMENT / FILL: pavement material and associated structural filling to depths of 0.25 m and 0.4 m respectively. A Slag gravel layer was present within BH01 from approximately 0.10 m to 0.25m bsl. Both pavements were surfaced by a 35 mm thick Asphalt wearing course; overlying

> RESIDUAL SOIL: Medium to high plasticity Silty CLAY was encountered from depths of approximately 0.25 m to 0.4m below ground level to approximately 4.2 m and 6.7 m BGL within boreholes BH01and BH02 respectively. The residual clays were observed to grade to extremely weathered siltstone extremely; overlying

> SILTSTONE: Extremely weathered to distinctly weathered, thinly laminated siltstone was encountered in BH01 and BH02 at depths of approximately 4.2 m and 6.7 m to the depth of 10.18 m and 7.09 m BGL respectively

Seepage was not encountered in any of the bore holes at the time of the investigation. It should be noted that groundwater levels are likely to fluctuate with variations in climatic and site conditions.

10.3 Discussion

The subsurface profile encountered across the site generally comprised of silty sand fill materials overlying residual silty clay. Fill depths were 0.40m, 0.70m and 0.20m below existing surface levels (bsl) within HA2, HA3 and HA6, respectively. Fill encountered in HA1 comprised gravel on surface to 0.05m bsl, overlying residual silty clay. HA4 and HA5 were terminated at 0.30m due to the presence of services. Fill depths within HA4 and HA5 were to the termination depth of 0.30m.

No indication of staining or olfactory indication of hydrocarbons (with the exception of slag materials), nor fibrous sheeting was observed within the bore holes. Traces of slag were encountered within HA4 and HA5 and traces of steel fragments were encountered in HA2.

A sample of the slag material was collected and analysed with laboratory results within the adopted site criteria. It must be appreciated that the extent of slag layer beneath the pavement formation is unknown and due to heterogeneous nature of the fill / slag materials, potentially contaminated slag materials may arise.

Based on the findings of this PSI and comparison of the analytical testing undertaken to threshold limits detailed in National Environment Protection Measure (NEPM) for the Assessment of Site Contamination, 2013 [2]. “Residential A”, no indication of gross contamination has been identified on the site that exceeds thresholds.

11 Preliminary Conceptual Site Model

11.1.1 General

A Conceptual Site Model (CSM) is “a description of a site including the environmental setting, geological, hydrogeological and soil characteristics together with the nature and distribution of contaminants. Potentially exposed populations and exposure pathways are identified” (NEPM, 2013) [2]. The development of a CSM comprises an iterative process of characterising site contamination on the basis of available information or data. This Preliminary CSM has been prepared to summarise the currently known or suspected contaminants at the Site, their locations, potential receptors of these contaminants and to assess whether linkages may be present between the contaminants and receptors. This Preliminary CSM is the first iteration of the CSM process and should be updated following subsequent rounds of assessment (where applicable) when additional information becomes available.

Based on the findings of the PSI the following Potential Sources of Contamination (PSOC) have been identified on the Site:

11.1.2 Areas of Environmental Concern (AEC)

Areas of Environmental Concern (AEC) are associated with:

> Potential contamination associated with minor areas of filling and surficial disturbance on site – onsite

> Potential contamination associated with slag materials beneath pavement materials - onsite

> Potential pesticide and herbicide use within greenhouses - onsite

> Asbestos containing materials (ACM) within structures– onsite

> Potential contaminated soils beneath building pads – onsite

11.1.3 Media potentially impacted

The potential media impacted by contamination may include:

> Potentially contaminated surficial soils onsite.

> Potentially contaminated underlying soils onsite.

> Potentially contaminated fill materials onsite.

> Potentially contaminated groundwater under the site

11.1.4 Human and Ecological Receptors

The potential human and ecological receptors include the following:

> Workers involved in the potential remediation / restoration or development of the site (onsite)

> Future site users (onsite)

> Site users – students and University staff (onsite)

> Surface water runoff (offsite) into adjacent drainage channels and creeklines.

> Local residents and surrounding properties (offsite).

11.1.5 Potential Exposure Pathways

The potential exposure pathways identified include;

> Air – ingestion

> Soil – dermal / direct contact

> Vapour – Inhalation

> Lateral migration via surface water.

11.1.6 Data Gaps and Uncertainties

Based on the inspection, intrusive sampling, comparison of the analytical testing undertaken to threshold limits detailed in (NEPM), the potential contamination at this site is not considered to present a significant constraint on the proposed redevelopment of subject site. However; It must be appreciated that assessment was limited to accessible soils within the subject site and limited intrusive sampling to address identified areas of environmental concern.

The following data gaps and uncertainties regarding the assessment are detailed below:

> Limited subsurface access during assessment, due to existing structures and concrete paths.

> Limited access within existing buildings.

> Soils beneath the existing building pads were not accessible and assessed which may potentially contain fill or contaminated materials.

> The extent of slag materials within the pavement formation

> Limited pavement testing was undertaken.

> No groundwater samples collected however; groundwater contamination is considered unlikely.

12 Conclusions and Recommendations

This report represents the findings of PSI undertaken on the subject site, University of Newcastle proposed Bio-Resources facility, Callaghan NSW. The assessment aimed to address the objectives outlined in Section 1.2 of this report, namely, to assess at a preliminary / supplementary level:

> The potential for the former and current site and adjacent sites uses to be a source of contamination.
> The nature and location of contamination of soil on-site and potential for contamination extending off-site.
> Whether the contamination status of the site presents any constraint on the proposed use of the site.
> The need for any further assessment or remedial works before definitive conclusions could be made on the suitably of the site for use.

12.1 Potential for Contamination

Cardno has identified the following potential sources of contamination at or in the vicinity of the site:

> Previous industrial operations and remediation test programs for contaminated groundwater conducted at the Newcastle Institute for Energy and Resources (NIER) which was formerly the BHP Newcastle Technology Centre. The site has undergone redevelopment recently with the expansion of NIER and the redevelopment of the Shortland Waters Golf Club. As it was licenced activity, the potential for groundwater contamination is considered low.
> Potentially contaminated soils beneath the building pads.
> Extent of slag layer beneath the pavement materials is unknown.
> Potentially ACM materials contained within building structures.

12.2 Potential Acid Sulfate Soil

A Review of the *"Department of Land and Water Conservation, Wallsend Acid Sulfate Soil Risk Map", Edition 2, dated December 1997,* identifies the site is not situated within known occurrence of acid sulfate soils. As result the likelihood that Actual Acid Sulfate Soils are present at the site is considered low. This was consistent with field observations of the material during the investigation.

12.3 Soil Contamination

A limited intrusive sampling and testing regime has been undertaken to provide a supplementary assessment of the identified AEC's and to address issues identified by the desktop study. Based on the findings of this PSI and comparison of the analytical testing undertaken to threshold limits detailed in National Environment Protection Measure (NEPM) for the Assessment of Site Contamination, 2013 [2]. "Residential A", no indication of gross contamination has been identified on the site. No COPCs were detected at concentrations above the applicable Tier I screening values.

12.4 Conclusions

Based on site history and limited laboratory results, the risk of contamination to constrain the development of the site for the proposed use is unlikely. Based on limited laboratory assessment and comparison to NEPM Residential A HILs/HSLs, no indication of gross contamination has been identified on the site. No COPCs were detected at concentrations above the applicable Tier I screening values. The site is considered low to moderate risk of potential contamination based on limited laboratory results, site access limitations and the identified data gaps. As there is a potential risk for contamination within inaccessible areas and the extent of slag is unknown, an unexpected finds protocol should be developed.

12.5 Recommendations

Based on the conclusions above, Cardno recommends:

> Any soil proposed to be excavated and transported off site for disposal should be classified in accordance with the NSW EPA Waste Classification Guidelines.

> Validation soil sampling will be required once the soil excavation is complete to ensure that the residual soils are suitable for the ongoing land use

13 References

[1] NSW EPA, “"Contaminated Sites: Guidelines for Consults on Contaminated Sites,” NSW Environmental Protection Authority, 1997.

[2] National Environment Protection (Assessment of Site Contamination) Measure 1999, “Schedule B1 Guidelines on Investigation Levels For Soil and Groundwater,” National Environment Protection Council (NEPC), 16 May 2013.

[3] Lotsearch, Environmental Risk and Planning Report, 130 University Drive, Callaghan, NSW 2308, 2017.

[4] Geological Survey of Newcastle, *1:100,000 Newcastle Geological Map,* Division of Mines and Geology.

[5] Department of Land And Water Conservation, “Acid Sulfate Soil Risk Map for Wallsend (Edition 2),” NSW Department of Natural Resources, December 1997.

[6] Newcastle Local Environment Plan, Acid Sulfate Soils Map, Newcastle City Council, 2012.

[7] NSW DEC, “Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd Edition),” Department of Environment and Conservation NSW, April 2006.

14 Limitations

Cardno have performed investigation and consulting services for this project in general accordance with current professional and industry standards. The extent of testing was limited to discrete test locations and variations in ground conditions can occur between test locations that cannot be inferred or predicted.

Cardno, or any other reputable consultant, cannot provide unqualified warranties nor does it assume any liability for the site conditions not observed or accessible during the investigations. Site conditions may also change subsequent to the investigations and assessment due to ongoing use.

This report and associated documentation was undertaken for the specific purpose described in the report and shall not be relied on for other purposes. This report was prepared solely for the use by University of Newcastle and any reliance assumed by other parties on this report shall be at such parties own risk.

University of Newcastle Proposed Bio-Resources Facility

APPENDIX A

FIGURES AND PHOTOGRAPHS

University of Newcastle Proposed Bio-Resources Facility

APPENDIX B

LOGS AND EXPLANATORY NOTES

University of Newcastle Proposed Bio-Resources Facility

APPENDIX C

ANALYTICAL RESULTS

University of Newcastle Proposed Bio-Resources Facility

APPENDIX D

LOTSEARCH REPORT

University of Newcastle Proposed Bio-Resources Facility

APPENDIX E

TILTE SEARCH

University of Newcastle Proposed Bio-Resources Facility

APPENDIX F

SECTION 149 CERTIFICATE

University of Newcastle Proposed Bio-Resources Facility

APPENDIX G

QA/QC REPORT

15 References

[1] NSW EPA, ""Contaminated Sites: Guidelines for Consults on Contaminated Sites," NSW Environmental Protection Authority, 1997.

[2] National Environment Protection (Assessment of Site Contamination) Measure 1999, "Schedule B1 Guidelines on Investigation Levels For Soil and Groundwater," National Environment Protection Council (NEPC), 16 May 2013.

[3] Lotsearch, Environmental Risk and Planning Report, 130 University Drive, Callaghan, NSW 2308, 2017.

[4] Geological Survey of Newcastle, *1:100,000 Newcastle Geological Map,* Division of Mines and Geology.

[5] Department of Land And Water Conservation, "Acid Sulfate Soil Risk Map for Wallsend (Edition 2)," NSW Department of Natural Resources, December 1997.

[6] Newcastle Local Environment Plan, Acid Sulfate Soils Map, Newcastle City Council, 2012.

[7] NSW DEC, "Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd Edition)," Department of Environment and Conservation NSW, April 2006.

University of Newcastle Proposed Bio-Resources Facility

APPENDIX A

FIGURES

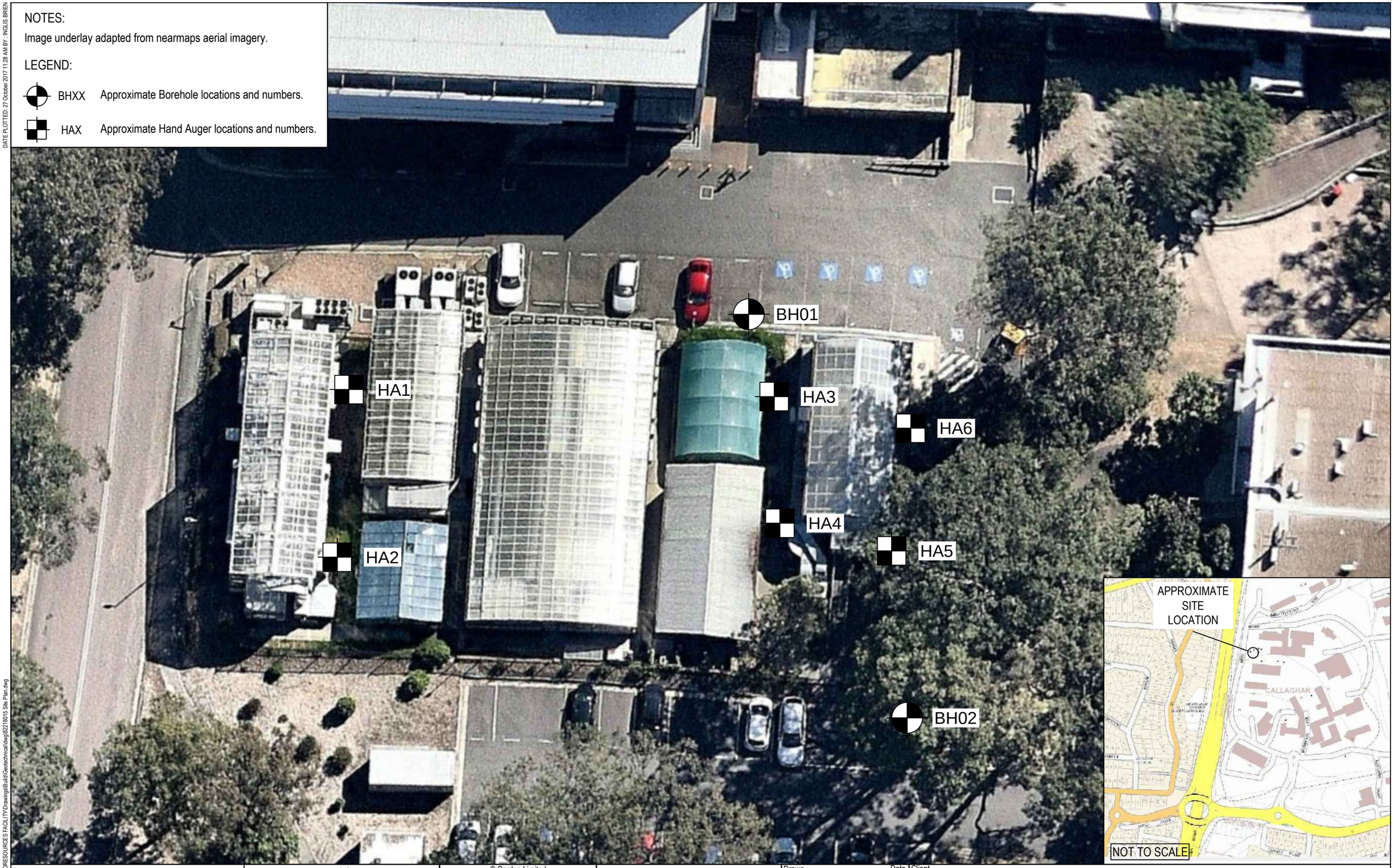
NOTES:

Image underlay adapted from nearmaps aerial imagery.

LEGEND:

BHXX Approximate Borehole locations and numbers.

HAX Approximate Hand Auger locations and numbers.



0 5 10m

SCALE 1:250 @A3

NORTH

Cardno
Shaping the Future
Cardno (NSW/ACT) Pty Ltd | ABN 95 001 145 035
Unit 1, 10 Denney Street
Broadmeadow, NSW 2292
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Web: www.cardno.com.au

Drawn	JG	Date 18/10/17
Checked	IB	Date 25/10/2017
		Date
Verified		Date
Approved		

Client: University of Newcastle

Project: Geotechnical Investigation
Bioresources Facility
Ring Road, University of Newcastle, Callaghan

Title: Site Plan

Status: FOR INFORMATION ONLY
NOT TO BE USED FOR CONSTRUCTION PURPOSES

Project Number	Scale	Size
82218015	1:250	A3

Drawing Number: DW01

Revision: A

DATE PLOTTED: 27 October 2017 11:28 AM BY : INGLIS BRIEN

XREFs:
CAD File: N:\Projects\82\PRY\80\15_UON BIORESOURCES FACILITY\Drawings\Build\Geotechnical\dwg\82218015 Site Plan.dwg

Photo 1: Wheelbarrow and existing greenhouse equipment in the south-west of the site

Photo 2: Example of site's tight access, facing north

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Dwn JG	25/10/2017 Date	Client	University of Newcastle
Chk DS	25/10/2017 Date	Project	Bioresources Facility Preliminary Site Investigation University of Newcastle, Callaghan
Des JG	Date	Status	PRELIMINARY NOT TO BE USED FOR CONSTRUCTION PURPOSES
Ver	Date	Scale	Size A4
App		Title	Site Photos
		Drawing Number	Plate 1
		Revn	A

Photo 3: Grassed area between existing greenhouses, facing north

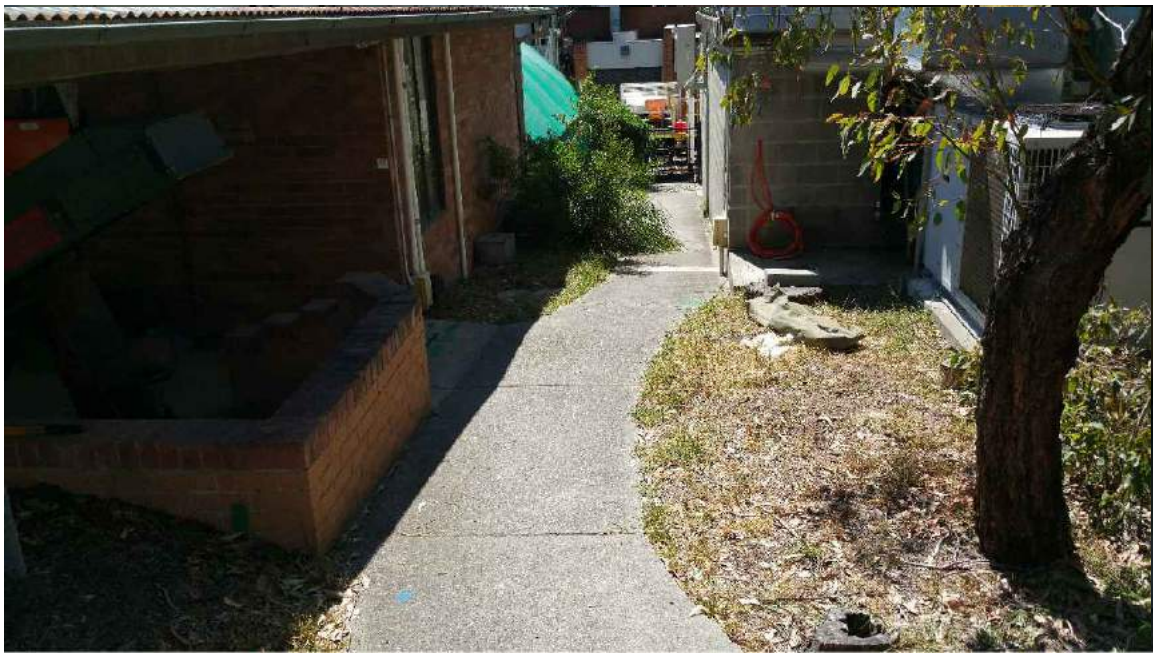

Photo 4: Typical concrete paths around the site

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Dwn JG	25/10/2017 Date	Client	University of Newcastle
Chk DS	25/10/2017 Date	Project	Bioresources Facility Preliminary Site Investigation University of Newcastle, Callaghan
Des JG	Date	Status	PRELIMINARY NOT TO BE USED FOR CONSTRUCTION PURPOSES
Ver	Date	Scale	Size A4
App		Title	Site Photos
		Drawing Number	Plate 2
		Revn	A

Photo 5: Typical paved area in carpark north of the site, facing west

Photo 6: Typical paved, confined area throughout the site

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Broadmeadow, NSW 2292
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Web: www.cardno.com.au

Dwn JG	25/10/2017 Date	Client	University of Newcastle
Chk DS	25/10/2017 Date	Project	Bioresources Facility Preliminary Site Investigation University of Newcastle, Callaghan
Des JG	Date	Status	PRELIMINARY NOT TO BE USED FOR CONSTRUCTION PURPOSES
Ver	Date	Scale	Size A4
App		Title	Site Photos
		Drawing Number	Plate 3
		Revn	A

University of Newcastle Proposed Bio-Resources Facility

APPENDIX B

LOGS AND EXPLANATORY NOTES

TESTBORE LOG

CLIENT : University of Newcastle
PROJECT : Contamination Investigation
LOCATION : Callaghan

HOLE NO : HA1
PROJECT REF : 82218015
SHEET : 1 OF 1

EQUIPMENT TYPE : Hand Auger | METHOD : Hand Auger
DATE EXCAVATED : 29/9/17 | LOGGED BY : JB | CHECKED BY :
LOCATION : See Drawing for location

GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	DYNAMIC PENETROMETER	HAND PENETRO-METER (kPa)	STRUCTURE & Other Observations
		0.0			FILL; GRAVEL, medium to coarse, sub-rounded to angular					FILL, gravel on surface
	0.05m				0.05m					
	ES-HA1				Silty CLAY, medium to high plasticity, brown					RESIDUAL
	0.15m					MC = PL	St			
Not Encountered					As above, colour change to orange to pale brown				120	HP In-situ = 120 kPa
					0.30m					
					Silty CLAY, medium to high plasticity, grey mottled orange					RESIDUAL
									170	HP In-situ = 170 kPa
	0.40m									
	ES-HA1				As above, trace of root fibres	MC = PL	St			
	0.50m				0.50m					
		0.5			Testbore HA1 terminated at 0.50 m					
					End at natural profile					
		1.0								

MOISTURE & GROUNDWATER
D - Dry
M - Moist
W - Wet
OMC - Optimum MC
PL - Plastic Limit
▶— - Water seepage/inflow
▼ - Water level

SAMPLES & FIELD TESTS
U - Undisturbed Sample
D - Disturbed Sample
ES - Environmental sample
B - Bulk Disturbed Sample
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer

CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

ROCK STRENGTH
EL - Extremely low
VL - Very low
L - Low
M - Medium
H - High
VH - Very high
EH - Extremely high

ROCK WEATHERING
RS - Residual soil
XW - Extremely weathered
DW - Distinctly weathered
SW - Slightly weathered
FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

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TESTBORE LOG

CLIENT : University of Newcastle
PROJECT : Contamination Investigation
LOCATION : Callaghan

HOLE NO : HA2
PROJECT REF : 82218015
SHEET : 1 OF 1

EQUIPMENT TYPE : Hand Auger | METHOD : Hand Auger

DATE EXCAVATED : 29/9/17 | LOGGED BY : JB | CHECKED BY :

LOCATION : See Drawing for location

GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	DYNAMIC PENETROMETER	HAND PENETRO-METER (kPa)	STRUCTURE & Other Observations
Not Encountered		0.0			FILL; Silty SAND, fine to coarse grained, brown, with gravel					FILL; scattered gravel on surface
	0.05m ES-HA2-DUP/TRIP				@0.05m trace of steel fragments					
	0.15m					D - M				
	0.40m				0.40m					
	ES-HA2				Silty CLAY, low to medium plasticity, dark brown, with sand	MC = PL	F		X	RESIDUAL HP In-situ = 70 kPa
	0.50m	0.5			0.50m Silty CLAY, medium to high plasticity, grey to brown mottled orange	MC = PL	St		X	RESIDUAL HP In-situ = 150 kPa
	0.60m ES-HA2									
	0.70m				0.70m Testbore HA2 terminated at 0.70 m End at natural profile					
		1.0								

MOISTURE & GROUNDWATER
D - Dry
M - Moist
W - Wet
OMC - Optimum MC
PL - Plastic Limit
▶— - Water seepage/inflow
▼ - Water level

SAMPLES & FIELD TESTS
U - Undisturbed Sample
D - Disturbed Sample
ES - Environmental sample
B - Bulk Disturbed Sample
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer

CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

ROCK STRENGTH
EL - Extremely low
VL - Very low
L - Low
M - Medium
H - High
VH - Very high
EH - Extremely high

ROCK WEATHERING
RS - Residual soil
XW - Extremely weathered
DW - Distinctly weathered
SW - Slightly weathered
FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO (NSW/ACT) PTY LTD

TESTBORE LOG

CLIENT : University of Newcastle
PROJECT : Contamination Investigation
LOCATION : Callaghan

HOLE NO : HA3
PROJECT REF : 82218015
SHEET : 1 OF 1

EQUIPMENT TYPE : Hand Auger | METHOD : Hand Auger
DATE EXCAVATED : 29/9/17 | LOGGED BY : JB | CHECKED BY :
LOCATION : See Drawing for location

GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	DYNAMIC PENETROMETER	HAND PENETRO-METER (kPa) 100 200 300 400	STRUCTURE & Other Observations
		0.0			FILL; Silty SAND, fine to coarse grained, grey to brown, with gravel and trace of root fibres					FILL/TOPSOIL
	0.05m ES-HA3					D - M				
	0.15m				0.15m FILL; SAND, fine to medium grained, pale yellow					FILL; service trench backfill
Not Encountered						D - M				
	0.50m ES-HA3	0.5								
	0.60m									
	0.70m ES-HA3				0.70m Silty CLAY, low to medium plasticity, grey mottled red					RESIDUAL
	0.80m				0.80m	MC = PL	St		×	HP In-situ = 170 kPa
					Testbore HA3 terminated at 0.80 m End at natural profile					
		1.0								

MOISTURE & GROUNDWATER
D - Dry
M - Moist
W - Wet
OMC - Optimum MC
PL - Plastic Limit
▶— - Water seepage/inflow
▼ - Water level

SAMPLES & FIELD TESTS
U - Undisturbed Sample
D - Disturbed Sample
ES - Environmental sample
B - Bulk Disturbed Sample
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer

CONSISTENCY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

ROCK STRENGTH
EL - Extremely low
VL - Very low
L - Low
M - Medium
H - High
VH - Very high
EH - Extremely high

ROCK WEATHERING
RS - Residual soil
XW - Extremely weathered
DW - Distinctly weathered
SW - Slightly weathered
FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

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TESTBORE LOG

CLIENT : University of Newcastle
PROJECT : Contamination Investigation
LOCATION : Callaghan

HOLE NO : HA4
PROJECT REF : 82218015
SHEET : 1 OF 1

EQUIPMENT TYPE : Hand Auger | METHOD : Hand Auger

DATE EXCAVATED : 29/9/17 | LOGGED BY : JB | CHECKED BY :

LOCATION : See Drawing for location

GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	DYNAMIC PENETROMETER	HAND PENETRO-METER (kPa) 100 200 300 400	STRUCTURE & Other Observations
Not Encountered	0.05m ES-HA4 0.15m	0.0			FILL; Silty SAND, fine to coarse grained, grey to brown, with gravel and trace of slag	D - M				FILL; scattered grass on surface
					0.30m Testbore HA4 terminated at 0.30 m Possible services					
		0.5								
		1.0								

MOISTURE & GROUNDWATER
- D - Dry
- M - Moist
- W - Wet
- OMC - Optimum MC
- PL - Plastic Limit
- ▶— - Water seepage/inflow
- ▼ - Water level

SAMPLES & FIELD TESTS
- U - Undisturbed Sample
- D - Disturbed Sample
- ES - Environmental sample
- B - Bulk Disturbed Sample
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer

CONSISTENCY
- VS - Very Soft
- S - Soft
- F - Firm
- St - Stiff
- VSt - Very Stiff
- H - Hard

RELATIVE DENSITY
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

ROCK STRENGTH
- EL - Extremely low
- VL - Very low
- L - Low
- M - Medium
- H - High
- VH - Very high
- EH - Extremely high

ROCK WEATHERING
- RS - Residual soil
- XW - Extremely weathered
- DW - Distinctly weathered
- SW - Slightly weathered
- FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

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TESTBORE LOG

CLIENT : University of Newcastle
PROJECT : Contamination Investigation
LOCATION : Callaghan

HOLE NO : HA5
PROJECT REF : 82218015
SHEET : 1 OF 1

EQUIPMENT TYPE : Hand Auger | METHOD : Hand Auger

DATE EXCAVATED : 29/9/17 | LOGGED BY : JB | CHECKED BY :

LOCATION : See Drawing for location

GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	DYNAMIC PENETROMETER	HAND PENETRO-METER (kPa) 100 200 300 400	STRUCTURE & Other Observations
Not Encountered	0.05m ES-HA5 0.15m 0.20m	0.0			FILL; Silty SAND, fine to coarse grained, grey to brown, with gravel and trace of slag	D - M				FILL
	ES-HA5 0.30m				0.20m FILL; GRAVEL, fine to coarse, sub-rounded to sub-angular 0.30m					FILL; potential drainage trench.
		0.5			Testbore HA5 terminated at 0.30 m Possible services					
		1.0								

MOISTURE & GROUNDWATER
- D - Dry
- M - Moist
- W - Wet
- OMC - Optimum MC
- PL - Plastic Limit
- ▶— - Water seepage/inflow
- ▼ - Water level

SAMPLES & FIELD TESTS
- U - Undisturbed Sample
- D - Disturbed Sample
- ES - Environmental sample
- B - Bulk Disturbed Sample
- SPT - Standard Penetration Test
- HP - Hand/Pocket Penetrometer

CONSISTENCY
- VS - Very Soft
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- St - Stiff
- VSt - Very Stiff
- H - Hard

RELATIVE DENSITY
- VL - Very Loose
- L - Loose
- MD - Medium Dense
- D - Dense
- VD - Very Dense

ROCK STRENGTH
- EL - Extremely low
- VL - Very low
- L - Low
- M - Medium
- H - High
- VH - Very high
- EH - Extremely high

ROCK WEATHERING
- RS - Residual soil
- XW - Extremely weathered
- DW - Distinctly weathered
- SW - Slightly weathered
- FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO (NSW/ACT) PTY LTD

TESTBORE LOG

CLIENT : University of Newcastle
PROJECT : Contamination Investigation
LOCATION : Callaghan

HOLE NO : HA6
PROJECT REF : 82218015
SHEET : 1 OF 1

EQUIPMENT TYPE : Hand Auger | METHOD : Hand Auger

DATE EXCAVATED : 29/9/17 | LOGGED BY : JB | CHECKED BY :

LOCATION : See Drawing for location

GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, plasticity or particle characteristic, colour Rock Type, grain size, colour Secondary and minor components	MOISTURE / WEATHERING	CONSISTENCY / REL DENSITY / ROCK STRENGTH	DYNAMIC PENETROMETER	HAND PENETRO-METER (kPa)	STRUCTURE & Other Observations
Not Encountered	0.05m ES-HA6 0.15m 0.40m ES-HA6 0.50m	0.0 0.5 1.0			FILL; Silty SAND, fine to coarse grained, grey to brown, with gravel and root fibres 0.20m Silty CLAY, medium plasticity, grey to brown 0.50m Testbore HA6 terminated at 0.50 m End at natural profile	D - M MC < PL			100 200 300 400	FILL/TOPSOIL RESIDUAL

MOISTURE & GROUNDWATER
D - Dry
M - Moist
W - Wet
OMC - Optimum MC
PL - Plastic Limit
▶— - Water seepage/inflow
▼ - Water level

SAMPLES & FIELD TESTS
U - Undisturbed Sample
D - Disturbed Sample
ES - Environmental sample
B - Bulk Disturbed Sample
SPT - Standard Penetration Test
HP - Hand/Pocket Penetrometer

CONSISTENCY
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S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard

RELATIVE DENSITY
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

ROCK STRENGTH
EL - Extremely low
VL - Very low
L - Low
M - Medium
H - High
VH - Very high
EH - Extremely high

ROCK WEATHERING
RS - Residual soil
XW - Extremely weathered
DW - Distinctly weathered
SW - Slightly weathered
FR - Fresh rock

See Explanatory Notes for details of abbreviations & basis of descriptions.

CARDNO (NSW/ACT) PTY LTD

Explanatory Notes

The methods of description and classification of soils and rocks used in this report are based on *Australian Standard 1726-2017 Geotechnical Site Investigations* Code. Material descriptions are deduced from field observation or engineering examination, and may be appended or confirmed by in situ or laboratory testing. The information is dependent on the scope of investigation, the extent of sampling and testing, and the inherent variability of the conditions encountered.

Subsurface investigation may be conducted by one or a combination of the following methods.

Method	
Test Pitting: excavation/trench	
BH	Backhoe bucket
EX	Excavator bucket
X	Existing excavation
Natural Exposure: existing natural rock or soil exposure	
Manual drilling: hand operated tools	
HA	Hand Auger
Continuous sample drilling	
PT	Push tube
PS	Percussion sampling
SON	Sonic drilling
Hammer drilling	
AH	Air hammer
AT	Air track
Spiral flight auger drilling	
AS	Large diameter short spiral auger
AD/V	Continuous flight spiral auger: V-Bit
AD/T	Continuous flight spiral auger: TC-Bit
HFA	Continuous hollow flight auger
Rotary non-core drilling	
WS	Washbore (mud drilling)
RR	Rock roller
Rotary core drilling	
PQ	85 mm core (wire line core barrel)
HQ	63.5 mm (diamond-tipped core barrel)
NMLC	51.94 mm (diamond-tipped core barrel)
NQ	47 mm (diamond-tipped core barrel)
Concrete coring	
DT	Diatube

Sampling is conducted to facilitate further assessment of selected materials encountered.

Sampling method	
Soil sampling	
B	Bulk disturbed sample
D	Disturbed sample
ES	Environmental sample
SPT	Standard Penetration Test sample
U#	Undisturbed tube sample (# mm diameter)
Water sampling	
W	Water sample
EW	Environmental water sample

Field testing may be conducted as a means of assessment of the in-situ conditions of materials encountered.

Field testing	
SPT	Standard Penetration Test
HP/PP	Hand/Pocket penetrometer
Dynamic Penetrometers (blows per 100/150 mm)	
	DCP Dynamic Cone Penetrometer
	PSP Perth Sand Penetrometer
VS	Vane Shear
PBT	Plate Bearing Test
PID	Photo Ionisation Detector

If encountered with SPT or dynamic penetrometer testing, refusal (R), virtual refusal (VR) or hammer bouncing (HB) may be noted.

The quality of the rock can be assessed by the degree of fracturing and the following.

Rock quality description	
TCR	Total core recovery (%) (Length of core recovered, divided by the length of the core run)
RQD	Rock Quality Designation (%) (sum of axial lengths of core greater than 100 mm long divided by the length of the core run)

Notes on groundwater conditions encountered may include the following.

Groundwater	
Not encountered	Excavation is dry in the short term
Not observed	Groundwater observation not possible
Seepage	Groundwater seeping into hole
Inflow	Groundwater flowing/flooding into hole

Perched groundwater may result in a misleading indication of the depth of the true water table. Groundwater levels are also likely to fluctuate with variations in climatic and site conditions.

Notes on the stability of excavation may include the following.

Rock quality description	
Stable	No obvious/gross short term instability noted
Spalling	Material falling into excavation, may be described as minor or major spalling
Unstable	Collapse of the majority, or one or more face of the excavation

Explanatory Notes – General soil Description

The methods of description and classification of soils and rocks used in this report are *based on Australian Standard 1726-2017 Geotechnical Site Investigations Code*. In practice, if the material can be remoulded by hand in its field condition or in water it is described as a soil. The dominant soil constituent is given in capital letters, with secondary textures in lower case. In general, descriptions cover: soil type, strength / relative density, moisture, colour, plasticity and inclusions.

Soil types are described according to the dominant particle size on the basis of the following particle sizes

Soil classification	Particle size (mm)	
CLAY	< 0.002	
SILT	0.002 to 0.075	
SAND	*fine*	0.075 to 0.21
	medium	0.21 to 0.60
	coarse	0.60 to 2.36
GRAVEL	*fine*	2.36 to 6.7
	medium	6.7 to 19
	coarse	19 to 63
COBBLES	63 to 200	
BOULDERS	> 200	

Soil types are qualified by the presence of minor components on the basis of field examination or grading.

Terminology	In coarse grained soils		In fine grained soils
	% Fines	% coarse	% coarse
Trace	≤ 5	≤ 15	≤ 15
With	>5 to ≤12	>15 to ≤30	>15 to ≤ 30

The strength of cohesive soils is classified by engineering assessment or field/laboratory testing as follows

Strength	Symbol	Undrained shear strength (kPa)
Very Soft	VS	≤12
Soft	S	>12 to ≤25
Firm	F	>25 to ≤50
Stiff	St	>50 to ≤100
Very Stiff	VSt	>100 to ≤200
Hard	H	>200

Cohesionless soils are classified on the basis of relative density as follows.

Strength	Symbol	Density Index (%)
Very Loose	VL	≤15
Loose	L	>15 to ≤35
Medium Dense	MD	>35 to ≤65
Dense	D	>65 to ≤85
Very Dense	VD	>85

The plasticity of cohesive soils is defined as follows.

Plasticity	LL for Silt (%)	LL for Clay (%)
Low	≤50	≤35
Medium	N/A	>35 to ≤50
High	>50	>50

The moisture condition of soil is described by appearance and feel and may be described in relation to the Plastic Limit (PL) or Optimum Moisture Content (OMC). For granular soils, the following guide is adopted.

Moisture condition	Description
Dry	Non-cohesive and free-running
Moist	Cool feel and darkened colour, soils tends to stick together
Wet	Cool feel and darkened colour, free-water forms when handling, soils tend to cohere

The following guide is adopted for cohesive soils.

Moisture condition	Description
Moist, dry of PL	w < PL
Moist, near PL	$w \approx$ PL
Moist, wet of PL	w > PL
Wet, near LL	$w \approx$ LL
Wet, wet of LL	w > LL

The structure of the soil may be described as follows.

Zoning	Description
Layer	Continuous across exposure or sample
Lens	Discontinuous layer
Pocket	Irregular inclusion of different material

The structure may include; defects such as softened zones, fissures, cracks, joints and root-holes; and coarse grained soils may be described as strongly/weakly cemented.

The soil origin may also be noted if possible to deduce.

Soil origin	Description
Fill	Man-made deposits or disturbed material
Topsoil	Material affected by roots and root fibres
Colluvial soil	Transported down slopes by gravity
Aeolian soil	Transported and deposited by wind
Estuarine soil	Deposited in coastal estuaries
Alluvial soil	Deposited by streams and rivers
Lacustrine soil	Deposited in freshwater lakes
Marine soil	Deposited in marine environment
Extremely weathered material	Developed from in-situ weathering, with structure/fabric of parent rock intact
Residual soil	Developed from in-situ weathering, with structure/fabric of parent rock but with soil strength properties

The origin of the soil generally cannot be deduced on the appearance of the material and may be assumed based on further geological evidence or field observation. Where there is doubt, the terms 'possibly' or 'probably' shall be used.

Explanatory Notes – General Rock Description

The methods of description and classification of soils and rocks used in this report are *based on Australian Standard 1726-2017 Geotechnical Site Investigations Code*. In practice, if the material can be remoulded by hand in its field condition or in water it is described as a soil. The dominant soil constituent is given in capital letters, with secondary textures in lower case. In general, descriptions cover: soil type, strength / relative density, moisture, colour, plasticity and inclusions and where applicable, the defect types, shape, roughness and coating/infill.

Sedimentary rock types are generally described according to the predominant grain size as follows

Rock Type	Description
Sedimentary	Deposited, carbonate (porous or non-porous), volcanic ejection
Igneous	Felsic (much quartz, pale), Intermediate or mafic(little quartz, dark)
Metamorphic	Foliated or non-foliated
Duricrust	Cementing minerology (iron oxides or hydroxides, silica, calcium, carbonate, gypsum)

The classification of rock weathering is described based on definitions outlined in AS 1726-2017 as follows

Term	Symbol	Definition
Residual Soil	RS	Soil developed on extremely weathered rock; mass structure and substance are no longer evident
Extremely weathered	XW	Weathered to such an extent that it has 'soil' properties. Mass structure and substance still visible
Distinctly weathered	DW	Strength usually changed and may be highly discoloured. Porosity may be increased by leaching, or decreased due to deposition in pores
Slightly weathered	SW	Slightly discoloured; little/no change of strength from fresh rock
Fresh	FR	Rock shows no sign of decomposition or staining

The rock strength can be defined based on point load index as follows.

Term	Symbol	Point Load Index I_{s50} (MPa)
Very Low	VL	0.03 to 0.1
Low	L	0.1 to 0.3
Medium	M	0.3 to 1
High	H	1 to 3
Very High	VH	3 to 10
Extremely High	EH	> 10

It is important to note that the rock material strength as above is distinct from the rock mass strength can be significantly weaker due to the influence of defects.

For preliminary assessment and in cases where no point load testing is available, the rock strength may be assessed using the field guide specified in AS 1726-2017.

The defect spacing and bedding thickness of rocks measured normal to defects of the same set or bedding can be described as follows.

Definition	Defect spacing (mm)
Thinly laminated	< 6
Laminated	6 to 20
Very thinly bedded	20 to 60
Thinly bedded	60 to 200
Medium bedded	200 to 600
Thickly bedded	600 to 2000
Very thickly bedded	> 2000

Defects in rock mass are described by the following

Terms		Terms	
Joint	JT	Sheared zone	SZ
Bed parting	BP	Sheared surface	SS
Contact	CO	Seam	SM
Dyke	DK	Crushed Seam	CS
Decomposed zone	DZ	Infilled Seam	IS
Fracture	FC	Foliation	FL
Fracture Zone	FZ	Vein	VN

The shape and roughness of defects in the rock mass are described using the following terms

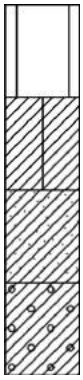
Planarity		Roughness	
Planar	PR	Very Rough	VR
Curved	CU	Rough	R
Undulating	U	Smooth	S
Irregular	IR	Polished	POL
Stepped	ST	Slickensided	SL

The coating or infill associated with defects in rock mass are described as follows

Definition	Symbol	Description
Clean	CN	No visible coating
Stain	SN	No visible coating; surfaces are discoloured
Veneer	VNR	Visible coating of soil or mineral, too thin to measure; may be patchy
Coating	CT	Visible coating or infilling of soil or mineral substance (up to 1 mm)

Graphics Symbol Index

CLAYS



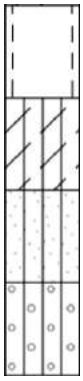
CLAY

Silty CLAY

Sandy CLAY

Gravelly CLAY

SILTS



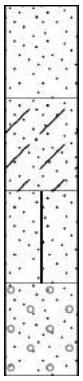
SILT

Clayey SILT

Sandy SILT

Gravelly SILT

SANDS



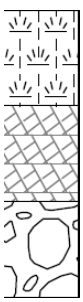
SAND

Clayey SAND

Silty SAND

Gravelly SAND

OTHER SOILS

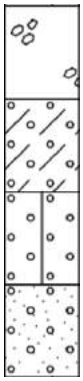


High plasticity ORGANIC CLAYS & SILTS

TOPSOIL

COBBLES & BOULDERS

GRAVELS



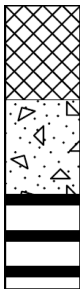
GRAVEL

Clayey GRAVEL

Silty GRAVEL

Sandy GRAVEL

FILL STRATA

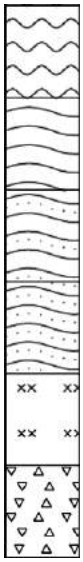


FILL

CONCRETE

ASPHALT

METAMORPHIC ROCK



SLATE/PHYLLITE

SCHIST

GNEISS

QUARTZITE

SERPENTINE

HORNFELS

SEDIMENTARY ROCKS

CONGLOMERATE

BRECCIA

SANDSTONE

SILTSTONE

CLAYSTONE

MUDSTONE

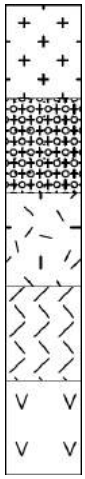
SHALE

COAL

LIMESTONE

TUFF

IGNEOUS ROCK



GRANITE

RHYOLITE

BASALT

DOLERITE

VOLCANIC

University of Newcastle Proposed Bio-Resources Facility

APPENDIX C

ANALYTICAL RESULTS

CHAIN OF CUSTODY RECORD

Cardno
Shaping the Future

LAB Name	
Address	

Client	Cardno Pty Ltd PO Box 74 Broadmeadow NSW 2292	
Contact	Malcolm Adrien	
Sampled by	Malcolm Adrien	
Project Ref:	82218015	

Contact Numbers	
Phone	0249 494300
Fax	0249 654666

E-mail	malcolm.adrien@cardno.com.au	ian.piper@cardno.com.au

(invoice to geotech@cardno.com.au)

Date Results Required	Standard TAT

Laboratory LIMS ID	Client Sample ID	Date Sampled	Matrix: Soil	Matrix: Water	Containers/Preservation: Soil Jar (G) Nat. Orange	0.5-1.0 litre (G) Nat. Yellow	0.1-1.0 litre (P) Nat. Green	50mL VOA Vial (G) H_2SO_4 Maroon	0.1-1.0 litre (P) H_2SO_4 Maroon	0.2-1.0 litre (G) H_2SO_4 Maroon	0.1-0.2 (P) Filtered?? Y=Yes, N=No (HNO_3) Red	0.2l (P) NaOH Blue	Other	Analysis Required: CL17	TRH	BTEX	8 Metals (Total)		
	HA1 0.05-0.15	29/09/2017	☒		☒														
1	HA1 0.4-0.5	29/09/2017	☒		☒									☒					
2	HA2 0.05-0.15	29/09/2017	☒		☒									☒					
	HA2 0.4-0.5	29/09/2017	☒		☒														
	HA2 0.6-0.7	29/09/2017	☒		☒														
	HA3 0.05-0.15	29/09/2017	☒		☒														
	HA3 0.5-0.6	29/09/2017	☒		☒														
3	HA3 0.7-0.8	29/09/2017	☒		☒									☒					
4	HA4 0.05-0.15	29/09/2017	☒		☒									☒					
5	HA5 0.05-0.15	29/09/2017	☒		☒									☒					
	HA5 0.2-0.3	29/09/2017	☒		☒														
	HA6 0.05-0.15	29/09/2017	☒		☒														
6	HA6 0.4-0.5	29/09/2017	☒		☒									☒					
7	RIN	29/09/2017		☒													☒		
8	TRIP SPIKE	29/09/2017	☒		☒										☒	☒			
9	TRIP BLANK	29/09/2017	☒		☒										☒	☒			
10	DUP	29/09/2017	☒		☒									☒					
✓	TRIP	29/09/2017	☒		☒									☒					

SGS EHS Alexandria Laboratory

SE171022 COC
Received: 04 – Oct – 2017

Released by: Samuel Blane Signature Date/Time 3/10/17
Received by: Suba Signature Date/Time 04/10/17 @ 11:20

Custody Seals Intact? / Samples Received Chilled?

SAMPLE RECEIPT ADVICE

SE171022

CLIENT DETAILS

Contact	Malcolm Adrien
Client	CARDNO GEOTECH SOLUTIONS PTY LTD
Address	34/205-207 Albany Street North Gosford NSW 2250
Telephone	61 2 4320 1000
Facsimile	61 2 4324 3251
Email	malcolm.adrien@cardno.com.au
Project	**82218015**
Order Number	**CARDNO140915065**
Samples	10

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
Samples Received	Wed 4/10/2017
Report Due	Tue 10/10/2017
SGS Reference	**SE171022**

SUBMISSION DETAILS

This is to confirm that 10 samples were received on Wednesday 4/10/2017. Results are expected to be ready by COB Tuesday 10/10/2017.
Please quote SGS reference SE171022 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	SGS	Sample cooling method	Ice Bricks
Samples received in correct containers	Yes	Sample counts by matrix	9 Soil, 1 Water
Date documentation received	4/10/2017	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	13.3°C	Sufficient sample for analysis	Yes
Turnaround time requested	Standard		

Unless otherwise instructed, water and bulk samples will be held for one month from date of report, and soil samples will be held for two months.

COMMENTS

TRIP - Forwarded to Eurofins
7 Soil samples have been placed on hold as no tests have been assigned for them by the client. These samples will not be processed.

SAMPLE RECEIPT ADVICE

SE171022

CLIENT DETAILS

Client CARDNO GEOTECH SOLUTIONS PTY LTD

Project 82218015

SUMMARY OF ANALYSIS

No.	Sample ID	OC Pesticides in Soil	OP Pesticides in Soil	PAH (Polynuclear Aromatic Hydrocarbons) in Soil	PCBs in Soil	Total Recoverable Elements in Soil/Waste	TRH (Total Recoverable Hydrocarbons) in Soil	VOC's in Soil	Volatile Petroleum Hydrocarbons in Soil
001	HA1 0.4-0.5	29	14	26	11	7	10	12	8
002	HA2 0.05-0.15	29	14	26	11	7	10	12	8
003	HA3 0.7-0.8	29	14	26	11	7	10	12	8
004	HA4 0.05-0.15	29	14	26	11	7	10	12	8
005	HA5 0.05-0.15	29	14	26	11	7	10	12	8
006	HA6 0.4-0.5	29	14	26	11	7	10	12	8
008	TRIP SPIKE	-	-	-	-	-	-	12	-
009	TRIP BLANK	-	-	-	-	-	10	12	8
010	DUP	29	14	26	11	7	10	12	8

CONTINUED OVERLEAF

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

SAMPLE RECEIPT ADVICE

SE171022

CLIENT DETAILS

Client CARDNO GEOTECH SOLUTIONS PTY LTD

Project 82218015

SUMMARY OF ANALYSIS

No.	Sample ID	Mercury (total) in Water	Mercury in Soil	Moisture Content	Trace Metals (Total) in Water by ICPMS
001	HA1 0.4-0.5	-	1	1	-
002	HA2 0.05-0.15	-	1	1	-
003	HA3 0.7-0.8	-	1	1	-
004	HA4 0.05-0.15	-	1	1	-
005	HA5 0.05-0.15	-	1	1	-
006	HA6 0.4-0.5	-	1	1	-
007	RIN	1	-	-	7
009	TRIP BLANK	-	-	1	-
010	DUP	-	1	1	-

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Malcolm Adrien
Client	CARDNO GEOTECH SOLUTIONS PTY LTD
Address	34/205-207 Albany Street North Gosford NSW 2250
Telephone	61 2 4320 1000
Facsimile	61 2 4324 3251
Email	malcolm.adrien@cardno.com.au
Project	**82218015**
Order Number	**CARDNO140915065**
Samples	10

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE171022 R0**
Date Received	4/10/2017
Date Reported	10/10/2017

COMMENTS

Accredited for compliance with ISO/IEC 17025- Testing. NATA accredited laboratory 2562(4354).

SIGNATORIES

Dong Liang
Metals/Inorganics Team Leader

Kamrul Ahsan
Senior Chemist

Ly Kim Ha
Organic Section Head

VOC's in Soil [AN433] Tested: 5/10/2017

PARAMETER	UOM	LOR	HA1 0.4-0.5 SOIL - 29/9/2017 SE171022.001	HA2 0.05-0.15 SOIL - 29/9/2017 SE171022.002	HA3 0.7-0.8 SOIL - 29/9/2017 SE171022.003	HA4 0.05-0.15 SOIL - 29/9/2017 SE171022.004	HA5 0.05-0.15 SOIL - 29/9/2017 SE171022.005
Benzene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	<0.1	**0.2**	**0.3**
m/p-xylene	mg/kg	0.2	<0.2	**0.3**	<0.2	**1.1**	**2.0**
o-xylene	mg/kg	0.1	<0.1	**0.1**	<0.1	**0.4**	**0.8**
Total Xylenes	mg/kg	0.3	<0.3	**0.4**	<0.3	**1.5**	**2.8**
Total BTEX	mg/kg	0.6	<0.6	<0.6	<0.6	**1.7**	**3.2**
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

PARAMETER	UOM	LOR	HA6 0.4-0.5 SOIL - 29/9/2017 SE171022.006	TRIP SPIKE SOIL - 29/9/2017 SE171022.008	TRIP BLANK SOIL - 29/9/2017 SE171022.009	DUP SOIL - 29/9/2017 SE171022.010
Benzene	mg/kg	0.1	<0.1	[89%]	<0.1	<0.1
Toluene	mg/kg	0.1	<0.1	[96%]	<0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1	[97%]	<0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2	[100%]	<0.2	**0.3**
o-xylene	mg/kg	0.1	<0.1	[100%]	<0.1	**0.2**
Total Xylenes	mg/kg	0.3	<0.3	-	<0.3	**0.4**
Total BTEX	mg/kg	0.6	<0.6	-	<0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1	-	<0.1	<0.1

Volatile Petroleum Hydrocarbons in Soil [AN433] Tested: 5/10/2017

PARAMETER	UOM	LOR	HA1 0.4-0.5 SOIL - 29/9/2017 SE171022.001	HA2 0.05-0.15 SOIL - 29/9/2017 SE171022.002	HA3 0.7-0.8 SOIL - 29/9/2017 SE171022.003	HA4 0.05-0.15 SOIL - 29/9/2017 SE171022.004	HA5 0.05-0.15 SOIL - 29/9/2017 SE171022.005
TRH C6-C9	mg/kg	20	<20	<20	<20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25	<25	<25

PARAMETER	UOM	LOR	HA6 0.4-0.5 SOIL - 29/9/2017 SE171022.006	TRIP BLANK SOIL - 29/9/2017 SE171022.009	DUP SOIL - 29/9/2017 SE171022.010
TRH C6-C9	mg/kg	20	<20	<20	<20
Benzene (F0)	mg/kg	0.1	<0.1	<0.1	<0.1
TRH C6-C10	mg/kg	25	<25	<25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	<25

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 6/10/2017

PARAMETER	UOM	LOR	HA1 0.4-0.5 SOIL - 29/9/2017 SE171022.001	HA2 0.05-0.15 SOIL - 29/9/2017 SE171022.002	HA3 0.7-0.8 SOIL - 29/9/2017 SE171022.003	HA4 0.05-0.15 SOIL - 29/9/2017 SE171022.004	HA5 0.05-0.15 SOIL - 29/9/2017 SE171022.005
TRH C10-C14	mg/kg	20	<20	<20	<20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45	<45	<45	<45
TRH C29-C36	mg/kg	45	<45	<45	<45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100	<100	<100	<100
TRH >C10-C16 (F2)	mg/kg	25	<25	<25	<25	<25	<25
TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	<25	<25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90	<90	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	<110	<110	<110	<110
TRH C10-C40 Total	mg/kg	210	<210	<210	<210	<210	<210

PARAMETER	UOM	LOR	HA6 0.4-0.5 SOIL - 29/9/2017 SE171022.006	TRIP BLANK SOIL - 29/9/2017 SE171022.009	DUP SOIL - 29/9/2017 SE171022.010
TRH C10-C14	mg/kg	20	<20	<20	<20
TRH C15-C28	mg/kg	45	<45	<45	<45
TRH C29-C36	mg/kg	45	<45	<45	<45
TRH C37-C40	mg/kg	100	<100	<100	<100
TRH >C10-C16 (F2)	mg/kg	25	<25	<25	<25
TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	<25	<25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90	<90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120	<120	<120
TRH C10-C36 Total	mg/kg	110	<110	<110	<110
TRH C10-C40 Total	mg/kg	210	<210	<210	<210

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 6/10/2017

PARAMETER	UOM	LOR	HA1 0.4-0.5 SOIL - 29/9/2017 SE171022.001	HA2 0.05-0.15 SOIL - 29/9/2017 SE171022.002	HA3 0.7-0.8 SOIL - 29/9/2017 SE171022.003	HA4 0.05-0.15 SOIL - 29/9/2017 SE171022.004	HA5 0.05-0.15 SOIL - 29/9/2017 SE171022.005
Naphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	0.3	<0.1	0.2	<0.1
Anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1	1.3	<0.1	1.3	0.4
Pyrene	mg/kg	0.1	<0.1	1.2	<0.1	1.1	0.3
Benzo(a)anthracene	mg/kg	0.1	<0.1	0.5	<0.1	0.5	0.2
Chrysene	mg/kg	0.1	<0.1	0.4	<0.1	0.4	0.2
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	0.5	<0.1	0.4	0.2
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	0.4	<0.1	0.4	0.2
Benzo(a)pyrene	mg/kg	0.1	<0.1	0.5	<0.1	0.3	0.2
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	0.5	<0.1	0.3	0.2
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	0.4	<0.1	0.3	0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ	0.2	<0.2	0.7	<0.2	0.5	0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	0.8	<0.3	0.6	0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2	0.7	<0.2	0.5	0.3
Total PAH (18)	mg/kg	0.8	<0.8	5.8	<0.8	5.1	1.9
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	5.8	<0.8	5.1	1.9

PARAMETER	UOM	LOR	HA6 0.4-0.5 SOIL - 29/9/2017 SE171022.006	DUP SOIL - 29/9/2017 SE171022.010
Naphthalene	mg/kg	0.1	<0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	0.1	0.2
Anthracene	mg/kg	0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	0.2	0.6
Pyrene	mg/kg	0.1	0.1	0.6
Benzo(a)anthracene	mg/kg	0.1	<0.1	0.3
Chrysene	mg/kg	0.1	<0.1	0.2
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1	0.2
Benzo(k)fluoranthene	mg/kg	0.1	<0.1	0.2
Benzo(a)pyrene	mg/kg	0.1	<0.1	0.2
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1	0.2
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1	0.2
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ	0.2	<0.2	0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3	0.4
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2	0.4
Total PAH (18)	mg/kg	0.8	<0.8	3.0
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8	3.0

OC Pesticides in Soil [AN420] Tested: 6/10/2017

PARAMETER	UOM	LOR	HA1 0.4-0.5 SOIL - 29/9/2017 SE171022.001	HA2 0.05-0.15 SOIL - 29/9/2017 SE171022.002	HA3 0.7-0.8 SOIL - 29/9/2017 SE171022.003	HA4 0.05-0.15 SOIL - 29/9/2017 SE171022.004	HA5 0.05-0.15 SOIL - 29/9/2017 SE171022.005
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1	<1	<1	<1

OC Pesticides in Soil [AN420] Tested: 6/10/2017 (continued)

PARAMETER	UOM	LOR	HA6 0.4-0.5 SOIL - 29/9/2017 SE171022.006	DUP SOIL - 29/9/2017 SE171022.010
Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1
Alpha BHC	mg/kg	0.1	<0.1	<0.1
Lindane	mg/kg	0.1	<0.1	<0.1
Heptachlor	mg/kg	0.1	<0.1	<0.1
Aldrin	mg/kg	0.1	<0.1	<0.1
Beta BHC	mg/kg	0.1	<0.1	<0.1
Delta BHC	mg/kg	0.1	<0.1	<0.1
Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1
o,p'-DDE	mg/kg	0.1	<0.1	<0.1
Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2
Gamma Chlordane	mg/kg	0.1	<0.1	<0.1
Alpha Chlordane	mg/kg	0.1	<0.1	<0.1
trans-Nonachlor	mg/kg	0.1	<0.1	<0.1
p,p'-DDE	mg/kg	0.1	<0.1	<0.1
Dieldrin	mg/kg	0.2	<0.2	<0.2
Endrin	mg/kg	0.2	<0.2	<0.2
o,p'-DDD	mg/kg	0.1	<0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1	<0.1
Beta Endosulfan	mg/kg	0.2	<0.2	<0.2
p,p'-DDD	mg/kg	0.1	<0.1	<0.1
p,p'-DDT	mg/kg	0.1	<0.1	<0.1
Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1
Methoxychlor	mg/kg	0.1	<0.1	<0.1
Endrin Ketone	mg/kg	0.1	<0.1	<0.1
Isodrin	mg/kg	0.1	<0.1	<0.1
Mirex	mg/kg	0.1	<0.1	<0.1
Total CLP OC Pesticides	mg/kg	1	<1	<1

OP Pesticides in Soil [AN420] Tested: 6/10/2017

PARAMETER	UOM	LOR	HA1 0.4-0.5 SOIL - 29/9/2017 SE171022.001	HA2 0.05-0.15 SOIL - 29/9/2017 SE171022.002	HA3 0.7-0.8 SOIL - 29/9/2017 SE171022.003	HA4 0.05-0.15 SOIL - 29/9/2017 SE171022.004	HA5 0.05-0.15 SOIL - 29/9/2017 SE171022.005
Dichlorvos	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	<1.7	<1.7	<1.7

PARAMETER	UOM	LOR	HA6 0.4-0.5 SOIL - 29/9/2017 SE171022.006	DUP SOIL - 29/9/2017 SE171022.010
Dichlorvos	mg/kg	0.5	<0.5	<0.5
Dimethoate	mg/kg	0.5	<0.5	<0.5
Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5
Fenitrothion	mg/kg	0.2	<0.2	<0.2
Malathion	mg/kg	0.2	<0.2	<0.2
Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2
Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2
Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2
Methidathion	mg/kg	0.5	<0.5	<0.5
Ethion	mg/kg	0.2	<0.2	<0.2
Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2
Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7

PCBs in Soil [AN420] Tested: 6/10/2017

PARAMETER	UOM	LOR	HA1 0.4-0.5 SOIL - 29/9/2017 SE171022.001	HA2 0.05-0.15 SOIL - 29/9/2017 SE171022.002	HA3 0.7-0.8 SOIL - 29/9/2017 SE171022.003	HA4 0.05-0.15 SOIL - 29/9/2017 SE171022.004	HA5 0.05-0.15 SOIL - 29/9/2017 SE171022.005
Arochlor 1016	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1221	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1232	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1242	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1248	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1254	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1260	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1262	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arochlor 1268	mg/kg	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	<1	<1	<1	<1	<1

PARAMETER	UOM	LOR	HA6 0.4-0.5 SOIL - 29/9/2017 SE171022.006	DUP SOIL - 29/9/2017 SE171022.010
Arochlor 1016	mg/kg	0.2	<0.2	<0.2
Arochlor 1221	mg/kg	0.2	<0.2	<0.2
Arochlor 1232	mg/kg	0.2	<0.2	<0.2
Arochlor 1242	mg/kg	0.2	<0.2	<0.2
Arochlor 1248	mg/kg	0.2	<0.2	<0.2
Arochlor 1254	mg/kg	0.2	<0.2	<0.2
Arochlor 1260	mg/kg	0.2	<0.2	<0.2
Arochlor 1262	mg/kg	0.2	<0.2	<0.2
Arochlor 1268	mg/kg	0.2	<0.2	<0.2
Total PCBs (Arochlors)	mg/kg	1	<1	<1

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 6/10/2017

PARAMETER	UOM	LOR	HA1 0.4-0.5 SOIL - 29/9/2017 SE171022.001	HA2 0.05-0.15 SOIL - 29/9/2017 SE171022.002	HA3 0.7-0.8 SOIL - 29/9/2017 SE171022.003	HA4 0.05-0.15 SOIL - 29/9/2017 SE171022.004	HA5 0.05-0.15 SOIL - 29/9/2017 SE171022.005
Arsenic, As	mg/kg	3	<3	3	46	4	6
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	3.8	40	7.9	16	13
Copper, Cu	mg/kg	0.5	8.2	11	20	36	24
Lead, Pb	mg/kg	1	7	20	15	14	30
Nickel, Ni	mg/kg	0.5	3.1	6.8	2.9	4.8	8.3
Zinc, Zn	mg/kg	0.5	22	200	25	120	230

PARAMETER	UOM	LOR	HA6 0.4-0.5 SOIL - 29/9/2017 SE171022.006	DUP SOIL - 29/9/2017 SE171022.010
Arsenic, As	mg/kg	3	6	3
Cadmium, Cd	mg/kg	0.3	<0.3	<0.3
Chromium, Cr	mg/kg	0.3	9.1	26
Copper, Cu	mg/kg	0.5	8.2	11
Lead, Pb	mg/kg	1	15	20
Nickel, Ni	mg/kg	0.5	2.2	6.5
Zinc, Zn	mg/kg	0.5	43	210

Mercury in Soil [AN312] Tested: 9/10/2017

PARAMETER	UOM	LOR	HA1 0.4-0.5 SOIL - 29/9/2017 SE171022.001	HA2 0.05-0.15 SOIL - 29/9/2017 SE171022.002	HA3 0.7-0.8 SOIL - 29/9/2017 SE171022.003	HA4 0.05-0.15 SOIL - 29/9/2017 SE171022.004	HA5 0.05-0.15 SOIL - 29/9/2017 SE171022.005
Mercury	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05	<0.05

PARAMETER	UOM	LOR	HA6 0.4-0.5 SOIL - 29/9/2017 SE171022.006	DUP SOIL - 29/9/2017 SE171022.010
Mercury	mg/kg	0.05	<0.05	<0.05

Moisture Content [AN002] Tested: 6/10/2017

PARAMETER	UOM	LOR	HA1 0.4-0.5 SOIL - 29/9/2017 SE171022.001	HA2 0.05-0.15 SOIL - 29/9/2017 SE171022.002	HA3 0.7-0.8 SOIL - 29/9/2017 SE171022.003	HA4 0.05-0.15 SOIL - 29/9/2017 SE171022.004	HA5 0.05-0.15 SOIL - 29/9/2017 SE171022.005
% Moisture	%w/w	0.5	22	4.9	17	3.1	8.5

PARAMETER	UOM	LOR	HA6 0.4-0.5 SOIL - 29/9/2017 SE171022.006	TRIP BLANK SOIL - 29/9/2017 SE171022.009	DUP SOIL - 29/9/2017 SE171022.010
% Moisture	%w/w	0.5	16	<0.5	5.4

Trace Metals (Total) in Water by ICPMS [AN022/AN318] Tested: 6/10/2017

PARAMETER	UOM	LOR	RIN WATER - 29/9/2017 SE171022.007
Total Arsenic	µg/L	1	<1
Total Cadmium	µg/L	0.1	<0.1
Total Chromium	µg/L	1	<1
Total Copper	µg/L	1	<1
Total Nickel	µg/L	1	<1
Total Lead	µg/L	1	<1
Total Zinc	µg/L	5	<5

Mercury (total) in Water [AN311(Perth) /AN312] Tested: 6/10/2017

PARAMETER	UOM	LOR	RIN WATER - 29/9/2017 SE171022.007
Total Mercury	mg/L	0.0001	<0.0001

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN022/AN318	Following acid digestion of un filtered sample, determination of elements at trace level in waters by ICP-MS technique, in accordance with USEPA 6020A.
AN022	The water sample is digested with Nitric Acid and made up to the original volume similar to APHA3030E.
AN040/AN320	A portion of sample is digested with nitric acid to decompose organic matter and hydrochloric acid to complete the digestion of metals. The digest is then analysed by ICP OES with metals results reported on the dried sample basis. Based on USEPA method 200.8 and 6010C.
AN040	A portion of sample is digested with Nitric acid to decompose organic matter and Hydrochloric acid to complete the digestion of metals and then filtered for analysis by ASS or ICP as per USEPA Method 200.8.
AN311(Perth) /AN312	Mercury by Cold Vapour AAS in Waters: Mercury ions taken from unfiltered sample are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500.
AN312	Mercury by Cold Vapour AAS in Soils: After digestion with nitric acid, hydrogen peroxide and hydrochloric acid, mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). F2 is reported directly and also corrected by subtracting Naphthalene (from VOC method AN433) where available.
AN403	Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Petroleum Hydrocarbons (TPH) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents.
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN420	SVOC Compounds: Semi-Volatile Organic Compounds (SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
		NVL	Not validated.	LOR	Limit of Reporting.
**	Indicative data, theoretical holding time exceeded.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

STATEMENT OF QA/QC PERFORMANCE

SE171022 R0

CLIENT DETAILS

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Project	**82218015**
Order Number	**CARDNO140915065**
Samples	10

LABORATORY DETAILS

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Email	au.environmental.sydney@sgs.com
SGS Reference	**SE171022 R0**
Date Received	04 Oct 2017
Date Reported	10 Oct 2017

COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document and was supplied by the Client.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met with the exception of the following:

Duplicate	Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES	2 items

SAMPLE SUMMARY

HOLDING TIME SUMMARY

SE171022 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS “Field Sampling Guide for Containers and Holding Time” (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

Mercury (total) in Water

Method: ME-(AU)-[ENV]AN311(Perth) /AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RIN	SE171022.007	LB133725	29 Sep 2017	04 Oct 2017	27 Oct 2017	06 Oct 2017	27 Oct 2017	06 Oct 2017

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
HA1 0.4-0.5	SE171022.001	LB133902	29 Sep 2017	04 Oct 2017	27 Oct 2017	09 Oct 2017	27 Oct 2017	10 Oct 2017
HA2 0.05-0.15	SE171022.002	LB133902	29 Sep 2017	04 Oct 2017	27 Oct 2017	09 Oct 2017	27 Oct 2017	10 Oct 2017
HA3 0.7-0.8	SE171022.003	LB133902	29 Sep 2017	04 Oct 2017	27 Oct 2017	09 Oct 2017	27 Oct 2017	10 Oct 2017
HA4 0.05-0.15	SE171022.004	LB133902	29 Sep 2017	04 Oct 2017	27 Oct 2017	09 Oct 2017	27 Oct 2017	10 Oct 2017
HA5 0.05-0.15	SE171022.005	LB133902	29 Sep 2017	04 Oct 2017	27 Oct 2017	09 Oct 2017	27 Oct 2017	10 Oct 2017
HA6 0.4-0.5	SE171022.006	LB133902	29 Sep 2017	04 Oct 2017	27 Oct 2017	09 Oct 2017	27 Oct 2017	10 Oct 2017
DUP	SE171022.010	LB133902	29 Sep 2017	04 Oct 2017	27 Oct 2017	09 Oct 2017	27 Oct 2017	10 Oct 2017

Moisture Content

Method: ME-(AU)-[ENV]AN002

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
HA1 0.4-0.5	SE171022.001	LB133754	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	11 Oct 2017	09 Oct 2017
HA2 0.05-0.15	SE171022.002	LB133754	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	11 Oct 2017	09 Oct 2017
HA3 0.7-0.8	SE171022.003	LB133754	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	11 Oct 2017	09 Oct 2017
HA4 0.05-0.15	SE171022.004	LB133754	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	11 Oct 2017	09 Oct 2017
HA5 0.05-0.15	SE171022.005	LB133754	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	11 Oct 2017	09 Oct 2017
HA6 0.4-0.5	SE171022.006	LB133754	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	11 Oct 2017	09 Oct 2017
TRIP BLANK	SE171022.009	LB133754	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	11 Oct 2017	09 Oct 2017
DUP	SE171022.010	LB133754	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	11 Oct 2017	09 Oct 2017

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
HA1 0.4-0.5	SE171022.001	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA2 0.05-0.15	SE171022.002	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA3 0.7-0.8	SE171022.003	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA4 0.05-0.15	SE171022.004	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA5 0.05-0.15	SE171022.005	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA6 0.4-0.5	SE171022.006	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
TRIP BLANK	SE171022.009	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
DUP	SE171022.010	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
HA1 0.4-0.5	SE171022.001	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA2 0.05-0.15	SE171022.002	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA3 0.7-0.8	SE171022.003	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA4 0.05-0.15	SE171022.004	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA5 0.05-0.15	SE171022.005	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA6 0.4-0.5	SE171022.006	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
TRIP BLANK	SE171022.009	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
DUP	SE171022.010	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
HA1 0.4-0.5	SE171022.001	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA2 0.05-0.15	SE171022.002	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA3 0.7-0.8	SE171022.003	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA4 0.05-0.15	SE171022.004	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA5 0.05-0.15	SE171022.005	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA6 0.4-0.5	SE171022.006	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
TRIP BLANK	SE171022.009	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
DUP	SE171022.010	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
HA1 0.4-0.5	SE171022.001	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA2 0.05-0.15	SE171022.002	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA3 0.7-0.8	SE171022.003	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA4 0.05-0.15	SE171022.004	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017

HOLDING TIME SUMMARY

SE171022 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS “Field Sampling Guide for Containers and Holding Time” (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

PCBs in Soil (continued)

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
HA5 0.05-0.15	SE171022.005	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA6 0.4-0.5	SE171022.006	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
TRIP BLANK	SE171022.009	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
DUP	SE171022.010	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
HA1 0.4-0.5	SE171022.001	LB133774	29 Sep 2017	04 Oct 2017	28 Mar 2018	06 Oct 2017	28 Mar 2018	09 Oct 2017
HA2 0.05-0.15	SE171022.002	LB133774	29 Sep 2017	04 Oct 2017	28 Mar 2018	06 Oct 2017	28 Mar 2018	09 Oct 2017
HA3 0.7-0.8	SE171022.003	LB133774	29 Sep 2017	04 Oct 2017	28 Mar 2018	06 Oct 2017	28 Mar 2018	09 Oct 2017
HA4 0.05-0.15	SE171022.004	LB133774	29 Sep 2017	04 Oct 2017	28 Mar 2018	06 Oct 2017	28 Mar 2018	09 Oct 2017
HA5 0.05-0.15	SE171022.005	LB133774	29 Sep 2017	04 Oct 2017	28 Mar 2018	06 Oct 2017	28 Mar 2018	09 Oct 2017
HA6 0.4-0.5	SE171022.006	LB133774	29 Sep 2017	04 Oct 2017	28 Mar 2018	06 Oct 2017	28 Mar 2018	09 Oct 2017
DUP	SE171022.010	LB133774	29 Sep 2017	04 Oct 2017	28 Mar 2018	06 Oct 2017	28 Mar 2018	09 Oct 2017

Trace Metals (Total) in Water by ICPMS

Method: ME-(AU)-[ENV]AN022/AN318

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
RIN	SE171022.007	LB133718	29 Sep 2017	04 Oct 2017	28 Mar 2018	06 Oct 2017	28 Mar 2018	06 Oct 2017

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
HA1 0.4-0.5	SE171022.001	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA2 0.05-0.15	SE171022.002	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA3 0.7-0.8	SE171022.003	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA4 0.05-0.15	SE171022.004	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA5 0.05-0.15	SE171022.005	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
HA6 0.4-0.5	SE171022.006	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
TRIP BLANK	SE171022.009	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017
DUP	SE171022.010	LB133739	29 Sep 2017	04 Oct 2017	13 Oct 2017	06 Oct 2017	15 Nov 2017	09 Oct 2017

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
HA1 0.4-0.5	SE171022.001	LB133698	29 Sep 2017	04 Oct 2017	13 Oct 2017	05 Oct 2017	14 Nov 2017	10 Oct 2017
HA2 0.05-0.15	SE171022.002	LB133698	29 Sep 2017	04 Oct 2017	13 Oct 2017	05 Oct 2017	14 Nov 2017	10 Oct 2017
HA3 0.7-0.8	SE171022.003	LB133698	29 Sep 2017	04 Oct 2017	13 Oct 2017	05 Oct 2017	14 Nov 2017	10 Oct 2017
HA4 0.05-0.15	SE171022.004	LB133698	29 Sep 2017	04 Oct 2017	13 Oct 2017	05 Oct 2017	14 Nov 2017	10 Oct 2017
HA5 0.05-0.15	SE171022.005	LB133698	29 Sep 2017	04 Oct 2017	13 Oct 2017	05 Oct 2017	14 Nov 2017	10 Oct 2017
HA6 0.4-0.5	SE171022.006	LB133698	29 Sep 2017	04 Oct 2017	13 Oct 2017	05 Oct 2017	14 Nov 2017	10 Oct 2017
TRIP SPIKE	SE171022.008	LB133698	29 Sep 2017	04 Oct 2017	13 Oct 2017	05 Oct 2017	14 Nov 2017	10 Oct 2017
TRIP BLANK	SE171022.009	LB133698	29 Sep 2017	04 Oct 2017	13 Oct 2017	05 Oct 2017	14 Nov 2017	10 Oct 2017
DUP	SE171022.010	LB133698	29 Sep 2017	04 Oct 2017	13 Oct 2017	05 Oct 2017	14 Nov 2017	10 Oct 2017

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
HA1 0.4-0.5	SE171022.001	LB133698	29 Sep 2017	04 Oct 2017	13 Oct 2017	05 Oct 2017	14 Nov 2017	10 Oct 2017
HA2 0.05-0.15	SE171022.002	LB133698	29 Sep 2017	04 Oct 2017	13 Oct 2017	05 Oct 2017	14 Nov 2017	10 Oct 2017
HA3 0.7-0.8	SE171022.003	LB133698	29 Sep 2017	04 Oct 2017	13 Oct 2017	05 Oct 2017	14 Nov 2017	10 Oct 2017
HA4 0.05-0.15	SE171022.004	LB133698	29 Sep 2017	04 Oct 2017	13 Oct 2017	05 Oct 2017	14 Nov 2017	10 Oct 2017
HA5 0.05-0.15	SE171022.005	LB133698	29 Sep 2017	04 Oct 2017	13 Oct 2017	05 Oct 2017	14 Nov 2017	10 Oct 2017
HA6 0.4-0.5	SE171022.006	LB133698	29 Sep 2017	04 Oct 2017	13 Oct 2017	05 Oct 2017	14 Nov 2017	10 Oct 2017
TRIP SPIKE	SE171022.008	LB133698	29 Sep 2017	04 Oct 2017	13 Oct 2017	05 Oct 2017	14 Nov 2017	10 Oct 2017
TRIP BLANK	SE171022.009	LB133698	29 Sep 2017	04 Oct 2017	13 Oct 2017	05 Oct 2017	14 Nov 2017	10 Oct 2017
DUP	SE171022.010	LB133698	29 Sep 2017	04 Oct 2017	13 Oct 2017	05 Oct 2017	14 Nov 2017	10 Oct 2017

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Tetrachloro-m-xylene (TCMX) (Surrogate)	HA1 0.4-0.5	SE171022.001	%	60 - 130%	94
	HA2 0.05-0.15	SE171022.002	%	60 - 130%	89
	HA3 0.7-0.8	SE171022.003	%	60 - 130%	93
	HA4 0.05-0.15	SE171022.004	%	60 - 130%	90
	HA5 0.05-0.15	SE171022.005	%	60 - 130%	82
	HA6 0.4-0.5	SE171022.006	%	60 - 130%	91
	DUP	SE171022.010	%	60 - 130%	90

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	HA1 0.4-0.5	SE171022.001	%	60 - 130%	88
	HA2 0.05-0.15	SE171022.002	%	60 - 130%	94
	HA3 0.7-0.8	SE171022.003	%	60 - 130%	88
	HA4 0.05-0.15	SE171022.004	%	60 - 130%	100
	HA5 0.05-0.15	SE171022.005	%	60 - 130%	98
	HA6 0.4-0.5	SE171022.006	%	60 - 130%	98
	DUP	SE171022.010	%	60 - 130%	96
d14-p-terphenyl (Surrogate)	HA1 0.4-0.5	SE171022.001	%	60 - 130%	88
	HA2 0.05-0.15	SE171022.002	%	60 - 130%	90
	HA3 0.7-0.8	SE171022.003	%	60 - 130%	88
	HA4 0.05-0.15	SE171022.004	%	60 - 130%	90
	HA5 0.05-0.15	SE171022.005	%	60 - 130%	94
	HA6 0.4-0.5	SE171022.006	%	60 - 130%	96
	DUP	SE171022.010	%	60 - 130%	90

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	HA1 0.4-0.5	SE171022.001	%	70 - 130%	88
	HA2 0.05-0.15	SE171022.002	%	70 - 130%	94
	HA3 0.7-0.8	SE171022.003	%	70 - 130%	88
	HA4 0.05-0.15	SE171022.004	%	70 - 130%	100
	HA5 0.05-0.15	SE171022.005	%	70 - 130%	98
	HA6 0.4-0.5	SE171022.006	%	70 - 130%	98
	DUP	SE171022.010	%	70 - 130%	96
d14-p-terphenyl (Surrogate)	HA1 0.4-0.5	SE171022.001	%	70 - 130%	88
	HA2 0.05-0.15	SE171022.002	%	70 - 130%	90
	HA3 0.7-0.8	SE171022.003	%	70 - 130%	88
	HA4 0.05-0.15	SE171022.004	%	70 - 130%	90
	HA5 0.05-0.15	SE171022.005	%	70 - 130%	94
	HA6 0.4-0.5	SE171022.006	%	70 - 130%	96
	DUP	SE171022.010	%	70 - 130%	90
d5-nitrobenzene (Surrogate)	HA1 0.4-0.5	SE171022.001	%	70 - 130%	92
	HA2 0.05-0.15	SE171022.002	%	70 - 130%	92
	HA3 0.7-0.8	SE171022.003	%	70 - 130%	90
	HA4 0.05-0.15	SE171022.004	%	70 - 130%	92
	HA5 0.05-0.15	SE171022.005	%	70 - 130%	100
	HA6 0.4-0.5	SE171022.006	%	70 - 130%	98
	DUP	SE171022.010	%	70 - 130%	96

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Tetrachloro-m-xylene (TCMX) (Surrogate)	HA1 0.4-0.5	SE171022.001	%	60 - 130%	94
	HA2 0.05-0.15	SE171022.002	%	60 - 130%	89
	HA3 0.7-0.8	SE171022.003	%	60 - 130%	93
	HA4 0.05-0.15	SE171022.004	%	60 - 130%	90
	HA5 0.05-0.15	SE171022.005	%	60 - 130%	82
	HA6 0.4-0.5	SE171022.006	%	60 - 130%	91
	DUP	SE171022.010	%	60 - 130%	90

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOC's in Soil (continued)

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	HA1 0.4-0.5	SE171022.001	%	60 - 130%	84
	HA2 0.05-0.15	SE171022.002	%	60 - 130%	101
	HA3 0.7-0.8	SE171022.003	%	60 - 130%	97
	HA4 0.05-0.15	SE171022.004	%	60 - 130%	107
	HA5 0.05-0.15	SE171022.005	%	60 - 130%	101
	HA6 0.4-0.5	SE171022.006	%	60 - 130%	96
	TRIP SPIKE	SE171022.008	%	60 - 130%	111
	TRIP BLANK	SE171022.009	%	60 - 130%	103
	DUP	SE171022.010	%	60 - 130%	110
d4-1,2-dichloroethane (Surrogate)	HA1 0.4-0.5	SE171022.001	%	60 - 130%	86
	HA2 0.05-0.15	SE171022.002	%	60 - 130%	92
	HA3 0.7-0.8	SE171022.003	%	60 - 130%	91
	HA4 0.05-0.15	SE171022.004	%	60 - 130%	103
	HA5 0.05-0.15	SE171022.005	%	60 - 130%	96
	HA6 0.4-0.5	SE171022.006	%	60 - 130%	99
	TRIP SPIKE	SE171022.008	%	60 - 130%	116
	TRIP BLANK	SE171022.009	%	60 - 130%	106
	DUP	SE171022.010	%	60 - 130%	106
d8-toluene (Surrogate)	HA1 0.4-0.5	SE171022.001	%	60 - 130%	85
	HA2 0.05-0.15	SE171022.002	%	60 - 130%	95
	HA3 0.7-0.8	SE171022.003	%	60 - 130%	92
	HA4 0.05-0.15	SE171022.004	%	60 - 130%	107
	HA5 0.05-0.15	SE171022.005	%	60 - 130%	99
	HA6 0.4-0.5	SE171022.006	%	60 - 130%	102
	TRIP SPIKE	SE171022.008	%	60 - 130%	119
	TRIP BLANK	SE171022.009	%	60 - 130%	109
	DUP	SE171022.010	%	60 - 130%	108
Dibromofluoromethane (Surrogate)	HA1 0.4-0.5	SE171022.001	%	60 - 130%	81
	HA2 0.05-0.15	SE171022.002	%	60 - 130%	72
	HA3 0.7-0.8	SE171022.003	%	60 - 130%	74
	HA4 0.05-0.15	SE171022.004	%	60 - 130%	83
	HA5 0.05-0.15	SE171022.005	%	60 - 130%	80
	HA6 0.4-0.5	SE171022.006	%	60 - 130%	78
	TRIP SPIKE	SE171022.008	%	60 - 130%	90
	TRIP BLANK	SE171022.009	%	60 - 130%	83
	DUP	SE171022.010	%	60 - 130%	84

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	HA1 0.4-0.5	SE171022.001	%	60 - 130%	84
	HA2 0.05-0.15	SE171022.002	%	60 - 130%	101
	HA3 0.7-0.8	SE171022.003	%	60 - 130%	97
	HA4 0.05-0.15	SE171022.004	%	60 - 130%	107
	HA5 0.05-0.15	SE171022.005	%	60 - 130%	101
	HA6 0.4-0.5	SE171022.006	%	60 - 130%	96
	TRIP BLANK	SE171022.009	%	60 - 130%	103
	DUP	SE171022.010	%	60 - 130%	110
d4-1,2-dichloroethane (Surrogate)	HA1 0.4-0.5	SE171022.001	%	60 - 130%	86
	HA2 0.05-0.15	SE171022.002	%	60 - 130%	92
	HA3 0.7-0.8	SE171022.003	%	60 - 130%	91
	HA4 0.05-0.15	SE171022.004	%	60 - 130%	103
	HA5 0.05-0.15	SE171022.005	%	60 - 130%	96
	HA6 0.4-0.5	SE171022.006	%	60 - 130%	99
	TRIP BLANK	SE171022.009	%	60 - 130%	106
	DUP	SE171022.010	%	60 - 130%	106
d8-toluene (Surrogate)	HA1 0.4-0.5	SE171022.001	%	60 - 130%	85
	HA2 0.05-0.15	SE171022.002	%	60 - 130%	95
	HA3 0.7-0.8	SE171022.003	%	60 - 130%	92
	HA4 0.05-0.15	SE171022.004	%	60 - 130%	107
	HA5 0.05-0.15	SE171022.005	%	60 - 130%	99
	HA6 0.4-0.5	SE171022.006	%	60 - 130%	102

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Volatile Petroleum Hydrocarbons in Soil (continued) — **Method: ME-(AU)-[ENV]AN433**

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
d8-toluene (Surrogate)	TRIP BLANK	SE171022.009	%	60 - 130%	109
	DUP	SE171022.010	%	60 - 130%	108
Dibromofluoromethane (Surrogate)	HA1 0.4-0.5	SE171022.001	%	60 - 130%	81
	HA2 0.05-0.15	SE171022.002	%	60 - 130%	72
	HA3 0.7-0.8	SE171022.003	%	60 - 130%	74
	HA4 0.05-0.15	SE171022.004	%	60 - 130%	83
	HA5 0.05-0.15	SE171022.005	%	60 - 130%	80
	HA6 0.4-0.5	SE171022.006	%	60 - 130%	78
	TRIP BLANK	SE171022.009	%	60 - 130%	83
	DUP	SE171022.010	%	60 - 130%	84

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Number	Parameter	Units	LOR	Result
LB133902.001	Mercury	mg/kg	0.05	<0.05

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB133739.001		Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1
		Alpha BHC	mg/kg	0.1	<0.1
		Lindane	mg/kg	0.1	<0.1
		Heptachlor	mg/kg	0.1	<0.1
		Aldrin	mg/kg	0.1	<0.1
		Beta BHC	mg/kg	0.1	<0.1
		Delta BHC	mg/kg	0.1	<0.1
		Heptachlor epoxide	mg/kg	0.1	<0.1
		Alpha Endosulfan	mg/kg	0.2	<0.2
		Gamma Chlordane	mg/kg	0.1	<0.1
		Alpha Chlordane	mg/kg	0.1	<0.1
		p,p'-DDE	mg/kg	0.1	<0.1
		Dieldrin	mg/kg	0.2	<0.2
		Endrin	mg/kg	0.2	<0.2
		Beta Endosulfan	mg/kg	0.2	<0.2
		p,p'-DDD	mg/kg	0.1	<0.1
		p,p'-DDT	mg/kg	0.1	<0.1
		Endosulfan sulphate	mg/kg	0.1	<0.1
		Endrin Aldehyde	mg/kg	0.1	<0.1
		Methoxychlor	mg/kg	0.1	<0.1
		Endrin Ketone	mg/kg	0.1	<0.1
		Isodrin	mg/kg	0.1	<0.1
		Mirex	mg/kg	0.1	<0.1
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	93

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB133739.001		Dichlorvos	mg/kg	0.5	<0.5
		Dimethoate	mg/kg	0.5	<0.5
		Diazinon (Dimpylate)	mg/kg	0.5	<0.5
		Fenitrothion	mg/kg	0.2	<0.2
		Malathion	mg/kg	0.2	<0.2
		Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2
		Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2
		Bromophos Ethyl	mg/kg	0.2	<0.2
		Methidathion	mg/kg	0.5	<0.5
		Ethion	mg/kg	0.2	<0.2
		Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2
	Surrogates	2-fluorobiphenyl (Surrogate)	%	-	102
		d14-p-terphenyl (Surrogate)	%	-	104

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number	Parameter	Units	LOR	Result
LB133739.001	Naphthalene	mg/kg	0.1	<0.1
	2-methylnaphthalene	mg/kg	0.1	<0.1
	1-methylnaphthalene	mg/kg	0.1	<0.1
	Acenaphthylene	mg/kg	0.1	<0.1
	Acenaphthene	mg/kg	0.1	<0.1
	Fluorene	mg/kg	0.1	<0.1
	Phenanthrene	mg/kg	0.1	<0.1
	Anthracene	mg/kg	0.1	<0.1
	Fluoranthene	mg/kg	0.1	<0.1
	Pyrene	mg/kg	0.1	<0.1
	Benzo(a)anthracene	mg/kg	0.1	<0.1
	Chrysene	mg/kg	0.1	<0.1
	Benzo(a)pyrene	mg/kg	0.1	<0.1

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB133739.001		Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
		Dibenzo(ah)anthracene	mg/kg	0.1	<0.1
		Benzo(ghi)perylene	mg/kg	0.1	<0.1
		Total PAH (18)	mg/kg	0.8	<0.8
	Surrogates	d5-nitrobenzene (Surrogate)	%	-	102
		2-fluorobiphenyl (Surrogate)	%	-	102
		d14-p-terphenyl (Surrogate)	%	-	104

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB133739.001		Arochlor 1016	mg/kg	0.2	<0.2
		Arochlor 1221	mg/kg	0.2	<0.2
		Arochlor 1232	mg/kg	0.2	<0.2
		Arochlor 1242	mg/kg	0.2	<0.2
		Arochlor 1248	mg/kg	0.2	<0.2
		Arochlor 1254	mg/kg	0.2	<0.2
		Arochlor 1260	mg/kg	0.2	<0.2
		Arochlor 1262	mg/kg	0.2	<0.2
		Arochlor 1268	mg/kg	0.2	<0.2
		Total PCBs (Arochlors)	mg/kg	1	<1
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	%	-	93

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Number	Parameter	Units	LOR	Result
LB133774.001	Arsenic, As	mg/kg	3	<3
	Cadmium, Cd	mg/kg	0.3	<0.3
	Chromium, Cr	mg/kg	0.3	<0.3
	Copper, Cu	mg/kg	0.5	<0.5
	Lead, Pb	mg/kg	1	<1
	Nickel, Ni	mg/kg	0.5	<0.5
	Zinc, Zn	mg/kg	0.5	<0.5

Trace Metals (Total) in Water by ICPMS

Method: ME-(AU)-[ENV]AN022/AN318

Sample Number	Parameter	Units	LOR	Result
LB133718.001	Total Arsenic	µg/L	1	<1
	Total Cadmium	µg/L	0.1	<0.1
	Total Copper	µg/L	1	<1
	Total Lead	µg/L	1	<1
	Total Nickel	µg/L	1	<1
	Total Zinc	µg/L	5	<5

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR	Result
LB133739.001	TRH C10-C14	mg/kg	20	<20
	TRH C15-C28	mg/kg	45	<45
	TRH C29-C36	mg/kg	45	<45
	TRH C37-C40	mg/kg	100	<100
	TRH C10-C36 Total	mg/kg	110	<110

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB133698.001	Monocyclic Aromatic	Benzene	mg/kg	0.1	<0.1
	Hydrocarbons	Toluene	mg/kg	0.1	<0.1
		Ethylbenzene	mg/kg	0.1	<0.1
		m/p-xylene	mg/kg	0.2	<0.2
		o-xylene	mg/kg	0.1	<0.1
	Polycyclic VOCs	Naphthalene	mg/kg	0.1	<0.1
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	87
		d4-1,2-dichloroethane (Surrogate)	%	-	88
		d8-toluene (Surrogate)	%	-	89
		Bromofluorobenzene (Surrogate)	%	-	89
	Totals	Total BTEX	mg/kg	0.6	<0.6

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Volatile Petroleum Hydrocarbons in Soil — **Method: ME-(AU)-[ENV]AN433**

Sample Number		Parameter	Units	LOR	Result
LB133698.001		TRH C6-C9	mg/kg	20	<20
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	87
		d4-1,2-dichloroethane (Surrogate)	%	-	88
		d8-toluene (Surrogate)	%	-	89

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE171022.010	LB133902.014	Mercury	mg/kg	0.05	<0.05	<0.05	193	0
SE171127.006	LB133902.024	Mercury	mg/kg	0.05	0.00748698530	0.0057698125	200	0

Moisture Content

Method: ME-(AU)-[ENV]AN002

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE171022.009	LB133754.011	% Moisture	%w/w	0.5	<0.5	<0.5	200	0
SE171022.010	LB133754.013	% Moisture	%w/w	0.5	5.4	5.3	49	3

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE170990.002	LB133739.014		Hexachlorobenzene (HCB)	mg/kg	0.1	0	0	200	0
			Alpha BHC	mg/kg	0.1	0	0	200	0
			Lindane	mg/kg	0.1	0	0	200	0
			Heptachlor	mg/kg	0.1	0	0	200	0
			Aldrin	mg/kg	0.1	0	0	200	0
			Beta BHC	mg/kg	0.1	0	0	200	0
			Delta BHC	mg/kg	0.1	0	0	200	0
			Heptachlor epoxide	mg/kg	0.1	0	0	200	0
			o,p'-DDE	mg/kg	0.1	0	0	200	0
			Alpha Endosulfan	mg/kg	0.2	0	0	200	0
			Gamma Chlordane	mg/kg	0.1	0	0	200	0
			Alpha Chlordane	mg/kg	0.1	0	0	200	0
			trans-Nonachlor	mg/kg	0.1	0	0	200	0
			p,p'-DDE	mg/kg	0.1	0	0	200	0
			Dieldrin	mg/kg	0.2	0	0	200	0
			Endrin	mg/kg	0.2	0	0	200	0
			o,p'-DDD	mg/kg	0.1	0	0	200	0
			o,p'-DDT	mg/kg	0.1	0	0	200	0
			Beta Endosulfan	mg/kg	0.2	0	0	200	0
			p,p'-DDD	mg/kg	0.1	0	0	200	0
			p,p'-DDT	mg/kg	0.1	0	0	200	0
			Endosulfan sulphate	mg/kg	0.1	0	0	200	0
			Endrin Aldehyde	mg/kg	0.1	0	0	200	0
			Methoxychlor	mg/kg	0.1	0	0	200	0
			Endrin Ketone	mg/kg	0.1	0	0	200	0
			Isodrin	mg/kg	0.1	0	0	200	0
			Mirex	mg/kg	0.1	0	0	200	0
			Total CLP OC Pesticides	mg/kg	1	0	0	200	0
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.133	0.133	30	0
SE171022.010	LB133739.025		Hexachlorobenzene (HCB)	mg/kg	0.1	<0.1	<0.1	200	0
			Alpha BHC	mg/kg	0.1	<0.1	<0.1	200	0
			Lindane	mg/kg	0.1	<0.1	<0.1	200	0
			Heptachlor	mg/kg	0.1	<0.1	<0.1	200	0
			Aldrin	mg/kg	0.1	<0.1	<0.1	200	0
			Beta BHC	mg/kg	0.1	<0.1	<0.1	200	0
			Delta BHC	mg/kg	0.1	<0.1	<0.1	200	0
			Heptachlor epoxide	mg/kg	0.1	<0.1	<0.1	200	0
			o,p'-DDE	mg/kg	0.1	<0.1	<0.1	200	0
			Alpha Endosulfan	mg/kg	0.2	<0.2	<0.2	200	0
			Gamma Chlordane	mg/kg	0.1	<0.1	<0.1	200	0
			Alpha Chlordane	mg/kg	0.1	<0.1	<0.1	200	0
			trans-Nonachlor	mg/kg	0.1	<0.1	<0.1	200	0
			p,p'-DDE	mg/kg	0.1	<0.1	<0.1	200	0
			Dieldrin	mg/kg	0.2	<0.2	<0.2	200	0
			Endrin	mg/kg	0.2	<0.2	<0.2	200	0
			o,p'-DDD	mg/kg	0.1	<0.1	<0.1	200	0
			o,p'-DDT	mg/kg	0.1	<0.1	<0.1	200	0
			Beta Endosulfan	mg/kg	0.2	<0.2	<0.2	200	0
			p,p'-DDD	mg/kg	0.1	<0.1	<0.1	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

OC Pesticides in Soil (continued)

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE171022.010	LB133739.025		p,p'-DDT	mg/kg	0.1	<0.1	<0.1	200	0
			Endosulfan sulphate	mg/kg	0.1	<0.1	<0.1	200	0
			Endrin Aldehyde	mg/kg	0.1	<0.1	<0.1	200	0
			Methoxychlor	mg/kg	0.1	<0.1	<0.1	200	0
			Endrin Ketone	mg/kg	0.1	<0.1	<0.1	200	0
			Isodrin	mg/kg	0.1	<0.1	<0.1	200	0
			Mirex	mg/kg	0.1	<0.1	<0.1	200	0
			Total CLP OC Pesticides	mg/kg	1	<1	<1	200	0
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.14	0.13	30	5

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE170990.002	LB133739.014		Dichlorvos	mg/kg	0.5	0	0	200	0
			Dimethoate	mg/kg	0.5	0	0	200	0
			Diazinon (Dimpylate)	mg/kg	0.5	0	0	200	0
			Fenitrothion	mg/kg	0.2	0	0	200	0
			Malathion	mg/kg	0.2	0	0	200	0
			Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	0	0	200	0
			Parathion-ethyl (Parathion)	mg/kg	0.2	0.01	0	200	0
			Bromophos Ethyl	mg/kg	0.2	0.01	0.02	200	0
			Methidathion	mg/kg	0.5	0	0	200	0
			Ethion	mg/kg	0.2	0	0	200	0
			Azinphos-methyl (Guthion)	mg/kg	0.2	0	0	200	0
			Total OP Pesticides*	mg/kg	1.7	0.02	0.02	200	0
		Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.47	0.48	30	2
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.42	0.46	30	9
SE171022.010	LB133739.025		Dichlorvos	mg/kg	0.5	<0.5	<0.5	200	0
			Dimethoate	mg/kg	0.5	<0.5	<0.5	200	0
			Diazinon (Dimpylate)	mg/kg	0.5	<0.5	<0.5	200	0
			Fenitrothion	mg/kg	0.2	<0.2	<0.2	200	0
			Malathion	mg/kg	0.2	<0.2	<0.2	200	0
			Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	<0.2	<0.2	200	0
			Parathion-ethyl (Parathion)	mg/kg	0.2	<0.2	<0.2	200	0
			Bromophos Ethyl	mg/kg	0.2	<0.2	<0.2	200	0
			Methidathion	mg/kg	0.5	<0.5	<0.5	200	0
			Ethion	mg/kg	0.2	<0.2	<0.2	200	0
			Azinphos-methyl (Guthion)	mg/kg	0.2	<0.2	<0.2	200	0
			Total OP Pesticides*	mg/kg	1.7	<1.7	<1.7	200	0
		Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	0
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	4

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE170990.002	LB133739.014	Naphthalene	mg/kg	0.1	0	0	200	0
		2-methylnaphthalene	mg/kg	0.1	0	0	200	0
		1-methylnaphthalene	mg/kg	0.1	0	0	200	0
		Acenaphthylene	mg/kg	0.1	0	0	200	0
		Acenaphthene	mg/kg	0.1	0	0	200	0
		Fluorene	mg/kg	0.1	0	0	200	0
		Phenanthrene	mg/kg	0.1	0	0	200	0
		Anthracene	mg/kg	0.1	0	0	200	0
		Fluoranthene	mg/kg	0.1	0	0.01	200	0
		Pyrene	mg/kg	0.1	0	0	200	0
		Benzo(a)anthracene	mg/kg	0.1	0.01	0.01	200	0
		Chrysene	mg/kg	0.1	0.01	0.01	200	0
		Benzo(b&j)fluoranthene	mg/kg	0.1	0.01	0.01	200	0
		Benzo(k)fluoranthene	mg/kg	0.1	0.01	0.01	200	0
		Benzo(a)pyrene	mg/kg	0.1	0	0	200	0
		Indeno(1,2,3-cd)pyrene	mg/kg	0.1	0	0	200	0
		Dibenzo(ah)anthracene	mg/kg	0.1	0	0	200	0
		Benzo(ghi)perylene	mg/kg	0.1	0	0	200	0
		Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	0	0	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE170990.002	LB133739.014		Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	0.242	0.242	134	0
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	0.121	0.121	175	0
			Total PAH (18)	mg/kg	0.8	0	0	200	0
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.47	0.47	30	0
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.47	0.48	30	2
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.42	0.46	30	9
SE171022.010	LB133739.025		Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
			2-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	200	0
			1-methylnaphthalene	mg/kg	0.1	<0.1	<0.1	200	0
			Acenaphthylene	mg/kg	0.1	<0.1	<0.1	200	0
			Acenaphthene	mg/kg	0.1	<0.1	<0.1	200	0
			Fluorene	mg/kg	0.1	<0.1	<0.1	200	0
			Phenanthrene	mg/kg	0.1	0.2	0.2	84	5
			Anthracene	mg/kg	0.1	<0.1	<0.1	200	0
			Fluoranthene	mg/kg	0.1	0.6	0.7	46	16
			Pyrene	mg/kg	0.1	0.6	0.6	47	10
			Benzo(a)anthracene	mg/kg	0.1	0.3	0.3	64	17
			Chrysene	mg/kg	0.1	0.2	0.2	75	0
			Benzo(b&j)fluoranthene	mg/kg	0.1	0.2	0.3	70	8
			Benzo(k)fluoranthene	mg/kg	0.1	0.2	0.2	79	5
			Benzo(a)pyrene	mg/kg	0.1	0.2	0.3	70	8
			Indeno(1,2,3-cd)pyrene	mg/kg	0.1	0.2	0.3	70	8
			Dibenzo(ah)anthracene	mg/kg	0.1	<0.1	<0.1	200	0
			Benzo(ghi)perylene	mg/kg	0.1	0.2	0.2	77	5
			Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ (mg/kg)	0.2	0.3	0.4	66	8
			Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	0.4	0.5	76	6
			Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	0.4	0.4	59	7
			Total PAH (18)	mg/kg	0.8	3.0	3.2	56	9
		Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.5	0.5	30	0
			2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	0
			d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	30	4

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE170990.002	LB133739.014		Arochlor 1016	mg/kg	0.2	0	0	200	0
			Arochlor 1221	mg/kg	0.2	0	0	200	0
			Arochlor 1232	mg/kg	0.2	0	0	200	0
			Arochlor 1242	mg/kg	0.2	0	0	200	0
			Arochlor 1248	mg/kg	0.2	0	0	200	0
			Arochlor 1254	mg/kg	0.2	0	0	200	0
			Arochlor 1260	mg/kg	0.2	0	0	200	0
			Arochlor 1262	mg/kg	0.2	0	0	200	0
			Arochlor 1268	mg/kg	0.2	0	0	200	0
			Total PCBs (Arochlors)	mg/kg	1	0	0	200	0
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.133	0.133	30	0
SE171022.010	LB133739.025		Arochlor 1016	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1221	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1232	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1242	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1248	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1254	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1260	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1262	mg/kg	0.2	<0.2	<0.2	200	0
			Arochlor 1268	mg/kg	0.2	<0.2	<0.2	200	0
			Total PCBs (Arochlors)	mg/kg	1	<1	<1	200	0
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0	0	30	5

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Original	Duplicate		Parameter	Units	LOR

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES (continued)

Method: ME-(AU)-[ENV]AN040/AN320

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE170993.010	LB133774.014	Arsenic, As	mg/kg	3	<3	<3	200	0
		Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
		Chromium, Cr	mg/kg	0.3	3.9	5.2	41	27
		Copper, Cu	mg/kg	0.5	0.8	0.7	98	20
		Lead, Pb	mg/kg	1	4	4	58	6
		Nickel, Ni	mg/kg	0.5	<0.5	<0.5	161	0
		Zinc, Zn	mg/kg	0.5	0.5	0.6	200	0
SE171022.010	LB133774.024	Arsenic, As	mg/kg	3	3	<3	63	26
		Cadmium, Cd	mg/kg	0.3	<0.3	<0.3	200	0
		Chromium, Cr	mg/kg	0.3	26	28	32	8
		Copper, Cu	mg/kg	0.5	11	22	33	65 ②
		Lead, Pb	mg/kg	1	20	18	35	11
		Nickel, Ni	mg/kg	0.5	6.5	5.4	38	18
		Zinc, Zn	mg/kg	0.5	210	410	31	62 ②

Trace Metals (Total) in Water by ICPMS

Method: ME-(AU)-[ENV]AN022/AN318

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE171022.007	LB133718.006	Total Arsenic	µg/L	1	<1	<1	200	0
		Total Cadmium	µg/L	0.1	<0.1	<0.1	200	0
		Total Chromium	µg/L	1	<1	<1	200	0
		Total Copper	µg/L	1	<1	<1	200	0
		Total Lead	µg/L	1	<1	<1	200	0
		Total Nickel	µg/L	1	<1	<1	200	0
		Total Zinc	µg/L	5	<5	<5	163	0

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE170990.002	LB133739.014		TRH C10-C14	mg/kg	20	0	0	200	0
			TRH C15-C28	mg/kg	45	0	0	200	0
			TRH C29-C36	mg/kg	45	0	0	200	0
			TRH C37-C40	mg/kg	100	0	0	200	0
			TRH C10-C36 Total	mg/kg	110	0	0	200	0
			TRH C10-C40 Total	mg/kg	210	0	0	200	0
		TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	0	0	200	0
			TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	0	0	200	0
			TRH >C16-C34 (F3)	mg/kg	90	0	0	200	0
			TRH >C34-C40 (F4)	mg/kg	120	0	0	200	0
SE171022.010	LB133739.025		TRH C10-C14	mg/kg	20	<20	<20	200	0
			TRH C15-C28	mg/kg	45	<45	<45	200	0
			TRH C29-C36	mg/kg	45	<45	<45	200	0
			TRH C37-C40	mg/kg	100	<100	<100	200	0
			TRH C10-C36 Total	mg/kg	110	<110	<110	200	0
			TRH C10-C40 Total	mg/kg	210	<210	<210	200	0
		TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	<25	<25	200	0
			TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	<25	<25	200	0
			TRH >C16-C34 (F3)	mg/kg	90	<90	<90	200	0
			TRH >C34-C40 (F4)	mg/kg	120	<120	<120	200	0

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE171022.003	LB133698.014	Monocyclic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
		Aromatic	Toluene	mg/kg	0.1	<0.1	<0.1	200	0
			Ethylbenzene	mg/kg	0.1	<0.1	<0.1	200	0
			m/p-xylene	mg/kg	0.2	<0.2	<0.2	200	0
			o-xylene	mg/kg	0.1	<0.1	<0.1	200	0
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.7	4.6	50	21
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.6	5.7	50	22
			d8-toluene (Surrogate)	mg/kg	-	4.6	5.8	50	23
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.9	5.5	50	13
		Totals	Total Xylenes	mg/kg	0.3	<0.3	<0.3	200	0
			Total BTEX	mg/kg	0.6	<0.6	<0.6	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOC's in Soil (continued)

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE171022.010	LB133698.021	Monocyclic	Benzene	mg/kg	0.1	<0.1	<0.1	200	0
		Aromatic	Toluene	mg/kg	0.1	<0.1	<0.1	200	0
			Ethylbenzene	mg/kg	0.1	<0.1	<0.1	200	0
			m/p-xylene	mg/kg	0.2	0.3	0.3	104	15
			o-xylene	mg/kg	0.1	0.2	0.1	101	14
		Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.2	3.8	50	10
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	5.3	4.6	50	13
			d8-toluene (Surrogate)	mg/kg	-	5.4	4.7	50	14
			Bromofluorobenzene (Surrogate)	mg/kg	-	5.5	4.8	50	13
		Totals	Total Xylenes	mg/kg	0.3	0.4	0.4	103	15
			Total BTEX	mg/kg	0.6	<0.6	<0.6	96	20

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE171022.003	LB133698.014		TRH C6-C10	mg/kg	25	<25	<25	200	0
			TRH C6-C9	mg/kg	20	<20	<20	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.7	4.6	30	21
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.6	5.7	30	22
			d8-toluene (Surrogate)	mg/kg	-	4.6	5.8	30	23
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.9	5.5	30	13
		VPH F Bands	Benzene (F0)	mg/kg	0.1	<0.1	<0.1	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	200	0
SE171022.010	LB133698.021		TRH C6-C10	mg/kg	25	<25	<25	200	0
			TRH C6-C9	mg/kg	20	<20	<20	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.2	3.8	30	10
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	5.3	4.6	30	13
			d8-toluene (Surrogate)	mg/kg	-	5.4	4.7	30	14
			Bromofluorobenzene (Surrogate)	mg/kg	-	5.5	4.8	30	13
		VPH F Bands	Benzene (F0)	mg/kg	0.1	<0.1	<0.1	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	200	0

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB133902.002	Mercury	mg/kg	0.05	0.20	0.2	70 - 130	98

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB133739.002		Heptachlor	mg/kg	0.1	0.2	0.2	60 - 140	122
		Aldrin	mg/kg	0.1	0.2	0.2	60 - 140	123
		Delta BHC	mg/kg	0.1	0.3	0.2	60 - 140	125
		Dieldrin	mg/kg	0.2	0.2	0.2	60 - 140	116
		Endrin	mg/kg	0.2	0.2	0.2	60 - 140	119
		p,p'-DDT	mg/kg	0.1	0.2	0.2	60 - 140	97
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.14	0.15	40 - 130	91

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB133739.002		Dichlorvos	mg/kg	0.5	1.9	2	60 - 140	94
		Diazinon (Dimpylate)	mg/kg	0.5	2.0	2	60 - 140	100
		Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	1.7	2	60 - 140	85
		Ethion	mg/kg	0.2	1.4	2	60 - 140	72
	Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	92
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	88

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB133739.002		Naphthalene	mg/kg	0.1	3.7	4	60 - 140	93
		Acenaphthylene	mg/kg	0.1	3.5	4	60 - 140	87
		Acenaphthene	mg/kg	0.1	3.7	4	60 - 140	93
		Phenanthrene	mg/kg	0.1	3.6	4	60 - 140	90
		Anthracene	mg/kg	0.1	3.7	4	60 - 140	91
		Fluoranthene	mg/kg	0.1	3.6	4	60 - 140	89
		Pyrene	mg/kg	0.1	3.3	4	60 - 140	82
		Benzo(a)pyrene	mg/kg	0.1	3.7	4	60 - 140	94
	Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	92
		2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	92
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	88

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB133739.002	Arochlor 1260	mg/kg	0.2	0.4	0.4	60 - 140	101

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB133774.002	Arsenic, As	mg/kg	3	48	50	80 - 120	96
	Cadmium, Cd	mg/kg	0.3	49	50	80 - 120	97
	Chromium, Cr	mg/kg	0.3	48	50	80 - 120	95
	Copper, Cu	mg/kg	0.5	48	50	80 - 120	97
	Lead, Pb	mg/kg	1	48	50	80 - 120	97
	Nickel, Ni	mg/kg	0.5	47	50	80 - 120	95
	Zinc, Zn	mg/kg	0.5	48	50	80 - 120	97

Trace Metals (Total) in Water by ICPMS

Method: ME-(AU)-[ENV]AN022/AN318

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB133718.002	Total Arsenic	µg/L	1	19	20	80 - 120	96
	Total Cadmium	µg/L	0.1	20	20	80 - 120	102
	Total Copper	µg/L	1	20	20	80 - 120	101
	Total Lead	µg/L	1	22	20	80 - 120	108
	Total Nickel	µg/L	1	19	20	80 - 120	97
	Total Zinc	µg/L	5	19	20	80 - 120	97

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

TRH (Total Recoverable Hydrocarbons) in Soil (continued)

Method: ME-(AU)-[ENV]AN403

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB133739.002		TRH C10-C14	mg/kg	20	38	40	60 - 140	95
		TRH C15-C28	mg/kg	45	<45	40	60 - 140	98
		TRH C29-C36	mg/kg	45	<45	40	60 - 140	78
	TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	39	40	60 - 140	98
		TRH >C16-C34 (F3)	mg/kg	90	<90	40	60 - 140	88
		TRH >C34-C40 (F4)	mg/kg	120	<120	20	60 - 140	70

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB133698.002	Monocyclic	Benzene	mg/kg	0.1	2.2	2.9	60 - 140	77
	Aromatic	Toluene	mg/kg	0.1	2.5	2.9	60 - 140	85
		Ethylbenzene	mg/kg	0.1	2.5	2.9	60 - 140	87
		m/p-xylene	mg/kg	0.2	5.0	5.8	60 - 140	86
		o-xylene	mg/kg	0.1	2.6	2.9	60 - 140	89
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.0	5	60 - 140	80
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	5.5	5	60 - 140	110
		d8-toluene (Surrogate)	mg/kg	-	5.6	5	60 - 140	112
		Bromofluorobenzene (Surrogate)	mg/kg	-	5.7	5	60 - 140	114

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB133698.002		TRH C6-C10	mg/kg	25	<25	24.65	60 - 140	99
		TRH C6-C9	mg/kg	20	22	23.2	60 - 140	95
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.0	5	60 - 140	80
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	5.5	5	60 - 140	110
		d8-toluene (Surrogate)	mg/kg	-	5.6	5	60 - 140	112
		Bromofluorobenzene (Surrogate)	mg/kg	-	5.7	5	60 - 140	114
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	7.25	60 - 140	133

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Mercury (total) in Water

Method: ME-(AU)-[ENV]AN311(Perth) /AN312

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE170899.001	LB133725.004	Total Mercury	mg/L	0.0001	0.0077	<0.0001	-	-

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE171108.001	LB133902.004	Mercury	mg/kg	0.05	0.21	<0.05	0.2	83

PCBs in Soil

Method: ME-(AU)-[ENV]AN420

QC Sample	Sample Number		Parameter	Units	LOR	Original	Spike	Recovery%
SE170989.001	LB133739.026		Arochlor 1016	mg/kg	0.2	0	-	-
			Arochlor 1221	mg/kg	0.2	0	-	-
			Arochlor 1232	mg/kg	0.2	0	-	-
			Arochlor 1242	mg/kg	0.2	0	-	-
			Arochlor 1248	mg/kg	0.2	0	-	-
			Arochlor 1254	mg/kg	0.2	0	-	-
			Arochlor 1260	mg/kg	0.2	0	0.4	104
			Arochlor 1262	mg/kg	0.2	0	-	-
			Arochlor 1268	mg/kg	0.2	0	-	-
			Total PCBs (Arochlors)	mg/kg	1	0	-	-
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.135	-	90

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE170993.001	LB133774.004	Arsenic, As	mg/kg	3	49	<3	50	98
		Cadmium, Cd	mg/kg	0.3	50	<0.3	50	100
		Chromium, Cr	mg/kg	0.3	53	2.8	50	100
		Copper, Cu	mg/kg	0.5	52	0.8	50	103
		Lead, Pb	mg/kg	1	53	3	50	100
		Nickel, Ni	mg/kg	0.5	49	<0.5	50	98
		Zinc, Zn	mg/kg	0.5	51	<0.5	50	101

Trace Metals (Total) in Water by ICPMS

Method: ME-(AU)-[ENV]AN022/AN318

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE170957.001	LB133718.004	Total Arsenic	µg/L	1	29	10	20	93
		Total Cadmium	µg/L	0.1	22	0.2	20	108
		Total Copper	µg/L	1	55	38	20	82
		Total Lead	µg/L	1	36	16	20	100
		Total Nickel	µg/L	1	67	51	20	83
		Total Zinc	µg/L	5	120	100	20	80

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE170989.001	LB133739.026		TRH C10-C14	mg/kg	20	35	0	40	88
			TRH C15-C28	mg/kg	45	68	34	40	85
			TRH C29-C36	mg/kg	45	50	0	40	125
			TRH C37-C40	mg/kg	100	<100	0	-	-
			TRH C10-C36 Total	mg/kg	110	150	34	-	-
			TRH C10-C40 Total	mg/kg	210	<210	56	-	-
		TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	38	0	40	95
			TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	38	0	-	-
			TRH >C16-C34 (F3)	mg/kg	90	<90	56	40	68
			TRH >C34-C40 (F4)	mg/kg	120	<120	0	-	-

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE170917.001	LB133698.004	Monocyclic	Benzene	mg/kg	0.1	1.8	<0.1	2.9	61
		Aromatic	Toluene	mg/kg	0.1	2.0	<0.1	2.9	69
			Ethylbenzene	mg/kg	0.1	1.9	<0.1	2.9	64
			m/p-xylene	mg/kg	0.2	3.8	<0.2	5.8	65
			o-xylene	mg/kg	0.1	2.0	<0.1	2.9	67

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

VOC's in Soil (continued)

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE170917.001	LB133698.004	Polycyclic	Naphthalene	mg/kg	0.1	<0.1	<0.1	-	-
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.1	4.1	-	82
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.3	4.2	-	86
			d8-toluene (Surrogate)	mg/kg	-	4.0	3.9	-	80
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.0	4.2	-	79
		Totals	Total Xylenes	mg/kg	0.3	5.7	<0.3	-	-
			Total BTEX	mg/kg	0.6	11	<0.6	-	-

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE170917.001	LB133698.004		TRH C6-C10	mg/kg	25	<25	<25	24.65	83
			TRH C6-C9	mg/kg	20	<20	<20	23.2	80
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.1	4.1	-	82
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.3	4.2	-	86
			d8-toluene (Surrogate)	mg/kg	-	4.0	3.9	-	80
			Bromofluorobenzene (Surrogate)	mg/kg	-	4.0	4.2	-	79
		VPH F	Benzene (F0)	mg/kg	0.1	1.8	<0.1	-	-
		Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	<25	7.25	126

MATRIX SPIKE DUPLICATES

SE171022 R0

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf

*	NATA accreditation does not cover the performance of this service.
**	Indicative data, theoretical holding time exceeded.
-	Sample not analysed for this analyte.
IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
LOR	Limit of reporting.
QFH	QC result is above the upper tolerance.
QFL	QC result is below the lower tolerance.

①	At least 2 of 3 surrogates are within acceptance criteria.
②	RPD failed acceptance criteria due to sample heterogeneity.
③	Results less than 5 times LOR preclude acceptance criteria for RPD.
④	Recovery failed acceptance criteria due to matrix interference.
⑤	Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
⑥	LOR was raised due to sample matrix interference.
⑦	LOR was raised due to dilution of significantly high concentration of analyte in sample.
⑧	Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
⑨	Recovery failed acceptance criteria due to sample heterogeneity.
⑩	LOR was raised due to high conductivity of the sample (required dilution).
†	Refer to Analytical Report comments for further information.

Log in Today - TCLP Analysis - Job No: SE171696 (1 sample)

Miguel Barritt, Elsa (Sydney)

Tue 24/10/2017 10:21 AM

To: AU.SampleReceipt.Sydney (Sydney) <AU.SampleReceipt.Sydney@sgs.com>;

Cc: Inglis Brien <inglis.brien@cardno.com.au>;

1 attachments (472 KB)

SE171696_COC.pdf;

SGS EHS Alexandria Laboratory

SE171696A COC
Received: 24 – Oct – 2017

Hi Sample Receipt,

FYA – As per client (Inglis) phone request this morning please log in Sample SE171696 (See COC attached) for TCLP – Metals & PAH on a 1 day TAT (Due tomorrow - Wed 25.10.17)

Any questions or issues let me know.

Kind Regards

Elsa Miguel Barritt
Environment, Health & Safety
Customer Service Representative

SGS Australia Pty Ltd
Unit 16, 33 Maddox Street
Alexandria, NSW, 2015

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E-mail: Elsa.MiguelBarritt@sgs.com
Web: www.au.sgs.com

SAMPLE RECEIPT ADVICE

SE171696A

CLIENT DETAILS

Contact	Inglis Brien
Client	CARDNO (NSW/ACT) PTY LTD
Address	Unit 1 10 Denney Street Broadmeadow NSW 2292
Telephone	61 2 4940 5527
Facsimile	61 2 4965 4666
Email	inglis.brien@cardno.com.au
Project	**82218015 Additional**
Order Number	**82218015**
Samples	1

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
Samples Received	Tue 24/10/2017
Report Due	Wed 25/10/2017
SGS Reference	**SE171696A**

SUBMISSION DETAILS

This is to confirm that 1 sample was received on Tuesday 24/10/2017. Results are expected to be ready by COB Wednesday 25/10/2017.
Please quote SGS reference SE171696A when making enquiries. Refer below for details relating to sample integrity upon receipt.

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	SGS	Sample cooling method	Ice Bricks
Samples received in correct containers	Yes	Sample counts by matrix	1 Soil
Date documentation received	24/10/17@10:21am	Type of documentation received	Email
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	9.3°C	Sufficient sample for analysis	Yes
Turnaround time requested	Next Day		

Unless otherwise instructed, water and bulk samples will be held for one month from date of report, and soil samples will be held for two months.

COMMENTS

SAMPLE RECEIPT ADVICE

SE171696A

CLIENT DETAILS

Client CARDNO (NSW/ACT) PTY LTD

Project 82218015 Additional

SUMMARY OF ANALYSIS

No.	Sample ID	Mercury in TCLP Extract	Metals in TCLP Extract by ICPOES	PAH (Polynuclear Aromatic Hydrocarbons) in TCLP	TCLP (Toxicity Characteristic Leaching
001	BH001 0.1-0.3	1	7	22	6

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Malcolm Adrien
Client	CARDNO (NSW/ACT) PTY LTD
Address	Unit 1 10 Denney Street Broadmeadow NSW 2292
Telephone	61 2 4949 4300
Facsimile	61 2 4965 4666
Email	malcolm.adrien@cardno.com.au
Project	**82218015**
Order Number	**82218015**
Samples	1

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE171696 R0**
Date Received	23/10/2017
Date Reported	24/10/2017

COMMENTS

Accredited for compliance with ISO/IEC 17025- Testing. NATA accredited laboratory 2562(4354).

SIGNATORIES

Akheeqar Beniameen
Chemist

Bennet Lo
Senior Organic Chemist/Metals Chemist

Dong Liang
Metals/Inorganics Team Leader

Ly Kim Ha
Organic Section Head

VOC's in Soil [AN433] Tested: 23/10/2017

PARAMETER	UOM	LOR	BH001 0.1-0.3 SOIL - 29/9/2017 SE171696.001
Benzene	mg/kg	0.1	<0.1
Toluene	mg/kg	0.1	<0.1
Ethylbenzene	mg/kg	0.1	<0.1
m/p-xylene	mg/kg	0.2	<0.2
o-xylene	mg/kg	0.1	<0.1
Total Xylenes	mg/kg	0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6
Naphthalene	mg/kg	0.1	<0.1

Volatile Petroleum Hydrocarbons in Soil [AN433] Tested: 23/10/2017

PARAMETER	UOM	LOR	BH001 0.1-0.3 SOIL - 29/9/2017 SE171696.001
TRH C6-C9	mg/kg	20	<20
Benzene (F0)	mg/kg	0.1	<0.1
TRH C6-C10	mg/kg	25	<25
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25

TRH (Total Recoverable Hydrocarbons) in Soil [AN403] Tested: 23/10/2017

PARAMETER	UOM	LOR	BH001 0.1-0.3 SOIL - 29/9/2017 SE171696.001
TRH C10-C14	mg/kg	20	<20
TRH C15-C28	mg/kg	45	<45
TRH C29-C36	mg/kg	45	<45
TRH C37-C40	mg/kg	100	<100
TRH >C10-C16 (F2)	mg/kg	25	<25
TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	<25
TRH >C16-C34 (F3)	mg/kg	90	<90
TRH >C34-C40 (F4)	mg/kg	120	<120
TRH C10-C36 Total	mg/kg	110	<110
TRH C10-C40 Total	mg/kg	210	<210

PAH (Polynuclear Aromatic Hydrocarbons) in Soil [AN420] Tested: 23/10/2017

PARAMETER	UOM	LOR	BH001 0.1-0.3 SOIL - 29/9/2017 SE171696.001
Naphthalene	mg/kg	0.1	<0.1
2-methylnaphthalene	mg/kg	0.1	<0.1
1-methylnaphthalene	mg/kg	0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1
Fluorene	mg/kg	0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1
Anthracene	mg/kg	0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1
Pyrene	mg/kg	0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1
Chrysene	mg/kg	0.1	<0.1
Benzo(b&j)fluoranthene	mg/kg	0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.1	<0.1
Carcinogenic PAHs, BaP TEQ <LOR=0	TEQ	0.2	<0.2
Carcinogenic PAHs, BaP TEQ <LOR=LOR	TEQ (mg/kg)	0.3	<0.3
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	TEQ (mg/kg)	0.2	<0.2
Total PAH (18)	mg/kg	0.8	<0.8
Total PAH (NEPM/WHO 16)	mg/kg	0.8	<0.8

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES [AN040/AN320] Tested: 24/10/2017

PARAMETER	UOM	LOR	BH001 0.1-0.3 SOIL - 29/9/2017 SE171696.001
Arsenic, As	mg/kg	3	<3
Cadmium, Cd	mg/kg	0.3	<0.3
Chromium, Cr	mg/kg	0.3	**2.7**
Copper, Cu	mg/kg	0.5	**0.5**
Lead, Pb	mg/kg	1	<1
Nickel, Ni	mg/kg	0.5	<0.5
Zinc, Zn	mg/kg	0.5	**1.7**

Mercury in Soil [AN312] Tested: 24/10/2017

PARAMETER	UOM	LOR	BH001 0.1-0.3 SOIL - 29/9/2017 SE171696.001
Mercury	mg/kg	0.05	<0.05

Moisture Content [AN002] Tested: 23/10/2017

PARAMETER	UOM	LOR	BH001 0.1-0.3 SOIL - 29/9/2017 SE171696.001
% Moisture	%w/w	0.5	**9.0**

METHOD	METHODOLOGY SUMMARY
AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN040/AN320	A portion of sample is digested with nitric acid to decompose organic matter and hydrochloric acid to complete the digestion of metals. The digest is then analysed by ICP OES with metals results reported on the dried sample basis. Based on USEPA method 200.8 and 6010C.
AN040	A portion of sample is digested with Nitric acid to decompose organic matter and Hydrochloric acid to complete the digestion of metals and then filtered for analysis by ASS or ICP as per USEPA Method 200.8.
AN312	Mercury by Cold Vapour AAS in Soils: After digestion with nitric acid, hydrogen peroxide and hydrochloric acid , mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser . Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). F2 is reported directly and also corrected by subtracting Naphthalene (from VOC method AN433) where available.
AN403	Additionally, the volatile C6-C9 fraction may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Petroleum Hydrocarbons (TPH) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents .
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).
AN420	Carcinogenic PAHs may be expressed as Benzo(a)pyrene equivalents by applying the BaP toxicity equivalence factor (NEPM 1999, June 2013, B7). These can be reported as the individual PAHs and as a sum of carcinogenic PAHs. The sum is reported three ways, the first assuming all <LOR results are zero, the second assuming all < LOR results are half the LOR and the third assuming all <LOR results are the LOR.
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
		NVL	Not validated.	LOR	Limit of Reporting.
**	Indicative data, theoretical holding time exceeded.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

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STATEMENT OF QA/QC PERFORMANCE

SE171696 R0

CLIENT DETAILS

Contact	Malcolm Adrien
Client	CARDNO (NSW/ACT) PTY LTD
Address	Unit 1 10 Denney Street Broadmeadow NSW 2292
Telephone	61 2 4949 4300
Facsimile	61 2 4965 4666
Email	malcolm.adrien@cardno.com.au
Project	**82218015**
Order Number	**82218015**
Samples	1

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
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Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE171696 R0**
Date Received	23 Oct 2017
Date Reported	24 Oct 2017

COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document and was supplied by the Client.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met with the exception of the following:

Extraction Date	Moisture Content	1 item
	PAH (Polynuclear Aromatic Hydrocarbons) in Soil	1 item
	TRH (Total Recoverable Hydrocarbons) in Soil	1 item
	VOC's in Soil	1 item
	Volatile Petroleum Hydrocarbons in Soil	1 item
Matrix Spike	Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES	1 item

SAMPLE SUMMARY

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	SGS	Sample cooling method	Ice Bricks
Samples received in correct containers	Yes	Sample counts by matrix	1 Soil
Date documentation received	23/10/2017	Type of documentation received	COC
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	9.3°C	Sufficient sample for analysis	Yes
Turnaround time requested	Next Day		

HOLDING TIME SUMMARY

SE171696 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS “Field Sampling Guide for Containers and Holding Time” (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH001 0.1-0.3	SE171696.001	LB135029	29 Sep 2017	23 Oct 2017	27 Oct 2017	24 Oct 2017	27 Oct 2017	24 Oct 2017

Moisture Content

Method: ME-(AU)-[ENV]AN002

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH001 0.1-0.3	SE171696.001	LB134984	29 Sep 2017	23 Oct 2017	13 Oct 2017	23 Oct 2017†	28 Oct 2017	24 Oct 2017

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH001 0.1-0.3	SE171696.001	LB134981	29 Sep 2017	23 Oct 2017	13 Oct 2017	23 Oct 2017†	02 Dec 2017	24 Oct 2017

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH001 0.1-0.3	SE171696.001	LB135037	29 Sep 2017	23 Oct 2017	28 Mar 2018	24 Oct 2017	28 Mar 2018	24 Oct 2017

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH001 0.1-0.3	SE171696.001	LB134981	29 Sep 2017	23 Oct 2017	13 Oct 2017	23 Oct 2017†	02 Dec 2017	24 Oct 2017

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH001 0.1-0.3	SE171696.001	LB134980	29 Sep 2017	23 Oct 2017	13 Oct 2017	23 Oct 2017†	02 Dec 2017	24 Oct 2017

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH001 0.1-0.3	SE171696.001	LB134980	29 Sep 2017	23 Oct 2017	13 Oct 2017	23 Oct 2017†	02 Dec 2017	24 Oct 2017

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

PAH (Polynuclear Aromatic Hydrocarbons) in Soil — Method: ME-(AU)-[ENV]AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	BH001 0.1-0.3	SE171696.001	%	70 - 130%	110
d14-p-terphenyl (Surrogate)	BH001 0.1-0.3	SE171696.001	%	70 - 130%	110
d5-nitrobenzene (Surrogate)	BH001 0.1-0.3	SE171696.001	%	70 - 130%	108

VOC's in Soil — Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	BH001 0.1-0.3	SE171696.001	%	60 - 130%	79
d4-1,2-dichloroethane (Surrogate)	BH001 0.1-0.3	SE171696.001	%	60 - 130%	71
d8-toluene (Surrogate)	BH001 0.1-0.3	SE171696.001	%	60 - 130%	71
Dibromofluoromethane (Surrogate)	BH001 0.1-0.3	SE171696.001	%	60 - 130%	79

Volatile Petroleum Hydrocarbons in Soil — Method: ME-(AU)-[ENV]AN433

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	BH001 0.1-0.3	SE171696.001	%	60 - 130%	79
d4-1,2-dichloroethane (Surrogate)	BH001 0.1-0.3	SE171696.001	%	60 - 130%	71
d8-toluene (Surrogate)	BH001 0.1-0.3	SE171696.001	%	60 - 130%	71
Dibromofluoromethane (Surrogate)	BH001 0.1-0.3	SE171696.001	%	60 - 130%	79

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Number	Parameter	Units	LOR	Result
LB135029.001	Mercury	mg/kg	0.05	<0.05

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB134981.001		Naphthalene	mg/kg	0.1	<0.1
		2-methylnaphthalene	mg/kg	0.1	<0.1
		1-methylnaphthalene	mg/kg	0.1	<0.1
		Acenaphthylene	mg/kg	0.1	<0.1
		Acenaphthene	mg/kg	0.1	<0.1
		Fluorene	mg/kg	0.1	<0.1
		Phenanthrene	mg/kg	0.1	<0.1
		Anthracene	mg/kg	0.1	<0.1
		Fluoranthene	mg/kg	0.1	<0.1
		Pyrene	mg/kg	0.1	<0.1
		Benzo(a)anthracene	mg/kg	0.1	<0.1
		Chrysene	mg/kg	0.1	<0.1
		Benzo(a)pyrene	mg/kg	0.1	<0.1
		Indeno(1,2,3-cd)pyrene	mg/kg	0.1	<0.1
		Dibenzo(ah)anthracene	mg/kg	0.1	<0.1
		Benzo(ghi)perylene	mg/kg	0.1	<0.1
		Total PAH (18)	mg/kg	0.8	<0.8
	Surrogates	d5-nitrobenzene (Surrogate)	%	-	102
		2-fluorobiphenyl (Surrogate)	%	-	102
		d14-p-terphenyl (Surrogate)	%	-	102

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Number	Parameter	Units	LOR	Result
LB135037.001	Arsenic, As	mg/kg	3	<3
	Cadmium, Cd	mg/kg	0.3	<0.3
	Chromium, Cr	mg/kg	0.3	<0.3
	Copper, Cu	mg/kg	0.5	<0.5
	Lead, Pb	mg/kg	1	<1
	Nickel, Ni	mg/kg	0.5	<0.5
	Zinc, Zn	mg/kg	0.5	<0.5

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number	Parameter	Units	LOR	Result
LB134981.001	TRH C10-C14	mg/kg	20	<20
	TRH C15-C28	mg/kg	45	<45
	TRH C29-C36	mg/kg	45	<45
	TRH C37-C40	mg/kg	100	<100
	TRH C10-C36 Total	mg/kg	110	<110

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result
LB134980.001	Monocyclic Aromatic	Benzene	mg/kg	0.1	<0.1
	Hydrocarbons	Toluene	mg/kg	0.1	<0.1
		Ethylbenzene	mg/kg	0.1	<0.1
		m/p-xylene	mg/kg	0.2	<0.2
		o-xylene	mg/kg	0.1	<0.1
	Polycyclic VOCs	Naphthalene	mg/kg	0.1	<0.1
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	78
		d4-1,2-dichloroethane (Surrogate)	%	-	81
		d8-toluene (Surrogate)	%	-	85
		Bromofluorobenzene (Surrogate)	%	-	80
	Totals	Total BTEX	mg/kg	0.6	<0.6

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number	Parameter	Units	LOR

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Volatile Petroleum Hydrocarbons in Soil (continued) — **Method: ME-(AU)-[ENV]AN433**

Sample Number		Parameter	Units	LOR	Result
LB134980.001		TRH C6-C9	mg/kg	20	<20
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	78
		d4-1,2-dichloroethane (Surrogate)	%	-	81
		d8-toluene (Surrogate)	%	-	85

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE171647A.006	LB135029.007	Mercury	mg/kg	0.05	<0.05	<0.05	132	0

Moisture Content

Method: ME-(AU)-[ENV]AN002

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE171696.001	LB134984.022	% Moisture	%w/w	0.5	9.0	8.8	41	3
SE171701.001	LB134984.024	% Moisture	%w/w	0.5	10.67484662579	9.6038415366	40	11

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE171701.001	LB134980.025	Monocyclic Aromatic	Benzene	mg/kg	0.1	0	0	200	0
			Toluene	mg/kg	0.1	0	0	200	0
			Ethylbenzene	mg/kg	0.1	0	0	200	0
			m/p-xylene	mg/kg	0.2	0	0	200	0
			o-xylene	mg/kg	0.1	0	0	200	0
		Polycyclic	Naphthalene	mg/kg	0.1	0	0.01	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.02	3.68	50	9
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	3.57	3.95	50	10
			d8-toluene (Surrogate)	mg/kg	-	3.64	4.86	50	29
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.76	3.86	50	3
		Totals	Total Xylenes	mg/kg	0.3	0	0	200	0
			Total BTEX	mg/kg	0.6	0	0	200	0

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE171701.001	LB134980.025		TRH C6-C10	mg/kg	25	0	1.02	200	0
			TRH C6-C9	mg/kg	20	0	0.97	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.02	3.68	30	9
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	3.57	3.95	30	10
			d8-toluene (Surrogate)	mg/kg	-	3.64	4.86	30	29
			Bromofluorobenzene (Surrogate)	mg/kg	-	3.76	3.86	30	3
		VPH F Bands	Benzene (F0)	mg/kg	0.1	0	0	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	0	1.02	200	0

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Mercury in Soil

Method: ME-(AU)-[ENV]AN312

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB135029.002	Mercury	mg/kg	0.05	0.18	0.2	70 - 130	92

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB134981.002		Naphthalene	mg/kg	0.1	4.2	4	60 - 140	105
		Acenaphthylene	mg/kg	0.1	4.1	4	60 - 140	103
		Acenaphthene	mg/kg	0.1	4.3	4	60 - 140	107
		Phenanthrene	mg/kg	0.1	4.2	4	60 - 140	104
		Anthracene	mg/kg	0.1	4.3	4	60 - 140	106
		Fluoranthene	mg/kg	0.1	4.0	4	60 - 140	101
		Pyrene	mg/kg	0.1	4.0	4	60 - 140	99
		Benzo(a)pyrene	mg/kg	0.1	4.1	4	60 - 140	102
	Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	100
		2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	100
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	98

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES

Method: ME-(AU)-[ENV]AN040/AN320

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB135037.002	Arsenic, As	mg/kg	3	52	50	80 - 120	104
	Cadmium, Cd	mg/kg	0.3	53	50	80 - 120	107
	Chromium, Cr	mg/kg	0.3	53	50	80 - 120	106
	Copper, Cu	mg/kg	0.5	52	50	80 - 120	103
	Lead, Pb	mg/kg	1	53	50	80 - 120	107
	Nickel, Ni	mg/kg	0.5	53	50	80 - 120	107
	Zinc, Zn	mg/kg	0.5	54	50	80 - 120	107

TRH (Total Recoverable Hydrocarbons) in Soil

Method: ME-(AU)-[ENV]AN403

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB134981.002		TRH C10-C14	mg/kg	20	43	40	60 - 140	108
		TRH C15-C28	mg/kg	45	45	40	60 - 140	113
		TRH C29-C36	mg/kg	45	<45	40	60 - 140	110
	TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	44	40	60 - 140	110
		TRH >C16-C34 (F3)	mg/kg	90	<90	40	60 - 140	118
		TRH >C34-C40 (F4)	mg/kg	120	<120	20	60 - 140	120

VOC's in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB134980.002	Monocyclic	Benzene	mg/kg	0.1	2.7	2.9	60 - 140	94
	Aromatic	Toluene	mg/kg	0.1	2.0	2.9	60 - 140	68
		Ethylbenzene	mg/kg	0.1	2.0	2.9	60 - 140	69
		m/p-xylene	mg/kg	0.2	4.0	5.8	60 - 140	69
		o-xylene	mg/kg	0.1	2.0	2.9	60 - 140	68
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.8	5	60 - 140	76
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.1	5	60 - 140	81
		d8-toluene (Surrogate)	mg/kg	-	4.4	5	60 - 140	87
		Bromofluorobenzene (Surrogate)	mg/kg	-	4.4	5	60 - 140	88

Volatile Petroleum Hydrocarbons in Soil

Method: ME-(AU)-[ENV]AN433

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB134980.002		TRH C6-C10	mg/kg	25	<25	24.65	60 - 140	85
		TRH C6-C9	mg/kg	20	<20	23.2	60 - 140	71
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.8	5	60 - 140	76
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.1	5	60 - 140	81
		d8-toluene (Surrogate)	mg/kg	-	4.4	5	60 - 140	87
		Bromofluorobenzene (Surrogate)	mg/kg	-	4.4	5	60 - 140	88
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	7.25	60 - 140	115

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Mercury in Soil — Method: ME-(AU)-[ENV]AN312

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE171701.001	LB135029.004	Mercury	mg/kg	0.05	0.23	0.02884034481	0.2	98

Total Recoverable Elements in Soil/Waste Solids/Materials by ICPOES — Method: ME-(AU)-[ENV]AN040/AN320

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE171701.001	LB135037.004	Arsenic, As	mg/kg	3	53	2.61783355533	50	101
		Cadmium, Cd	mg/kg	0.3	46	0.23747086247	50	92
		Chromium, Cr	mg/kg	0.3	54	5.82086316461	50	96
		Copper, Cu	mg/kg	0.5	65	16.00383991008	50	99
		Lead, Pb	mg/kg	1	89	52.30013042513	50	74
		Nickel, Ni	mg/kg	0.5	48	2.49061702186	50	91
		Zinc, Zn	mg/kg	0.5	180	08.5863788988	50	145 ④

MATRIX SPIKE DUPLICATES

SE171696 R0

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf

*	NATA accreditation does not cover the performance of this service.
**	Indicative data, theoretical holding time exceeded.
-	Sample not analysed for this analyte.
IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
LOR	Limit of reporting.
QFH	QC result is above the upper tolerance.
QFL	QC result is below the lower tolerance.

①	At least 2 of 3 surrogates are within acceptance criteria.
②	RPD failed acceptance criteria due to sample heterogeneity.
③	Results less than 5 times LOR preclude acceptance criteria for RPD.
④	Recovery failed acceptance criteria due to matrix interference.
⑤	Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
⑥	LOR was raised due to sample matrix interference.
⑦	LOR was raised due to dilution of significantly high concentration of analyte in sample.
⑧	Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
⑨	Recovery failed acceptance criteria due to sample heterogeneity.
⑩	LOR was raised due to high conductivity of the sample (required dilution).
†	Refer to Analytical Report comments for further information.

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Inglis Brien
Client	CARDNO (NSW/ACT) PTY LTD
Address	Unit 1 10 Denney Street Broadmeadow NSW 2292
Telephone	61 2 4940 5527
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Email	inglis.brien@cardno.com.au
Project	**82218015 Additional**
Order Number	**82218015**
Samples	1

LABORATORY DETAILS

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Laboratory	SGS Alexandria Environmental
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SGS Reference	**SE171696A R0**
Date Received	24/10/2017
Date Reported	25/10/2017

COMMENTS

Accredited for compliance with ISO/IEC 17025- Testing. NATA accredited laboratory 2562(4354).

SIGNATORIES

Dong Liang
Metals/Inorganics Team Leader

Huong Crawford
Production Manager

Ly Kim Ha
Organic Section Head

TCLP (Toxicity Characteristic Leaching Procedure) for Organics/SVOC [AN006] Tested: 24/10/2017

PARAMETER	UOM	LOR	BH001 0.1-0.3 SOIL - 29/9/2017 SE171696A.001
pH 1:20	pH Units	-	**10**
pH 1:20 plus HCL	pH Units	-	**1.7**
Extraction Solution Used	No unit	-	**1**
Mass of Sample Used*	g	-	**25**
Volume of ExtractionSolution Used*	mL	-	**500**
pH TCLP after 18 hours	pH Units	-	**5.7**

PAH (Polynuclear Aromatic Hydrocarbons) in TCLP Extract [AN420] Tested: 24/10/2017

PARAMETER	UOM	LOR	BH001 0.1-0.3 SOIL - 29/9/2017 SE171696A.001
Naphthalene	µg/L	0.1	<0.1
2-methylnaphthalene	µg/L	0.1	<0.1
1-methylnaphthalene	µg/L	0.1	<0.1
Acenaphthylene	µg/L	0.1	<0.1
Acenaphthene	µg/L	0.1	<0.1
Fluorene	µg/L	0.1	<0.1
Phenanthrene	µg/L	0.1	<0.1
Anthracene	µg/L	0.1	<0.1
Fluoranthene	µg/L	0.1	<0.1
Pyrene	µg/L	0.1	<0.1
Benzo(a)anthracene	µg/L	0.1	<0.1
Chrysene	µg/L	0.1	<0.1
Benzo(b&j)fluoranthene	µg/L	0.1	<0.1
Benzo(k)fluoranthene	µg/L	0.1	<0.1
Benzo(a)pyrene	µg/L	0.1	<0.1
Indeno(1,2,3-cd)pyrene	µg/L	0.1	<0.1
Dibenzo(ah)anthracene	µg/L	0.1	<0.1
Benzo(ghi)perylene	µg/L	0.1	<0.1
Total PAH (18)	µg/L	1	<1

Metals in TCLP Extract by ICPOES [AN320] Tested: 24/10/2017

PARAMETER	UOM	LOR	BH001 0.1-0.3 SOIL - 29/9/2017 SE171696A.001
Arsenic, As	mg/L	0.02	<0.02
Cadmium, Cd	mg/L	0.001	<0.001
Chromium, Cr	mg/L	0.005	<0.005
Copper, Cu	mg/L	0.005	<0.005
Lead, Pb	mg/L	0.02	<0.02
Nickel, Ni	mg/L	0.005	<0.005
Zinc, Zn	mg/L	0.01	<0.01

Mercury in TCLP Extract [AN311(Perth) /AN312] Tested: 24/10/2017

PARAMETER	UOM	LOR	BH001 0.1-0.3 SOIL - 29/9/2017 SE171696A.001
Mercury	mg/L	0.0001	<0.0001

METHOD	METHODOLOGY SUMMARY
AN006	Contaminants of interest in a waste material are leached out of the waste with a selected leaching solution under controlled conditions. The ratio of sample to extraction fluid is 100g to 2L (1 to 20 by mass). The concentration of each contaminant of interest is determined in the leachate by appropriate methods after separation from the sample by filtering. Base on USEPA 1311.
AN006	Extraction Fluid #1: This fluid is made by combining 128.6mL of dilute sodium hydroxide solution and 11.5mL glacial acetic acid with water and diluting to a volume of 2 litres. The pH of this fluid should be 4.93 ± 0.05.
AN006	Extraction Fluid #2: This fluid is made by diluting 5.7mL glacial acetic acid with water to a volume of 1 litre. The pH of this fluid should be 2.88 ± 0.05.
AN020	Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
AN311(Perth) /AN312	Mercury by Cold Vapour AAS in Waters: Mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500.
AN320	Metals by ICP-OES: Samples are preserved with 10% nitric acid for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components .
AN320	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements . Reference APHA 3120 B.
AN420	(SVOCs) including OC, OP, PCB, Herbicides, PAH, Phthalates and Speciated Phenols (etc) in soils, sediments and waters are determined by GCMS/ECD technique following appropriate solvent extraction process (Based on USEPA 3500C and 8270D).

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
		NVL	Not validated.	LOR	Limit of Reporting.
**	Indicative data, theoretical holding time exceeded.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

STATEMENT OF QA/QC PERFORMANCE

SE171696A R0

CLIENT DETAILS

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Client	CARDNO (NSW/ACT) PTY LTD
Address	Unit 1 10 Denney Street Broadmeadow NSW 2292
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Project	**82218015 Additional**
Order Number	**82218015**
Samples	1

LABORATORY DETAILS

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SGS Reference	**SE171696A R0**
Date Received	24 Oct 2017
Date Reported	25 Oct 2017

COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document and was supplied by the Client.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met with the exception of the following:

Extraction Date	PAH (Polynuclear Aromatic Hydrocarbons) in TCLP Extract	1 item
	TCLP (Toxicity Characteristic Leaching Procedure) for Organics/SVOC	1 item

SAMPLE SUMMARY

Samples clearly labelled	Yes	Complete documentation received	Yes
Sample container provider	SGS	Sample cooling method	Ice Bricks
Samples received in correct containers	Yes	Sample counts by matrix	1 Soil
Date documentation received	24/10/17@10:21am	Type of documentation received	Email
Samples received in good order	Yes	Samples received without headspace	Yes
Sample temperature upon receipt	9.3°C	Sufficient sample for analysis	Yes
Turnaround time requested	Next Day		

HOLDING TIME SUMMARY

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SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS “Field Sampling Guide for Containers and Holding Time” (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

Mercury in TCLP Extract

Method: ME-(AU)-[ENV]AN311(Perth) /AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH001 0.1-0.3	SE171696A.001	LB135082	29 Sep 2017	24 Oct 2017	27 Oct 2017	24 Oct 2017	27 Oct 2017	25 Oct 2017

Metals in TCLP Extract by ICPOES

Method: ME-(AU)-[ENV]AN320

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH001 0.1-0.3	SE171696A.001	LB135097	29 Sep 2017	24 Oct 2017	28 Mar 2018	24 Oct 2017	22 Apr 2018	25 Oct 2017

PAH (Polynuclear Aromatic Hydrocarbons) in TCLP Extract

Method: ME-(AU)-[ENV]AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH001 0.1-0.3	SE171696A.001	LB135103	29 Sep 2017	24 Oct 2017	20 Oct 2017	24 Oct 2017†	03 Dec 2017	25 Oct 2017

TCLP (Toxicity Characteristic Leaching Procedure) for Organics/SVOC

Method: ME-(AU)-[ENV]AN006

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
BH001 0.1-0.3	SE171696A.001	LB135059	29 Sep 2017	24 Oct 2017	13 Oct 2017	24 Oct 2017†	07 Nov 2017	25 Oct 2017

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

PAH (Polynuclear Aromatic Hydrocarbons) in TCLP Extract — **Method: ME-(AU)-[ENV]AN420**

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	BH001 0.1-0.3	SE171696A.001	%	40 - 130%	44
d14-p-terphenyl (Surrogate)	BH001 0.1-0.3	SE171696A.001	%	40 - 130%	60
d5-nitrobenzene (Surrogate)	BH001 0.1-0.3	SE171696A.001	%	40 - 130%	46

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Mercury in TCLP Extract

Method: ME-(AU)-[ENV]AN311(Perth) /AN312

Sample Number	Parameter	Units	LOR	Result
LB135082.001	Mercury	mg/L	0.0001	-0.0044

Metals in TCLP Extract by ICPOES

Method: ME-(AU)-[ENV]AN320

Sample Number	Parameter	Units	LOR	Result
LB135097.001	Arsenic, As	mg/L	0.02	<0.02
	Cadmium, Cd	mg/L	0.001	<0.001
	Chromium, Cr	mg/L	0.005	<0.005
	Copper, Cu	mg/L	0.005	<0.005
	Lead, Pb	mg/L	0.02	<0.02
	Nickel, Ni	mg/L	0.005	<0.005
	Zinc, Zn	mg/L	0.01	<0.01

PAH (Polynuclear Aromatic Hydrocarbons) in TCLP Extract

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result
LB135103.001		Naphthalene	µg/L	0.1	<0.1
		2-methylnaphthalene	µg/L	0.1	<0.1
		1-methylnaphthalene	µg/L	0.1	<0.1
		Acenaphthylene	µg/L	0.1	<0.1
		Acenaphthene	µg/L	0.1	<0.1
		Fluorene	µg/L	0.1	<0.1
		Phenanthrene	µg/L	0.1	<0.1
		Anthracene	µg/L	0.1	<0.1
		Fluoranthene	µg/L	0.1	<0.1
		Pyrene	µg/L	0.1	<0.1
		Benzo(a)anthracene	µg/L	0.1	<0.1
		Chrysene	µg/L	0.1	<0.1
		Benzo(a)pyrene	µg/L	0.1	<0.1
		Indeno(1,2,3-cd)pyrene	µg/L	0.1	<0.1
		Dibenzo(ah)anthracene	µg/L	0.1	<0.1
		Benzo(ghi)perylene	µg/L	0.1	<0.1
	Surrogates	d5-nitrobenzene (Surrogate)	%	-	64
		2-fluorobiphenyl (Surrogate)	%	-	72
		d14-p-terphenyl (Surrogate)	%	-	82

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

PAH (Polynuclear Aromatic Hydrocarbons) in TCLP Extract — **Method: ME-(AU)-[ENV]AN420**

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE171452A.001	LB135103.023		Naphthalene	µg/L	0.1	<0.1	0	200	0
			2-methylnaphthalene	µg/L	0.1	<0.1	0	200	0
			1-methylnaphthalene	µg/L	0.1	<0.1	0	200	0
			Acenaphthylene	µg/L	0.1	<0.1	0	200	0
			Acenaphthene	µg/L	0.1	<0.1	0	200	0
			Fluorene	µg/L	0.1	<0.1	0	200	0
			Phenanthrene	µg/L	0.1	<0.1	0.02	200	0
			Anthracene	µg/L	0.1	<0.1	0.02	200	0
			Fluoranthene	µg/L	0.1	<0.1	0	200	0
			Pyrene	µg/L	0.1	<0.1	0.04	200	0
			Benzo(a)anthracene	µg/L	0.1	<0.1	0.02	200	0
			Chrysene	µg/L	0.1	<0.1	0.02	200	0
			Benzo(b&j)fluoranthene	µg/L	0.1	<0.1	0	200	0
			Benzo(k)fluoranthene	µg/L	0.1	<0.1	0	200	0
			Benzo(a)pyrene	µg/L	0.1	<0.1	0	200	0
			Indeno(1,2,3-cd)pyrene	µg/L	0.1	<0.1	0	200	0
			Dibenzo(ah)anthracene	µg/L	0.1	<0.1	0	200	0
			Benzo(ghi)perylene	µg/L	0.1	<0.1	0	200	0
		Surrogates	d5-nitrobenzene (Surrogate)	µg/L	-	0.2	0.21	30	9
			2-fluorobiphenyl (Surrogate)	µg/L	-	0.2	0.21	30	5
			d14-p-terphenyl (Surrogate)	µg/L	-	0.3	0.23	30	12

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Metals in TCLP Extract by ICPOES

Method: ME-(AU)-[ENV]AN320

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB135097.002	Arsenic, As	mg/L	0.02	2.1	2	80 - 120	103
	Cadmium, Cd	mg/L	0.001	2.0	2	80 - 120	101
	Chromium, Cr	mg/L	0.005	2.0	2	80 - 120	99
	Copper, Cu	mg/L	0.005	1.9	2	80 - 120	95
	Lead, Pb	mg/L	0.02	2.0	2	80 - 120	101
	Nickel, Ni	mg/L	0.005	2.0	2	80 - 120	100
	Zinc, Zn	mg/L	0.01	2.0	2	80 - 120	100

PAH (Polynuclear Aromatic Hydrocarbons) in TCLP Extract

Method: ME-(AU)-[ENV]AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB135103.002		Naphthalene	µg/L	0.1	27	40	60 - 140	68
		Acenaphthylene	µg/L	0.1	27	40	60 - 140	68
		Acenaphthene	µg/L	0.1	27	40	60 - 140	69
		Phenanthrene	µg/L	0.1	29	40	60 - 140	71
		Anthracene	µg/L	0.1	29	40	60 - 140	73
		Fluoranthene	µg/L	0.1	26	40	60 - 140	66
		Pyrene	µg/L	0.1	28	40	60 - 140	70
		Benzo(a)pyrene	µg/L	0.1	32	40	60 - 140	79
	Surrogates	d5-nitrobenzene (Surrogate)	µg/L	-	0.3	0.5	40 - 130	62
		2-fluorobiphenyl (Surrogate)	µg/L	-	0.3	0.5	40 - 130	66
		d14-p-terphenyl (Surrogate)	µg/L	-	0.4	0.5	40 - 130	74

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No matrix spikes were required for this job.

MATRIX SPIKE DUPLICATES

SE171696A R0

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf

*	NATA accreditation does not cover the performance of this service.
**	Indicative data, theoretical holding time exceeded.
-	Sample not analysed for this analyte.
IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
LOR	Limit of reporting.
QFH	QC result is above the upper tolerance.
QFL	QC result is below the lower tolerance.

①	At least 2 of 3 surrogates are within acceptance criteria.
②	RPD failed acceptance criteria due to sample heterogeneity.
③	Results less than 5 times LOR preclude acceptance criteria for RPD.
④	Recovery failed acceptance criteria due to matrix interference.
⑤	Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
⑥	LOR was raised due to sample matrix interference.
⑦	LOR was raised due to dilution of significantly high concentration of analyte in sample.
⑧	Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
⑨	Recovery failed acceptance criteria due to sample heterogeneity.
⑩	LOR was raised due to high conductivity of the sample (required dilution).
†	Refer to Analytical Report comments for further information.

CHAIN OF CUSTODY RECORD

Cardno
Shaping the Future

LAB Name	
Address	

Client	Cardno Pty Ltd PO Box 74 Broadmeadow NSW 2292	
Contact	Malcolm Adrien	
Sampled by	Malcolm Adrien	
Project Ref:	82218015	

Contact Numbers	
Phone	0249 494300
Fax	0249 654666

E-mail	malcolm.adrien@cardno.com.au	ian.piper@cardno.com.au

(invoice to geotech@cardno.com.au)

Date Results Required	Standard TAT

566466

Laboratory LIMS ID	Client Sample ID	Date Sampled	Matrix: Soil	Matrix: Water	Containers/Preservation: Soil Jar (G) Nat. Orange	0.5-1.0 litre (G) Nat. Yellow	0.1-1.0 litre (P) Nat. Green	50mL VOA Vial (G) H_2SO_4 Maroon	0.1-1.0 litre (P) H_2SO_4 Maroon	0.2-1.0 litre (G) H_2SO_4 Maroon	0.1-0.2 (P) Filtered?? Y=Yes, N=No (HNO_3) Red	0.2l (P) NaOH Blue	Other	Analysis Required: CL17	TRH	BTEX	8 Metals (Total)		
	HA1 0.05-0.15	29/09/2017	☒		☒														
1	HA1 0.4-0.5	29/09/2017	☒		☒									☒					
2	HA2 0.05-0.15	29/09/2017	☒		☒									☒					
	HA2 0.4-0.5	29/09/2017	☒		☒														
	HA2 0.6-0.7	29/09/2017	☒		☒														
	HA3 0.05-0.15	29/09/2017	☒		☒														
	HA3 0.5-0.6	29/09/2017	☒		☒														
3	HA3 0.7-0.8	29/09/2017	☒		☒									☒					
4	HA4 0.05-0.15	29/09/2017	☒		☒									☒					
5	HA5 0.05-0.15	29/09/2017	☒		☒									☒					
	HA5 0.2-0.3	29/09/2017	☒		☒														
	HA6 0.05-0.15	29/09/2017	☒		☒														
6	HA6 0.4-0.5	29/09/2017	☒		☒									☒					
7	RIN	29/09/2017		☒													☒		
8	TRIP SPIKE	29/09/2017	☒		☒										☒	☒			
9	TRIP BLANK	29/09/2017	☒		☒										☒	☒			
10	DUP	29/09/2017	☒		☒									☒					
11	TRIP	29/09/2017	☒		☒									☒					

SGS EHS Alexandria Laboratory

SE171022 COC
Received: 04-Oct-2017

Rec'd: [signature] eurofins
5/10 2:57pm

Released by: [signature] Signature Date/Time 3/10/17
Received by: [signature] Signature Date/Time 04/10/17 @ 11:20

Custody Seals Intact? / Samples Received Chilled?

Melbourne
3-5 Kingston Town Close
Oakleigh Vic 3166
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

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

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261 Site # 23736

ABN – 50 005 085 521 e.mail : EnviroSales@eurofins.com web : www.eurofins.com.au

Sample Receipt Advice

Company name:	**Cardno (NSW/ACT) Pty Ltd**
Contact name:	Malcolm Adrien
Project name:	SOIL ANALYSIS
Project ID:	82218015
COC number:	Not provided
Turn around time:	5 Day
Date/Time received:	Oct 5, 2017 2:57 PM
Eurofins | mgt reference:	**566466**

Sample information

☑ A detailed list of analytes logged into our LIMS, is included in the attached summary table.

☑ All samples have been received as described on the above COC.

☑ COC has been completed correctly.

☑ Attempt to chill was evident.

☑ Appropriately preserved sample containers have been used.

☑ All samples were received in good condition.

☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

☑ Appropriate sample containers have been used.

☒ Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Nibha Vaidya on Phone : +61 (2) 9900 8400 or by e.mail: NibhaVaidya@eurofins.com

Results will be delivered electronically via e.mail to Malcolm Adrien - malcolm.adrien@cardno.com.au.

ABN– 50 005 085 521
e.mail : EnviroSales@eurofins.com
web : www.eurofins.com.au

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2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Company Name:	Cardno (NSW/ACT) Pty Ltd	**Order No.:**		**Received:**	Oct 5, 2017 2:57 PM
Address:	Level 9, 203 Pacific Highway St Leonards NSW 2065	**Report #:**	566466	**Due:**	Oct 12, 2017
		Phone:	0294967700	**Priority:**	5 Day
		Fax:	02 9499 3902	**Contact Name:**	Malcolm Adrien
Project Name:	SOIL ANALYSIS				
Project ID:	82218015				

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Polycyclic Aromatic Hydrocarbons	Organochlorine Pesticides	Organophosphorus Pesticides	Polychlorinated Biphenyls	Metals M8	BTEX and Naphthalene	Moisture Set	Total Recoverable Hydrocarbons
Melbourne Laboratory - NATA Site # 1254 & 14271													
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794													
Perth Laboratory - NATA Site # 23736													
External Laboratory													
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**								
1	TRIP	Sep 29, 2017		Soil	S17-Oc06118	X	X	X	X	X	X	X	X
Test Counts						1	1	1	1	1	1	1	1

eurofins | mgt

Certificate of Analysis

Cardno (NSW/ACT) Pty Ltd
Level 9, 203 Pacific Highway
St Leonards
NSW 2065

NATA Accredited
Accreditation Number 1261
Site Number 18217

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

Attention: **Malcolm Adrien**

Report **566466-S**
Project name SOIL ANALYSIS
Project ID 82218015
Received Date Oct 05, 2017

Client Sample ID			**TRIP**
Sample Matrix			**Soil**
Eurofins | mgt Sample No.			**S17-Oc06118**
Date Sampled			**Sep 29, 2017**
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	20	mg/kg	< 20
TRH C10-C14	20	mg/kg	< 20
TRH C15-C28	50	mg/kg	50
TRH C29-C36	50	mg/kg	69
TRH C10-36 (Total)	50	mg/kg	119
BTEX			
Benzene	0.1	mg/kg	< 0.1
Toluene	0.1	mg/kg	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2
o-Xylene	0.1	mg/kg	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3
4-Bromofluorobenzene (surr.)	1	%	102
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.5	mg/kg	< 0.5
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20
TRH C6-C10	20	mg/kg	< 20
TRH >C10-C16	50	mg/kg	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50
TRH >C16-C34	100	mg/kg	< 100
TRH >C34-C40	100	mg/kg	< 100
Polycyclic Aromatic Hydrocarbons			
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2
Acenaphthene	0.5	mg/kg	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5
Anthracene	0.5	mg/kg	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5
Chrysene	0.5	mg/kg	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5

Client Sample ID			TRIP
Sample Matrix			Soil
Eurofins | mgt Sample No.			S17-Oc06118
Date Sampled			Sep 29, 2017
Test/Reference	LOR	Unit	
Polycyclic Aromatic Hydrocarbons			
Fluoranthene	0.5	mg/kg	0.6
Fluorene	0.5	mg/kg	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5
Naphthalene	0.5	mg/kg	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5
Pyrene	0.5	mg/kg	0.6
Total PAH*	0.5	mg/kg	1.2
2-Fluorobiphenyl (surr.)	1	%	96
p-Terphenyl-d14 (surr.)	1	%	99
Organochlorine Pesticides			
Chlordanes - Total	0.1	mg/kg	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05
a-BHC	0.05	mg/kg	< 0.05
Aldrin	0.05	mg/kg	< 0.05
b-BHC	0.05	mg/kg	< 0.05
d-BHC	0.05	mg/kg	< 0.05
Dieldrin	0.05	mg/kg	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05
Endrin	0.05	mg/kg	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05
Heptachlor	0.05	mg/kg	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05
Methoxychlor	0.2	mg/kg	< 0.2
Toxaphene	1	mg/kg	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1
Dibutylchlorendate (surr.)	1	%	72
Tetrachloro-m-xylene (surr.)	1	%	82
Organophosphorus Pesticides			
Azinphos-methyl	0.2	mg/kg	< 0.2
Bolstar	0.2	mg/kg	< 0.2
Chlorfenvinphos	0.2	mg/kg	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2
Coumaphos	2	mg/kg	< 2
Demeton-S	0.2	mg/kg	< 0.2
Demeton-O	0.2	mg/kg	< 0.2
Diazinon	0.2	mg/kg	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2
Dimethoate	0.2	mg/kg	< 0.2

Client Sample ID			TRIP
Sample Matrix			Soil
Eurofins | mgt Sample No.			S17-Oc06118
Date Sampled			Sep 29, 2017
Test/Reference	LOR	Unit	
Organophosphorus Pesticides			
Disulfoton	0.2	mg/kg	< 0.2
EPN	0.2	mg/kg	< 0.2
Ethion	0.2	mg/kg	< 0.2
Ethoprop	0.2	mg/kg	< 0.2
Ethyl parathion	0.2	mg/kg	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2
Fenthion	0.2	mg/kg	< 0.2
Malathion	0.2	mg/kg	< 0.2
Merphos	0.2	mg/kg	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2
Mevinphos	0.2	mg/kg	< 0.2
Monocrotophos	2	mg/kg	< 2
Naled	0.2	mg/kg	< 0.2
Omethoate	2	mg/kg	< 2
Phorate	0.2	mg/kg	< 0.2
Pirimiphos-methyl	0.2	mg/kg	< 0.2
Pyrazophos	0.2	mg/kg	< 0.2
Ronnel	0.2	mg/kg	< 0.2
Terbufos	0.2	mg/kg	< 0.2
Tetrachlorvinphos	0.2	mg/kg	< 0.2
Tokuthion	0.2	mg/kg	< 0.2
Trichloronate	0.2	mg/kg	< 0.2
Triphenylphosphate (surr.)	1	%	100
Polychlorinated Biphenyls			
Aroclor-1016	0.5	mg/kg	< 0.5
Aroclor-1221	0.1	mg/kg	< 0.1
Aroclor-1232	0.5	mg/kg	< 0.5
Aroclor-1242	0.5	mg/kg	< 0.5
Aroclor-1248	0.5	mg/kg	< 0.5
Aroclor-1254	0.5	mg/kg	< 0.5
Aroclor-1260	0.5	mg/kg	< 0.5
Total PCB*	0.5	mg/kg	< 0.5
Dibutylchlorendate (surr.)	1	%	72
Tetrachloro-m-xylene (surr.)	1	%	82
Heavy Metals			
Arsenic	2	mg/kg	3.6
Cadmium	0.4	mg/kg	< 0.4
Chromium	5	mg/kg	39
Copper	5	mg/kg	17
Lead	5	mg/kg	28
Mercury	0.1	mg/kg	< 0.1
Nickel	5	mg/kg	9.8
Zinc	5	mg/kg	260
% Moisture	1	%	5.7

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Sydney	Oct 09, 2017	14 Day
- Method: TRH C6-C36 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Oct 09, 2017	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Sydney	Oct 09, 2017	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
BTEX	Sydney	Oct 09, 2017	14 Day
- Method: TRH C6-C40 - LTM-ORG-2010			
Polycyclic Aromatic Hydrocarbons	Sydney	Oct 09, 2017	14 Days
- Method: LTM-ORG-2140 PAH and Phenols in Soils by GCMS			
Organochlorine Pesticides	Sydney	Oct 09, 2017	14 Day
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Organophosphorus Pesticides	Sydney	Oct 09, 2017	14 Day
- Method: LTM-ORG-2200 Organophosphorus Pesticides by GC-MS			
Polychlorinated Biphenyls	Sydney	Oct 09, 2017	28 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Metals M8	Sydney	Oct 09, 2017	28 Day
- Method: LTM-MET-3040_R0 TOTAL AND DISSOLVED METALS AND MERCURY IN WATERS BY ICP-MS			
% Moisture	Sydney	Oct 06, 2017	14 Day
- Method: LTM-GEN-7080 Moisture			

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Site # 23736

Company Name: Cardno (NSW/ACT) Pty Ltd
Address: Level 9, 203 Pacific Highway
St Leonards
NSW 2065

Project Name: SOIL ANALYSIS
Project ID: 82218015

Order No.:
Report #: 566466
Phone: 0294967700
Fax: 02 9499 3902

Received: Oct 5, 2017 2:57 PM
Due: Oct 12, 2017
Priority: 5 Day
Contact Name: Malcolm Adrien

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Polycyclic Aromatic Hydrocarbons	Organochlorine Pesticides	Organophosphorus Pesticides	Polychlorinated Biphenyls	Metals M8	BTEX and Naphthalene	Moisture Set	Total Recoverable Hydrocarbons
Melbourne Laboratory - NATA Site # 1254 & 14271													
Sydney Laboratory - NATA Site # 18217						X	X	X	X	X	X	X	X
Brisbane Laboratory - NATA Site # 20794													
Perth Laboratory - NATA Site # 23736													
External Laboratory													
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**								
1	TRIP	Sep 29, 2017		Soil	S17-Oc06118	X	X	X	X	X	X	X	X
Test Counts						1	1	1	1	1	1	1	1

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

ug/L: micrograms per litre

ppb: Parts per billion

org/100mL: Organisms per 100 millilitres

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

mg/L: milligrams per litre

ppm: Parts per million

%: Percentage

NTU: Nephelometric Turbidity Units

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/kg	< 0.1			0.1	Pass	
4.4'-DDD	mg/kg	< 0.05			0.05	Pass	
4.4'-DDE	mg/kg	< 0.05			0.05	Pass	
4.4'-DDT	mg/kg	< 0.05			0.05	Pass	
a-BHC	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-BHC	mg/kg	< 0.05			0.05	Pass	
d-BHC	mg/kg	< 0.05			0.05	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-BHC (Lindane)	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.2			0.2	Pass	
Toxaphene	mg/kg	< 1			1	Pass	
Method Blank							
Organophosphorus Pesticides							
Azinphos-methyl	mg/kg	< 0.2			0.2	Pass	
Bolstar	mg/kg	< 0.2			0.2	Pass	
Chlorfenvinphos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos-methyl	mg/kg	< 0.2			0.2	Pass	
Coumaphos	mg/kg	< 2			2	Pass	
Demeton-S	mg/kg	< 0.2			0.2	Pass	
Demeton-O	mg/kg	< 0.2			0.2	Pass	
Diazinon	mg/kg	< 0.2			0.2	Pass	
Dichlorvos	mg/kg	< 0.2			0.2	Pass	
Dimethoate	mg/kg	< 0.2			0.2	Pass	
Disulfoton	mg/kg	< 0.2			0.2	Pass	
EPN	mg/kg	< 0.2			0.2	Pass	
Ethion	mg/kg	< 0.2			0.2	Pass	
Ethoprop	mg/kg	< 0.2			0.2	Pass	
Ethyl parathion	mg/kg	< 0.2			0.2	Pass	
Fenitrothion	mg/kg	< 0.2			0.2	Pass	
Fensulfothion	mg/kg	< 0.2			0.2	Pass	
Fenthion	mg/kg	< 0.2			0.2	Pass	
Malathion	mg/kg	< 0.2			0.2	Pass	
Merphos	mg/kg	< 0.2			0.2	Pass	
Methyl parathion	mg/kg	< 0.2			0.2	Pass	
Mevinphos	mg/kg	< 0.2			0.2	Pass	
Monocrotophos	mg/kg	< 2			2	Pass	
Naled	mg/kg	< 0.2			0.2	Pass	
Omethoate	mg/kg	< 2			2	Pass	
Phorate	mg/kg	< 0.2			0.2	Pass	
Pirimiphos-methyl	mg/kg	< 0.2			0.2	Pass	
Pyrazophos	mg/kg	< 0.2			0.2	Pass	
Ronnel	mg/kg	< 0.2			0.2	Pass	
Terbufos	mg/kg	< 0.2			0.2	Pass	
Tetrachlorvinphos	mg/kg	< 0.2			0.2	Pass	
Tokuthion	mg/kg	< 0.2			0.2	Pass	
Trichloronate	mg/kg	< 0.2			0.2	Pass	
Method Blank							
Polychlorinated Biphenyls							
Aroclor-1016	mg/kg	< 0.5			0.5	Pass	
Aroclor-1221	mg/kg	< 0.1			0.1	Pass	
Aroclor-1232	mg/kg	< 0.5			0.5	Pass	
Aroclor-1242	mg/kg	< 0.5			0.5	Pass	
Aroclor-1248	mg/kg	< 0.5			0.5	Pass	
Aroclor-1254	mg/kg	< 0.5			0.5	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Aroclor-1260	mg/kg	< 0.5			0.5	Pass	
Total PCB*	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	92			70-130	Pass	
TRH C10-C14	%	89			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	100			70-130	Pass	
Toluene	%	111			70-130	Pass	
Ethylbenzene	%	115			70-130	Pass	
m&p-Xylenes	%	109			70-130	Pass	
o-Xylene	%	110			70-130	Pass	
Xylenes - Total	%	110			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	107			70-130	Pass	
TRH C6-C10	%	90			70-130	Pass	
TRH >C10-C16	%	92			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	101			70-130	Pass	
Acenaphthylene	%	99			70-130	Pass	
Anthracene	%	103			70-130	Pass	
Benz(a)anthracene	%	96			70-130	Pass	
Benzo(a)pyrene	%	101			70-130	Pass	
Benzo(b&j)fluoranthene	%	95			70-130	Pass	
Benzo(g.h.i)perylene	%	100			70-130	Pass	
Benzo(k)fluoranthene	%	114			70-130	Pass	
Chrysene	%	103			70-130	Pass	
Dibenz(a.h)anthracene	%	102			70-130	Pass	
Fluoranthene	%	100			70-130	Pass	
Fluorene	%	102			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	102			70-130	Pass	
Naphthalene	%	97			70-130	Pass	
Phenanthrene	%	98			70-130	Pass	
Pyrene	%	98			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
4.4'-DDE	%	103			70-130	Pass	
a-BHC	%	101			70-130	Pass	
Aldrin	%	103			70-130	Pass	
b-BHC	%	98			70-130	Pass	
d-BHC	%	93			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Dieldrin	%	102			70-130	Pass	
Endosulfan I	%	101			70-130	Pass	
Endosulfan II	%	95			70-130	Pass	
Endosulfan sulphate	%	95			70-130	Pass	
g-BHC (Lindane)	%	99			70-130	Pass	
Heptachlor epoxide	%	102			70-130	Pass	
Hexachlorobenzene	%	95			70-130	Pass	
LCS - % Recovery							
Organophosphorus Pesticides							
Diazinon	%	97			70-130	Pass	
Dimethoate	%	86			70-130	Pass	
Ethion	%	87			70-130	Pass	
Fenitrothion	%	80			70-130	Pass	
Methyl parathion	%	77			70-130	Pass	
Mevinphos	%	102			70-130	Pass	
LCS - % Recovery							
Polychlorinated Biphenyls							
Aroclor-1260	%	114			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	97			70-130	Pass	
Cadmium	%	95			70-130	Pass	
Chromium	%	100			70-130	Pass	
Copper	%	100			70-130	Pass	
Lead	%	98			70-130	Pass	
Mercury	%	99			70-130	Pass	
Nickel	%	99			70-130	Pass	
Zinc	%	95			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S17-Oc09283	NCP	%	97			70-130	Pass	
TRH C10-C14	S17-Oc07509	NCP	%	93			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S17-Oc09283	NCP	%	104			70-130	Pass	
Toluene	S17-Oc09283	NCP	%	114			70-130	Pass	
Ethylbenzene	S17-Oc09283	NCP	%	118			70-130	Pass	
m&p-Xylenes	S17-Oc09283	NCP	%	114			70-130	Pass	
o-Xylene	S17-Oc09283	NCP	%	113			70-130	Pass	
Xylenes - Total	S17-Oc09283	NCP	%	114			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S17-Oc09283	NCP	%	115			70-130	Pass	
TRH C6-C10	S17-Oc09283	NCP	%	94			70-130	Pass	
TRH >C10-C16	S17-Oc07509	NCP	%	96			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	S17-Oc03835	NCP	%	103			70-130	Pass	
Acenaphthylene	S17-Oc03835	NCP	%	101			70-130	Pass	
Anthracene	S17-Oc03835	NCP	%	108			70-130	Pass	
Benz(a)anthracene	S17-Oc03835	NCP	%	100			70-130	Pass	
Benzo(a)pyrene	S17-Oc03835	NCP	%	103			70-130	Pass	
Benzo(b&j)fluoranthene	S17-Oc03835	NCP	%	97			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Benzo(g.h.i)perylene	S17-Oc03835	NCP	%	104			70-130	Pass	
Benzo(k)fluoranthene	S17-Oc03835	NCP	%	116			70-130	Pass	
Chrysene	S17-Oc03835	NCP	%	104			70-130	Pass	
Dibenz(a.h)anthracene	S17-Oc03835	NCP	%	104			70-130	Pass	
Fluoranthene	S17-Oc03835	NCP	%	100			70-130	Pass	
Fluorene	S17-Oc03835	NCP	%	105			70-130	Pass	
Indeno(1.2.3-cd)pyrene	S17-Oc03835	NCP	%	103			70-130	Pass	
Naphthalene	S17-Oc03835	NCP	%	99			70-130	Pass	
Phenanthrene	S17-Oc03835	NCP	%	104			70-130	Pass	
Pyrene	S17-Oc03835	NCP	%	101			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
4.4'-DDD	S17-Oc10349	NCP	%	112			70-130	Pass	
4.4'-DDE	S17-Oc10341	NCP	%	78			70-130	Pass	
4.4'-DDT	S17-Oc03836	NCP	%	79			70-130	Pass	
a-BHC	S17-Oc10341	NCP	%	89			70-130	Pass	
Aldrin	S17-Oc10341	NCP	%	92			70-130	Pass	
b-BHC	S17-Oc10341	NCP	%	80			70-130	Pass	
d-BHC	S17-Oc10341	NCP	%	79			70-130	Pass	
Dieldrin	S17-Oc10349	NCP	%	97			70-130	Pass	
Endosulfan I	S17-Oc10341	NCP	%	126			70-130	Pass	
Endosulfan II	S17-Oc10349	NCP	%	95			70-130	Pass	
Endosulfan sulphate	S17-Oc10349	NCP	%	103			70-130	Pass	
Endrin	S17-Oc10002	NCP	%	96			70-130	Pass	
Endrin aldehyde	S17-Oc10341	NCP	%	128			70-130	Pass	
Endrin ketone	S17-Oc10002	NCP	%	108			70-130	Pass	
g-BHC (Lindane)	S17-Oc10349	NCP	%	83			70-130	Pass	
Heptachlor	S17-Oc10341	NCP	%	74			70-130	Pass	
Heptachlor epoxide	S17-Oc10341	NCP	%	99			70-130	Pass	
Hexachlorobenzene	S17-Oc10341	NCP	%	71			70-130	Pass	
Methoxychlor	S17-Oc10002	NCP	%	71			70-130	Pass	
Toxaphene	S17-Oc10002	NCP	%	107			70-130	Pass	
Spike - % Recovery									
Polychlorinated Biphenyls				Result 1					
Aroclor-1260	S17-Oc05124	NCP	%	92			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S17-Oc05592	NCP	%	103			70-130	Pass	
Cadmium	S17-Oc05592	NCP	%	106			70-130	Pass	
Chromium	S17-Oc05592	NCP	%	111			70-130	Pass	
Copper	S17-Oc05592	NCP	%	93			70-130	Pass	
Lead	S17-Oc05592	NCP	%	112			70-130	Pass	
Mercury	S17-Oc05592	NCP	%	106			70-130	Pass	
Nickel	S17-Oc05592	NCP	%	97			70-130	Pass	
Zinc	S17-Oc05592	NCP	%	102			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S17-Oc09281	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	S17-Oc05595	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S17-Oc05595	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	S17-Oc05595	NCP	mg/kg	< 50	< 50	<1	30%	Pass	

Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S17-Oc09281	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S17-Oc09281	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S17-Oc09281	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S17-Oc09281	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S17-Oc09281	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S17-Oc09281	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S17-Oc09281	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S17-Oc09281	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	S17-Oc05595	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S17-Oc05595	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	S17-Oc05595	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S17-Oc03831	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S17-Oc03831	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S17-Oc03831	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S17-Oc03831	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S17-Oc03831	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	S17-Oc03831	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	S17-Oc03831	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S17-Oc03831	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	S17-Oc03831	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	S17-Oc03831	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S17-Oc03831	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S17-Oc03831	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S17-Oc03831	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S17-Oc03831	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S17-Oc03831	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S17-Oc03831	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	S17-Oc09280	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	S17-Oc09280	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	S17-Oc09280	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	S17-Oc09280	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-BHC	S17-Oc09280	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	S17-Oc09280	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	S17-Oc09280	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	S17-Oc09280	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	S17-Oc09280	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	S17-Oc09280	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	S17-Oc09280	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	S17-Oc09280	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	S17-Oc09280	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	S17-Oc09280	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	S17-Oc09280	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	S17-Oc09280	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	S17-Oc09280	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	S17-Oc09280	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	S17-Oc09280	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	S17-Oc09280	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Toxaphene	S17-Oc09280	NCP	mg/kg	< 1	< 1	<1	30%	Pass	

Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Azinphos-methyl	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bolstar	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorfenvinphos	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos	S17-Oc10347	NCP	mg/kg	0.3	0.4	30	30%	Pass	
Chlorpyrifos-methyl	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Coumaphos	S17-Oc10347	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Demeton-S	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Demeton-O	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Diazinon	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dichlorvos	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dimethoate	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Disulfoton	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
EPN	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethoprop	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethyl parathion	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenitrothion	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fensulfothion	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenthion	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Malathion	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Merphos	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl parathion	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Mevinphos	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Monocrotophos	S17-Oc10347	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Naled	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Omethoate	S17-Oc10347	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Phorate	S17-Oc10347	NCP	mg/kg	0.3	0.6	72	30%	Fail	Q15
Pirimiphos-methyl	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pyrazophos	S17-Oc03831	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ronnel	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbufos	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tetrachlorvinphos	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tokuthion	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Trichloronate	S17-Oc10347	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Polychlorinated Biphenyls				Result 1	Result 2	RPD			
Aroclor-1016	S17-Oc09280	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Aroclor-1221	S17-Oc09280	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1232	S17-Oc09280	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Aroclor-1242	S17-Oc09280	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Aroclor-1248	S17-Oc09280	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Aroclor-1254	S17-Oc09280	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Aroclor-1260	S17-Oc09280	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S17-Oc05591	NCP	mg/kg	11	10	2.0	30%	Pass	
Cadmium	S17-Oc05591	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S17-Oc05591	NCP	mg/kg	28	27	4.0	30%	Pass	
Copper	S17-Oc05591	NCP	mg/kg	59	57	4.0	30%	Pass	
Lead	S17-Oc05591	NCP	mg/kg	63	60	4.0	30%	Pass	
Mercury	S17-Oc05591	NCP	mg/kg	0.2	0.1	3.0	30%	Pass	
Nickel	S17-Oc05591	NCP	mg/kg	30	29	3.0	30%	Pass	
Zinc	S17-Oc05591	NCP	mg/kg	120	110	3.0	30%	Pass	

Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S17-Oc06118	CP	%	5.7	5.5	3.0	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
Q15	The RPD reported passes Eurofins | mgt's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised By

Nibha Vaidya Analytical Services Manager

Glenn Jackson

National Operations Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

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

Measurement uncertainty of test data is available on request or please click here.

University of Newcastle Proposed Bio-Resources Facility

APPENDIX D

LOTSEARCH REPORT

Environmental Risk and Planning Report

130 University Drive, Callaghan, NSW 2308

Report Date: **17 Oct 2017 10:27:59**

Disclaimer:
The purpose of this report is to provide an overview of some of the site history, environmental risk and planning information available, affecting an individual address or geographical area in which the property is located. It is not a substitute for an on-site inspection or review of other available reports and records. It is not intended to be, and should not be taken to be, a rating or assessment of the desirability or market value of the property or its features.
You should obtain independent advice before you make any decision based on the information within the report.
The detailed terms applicable to use of this report are set out at the end of this report.

Table of Contents

Location Confidences

Where Lotsearch has had to georeference features from supplied addresses, a location confidence has been assigned to the data record. This indicates a confidence to the positional accuracy of the feature. Where applicable, a code is given under the field heading “LC” or “LocConf”. These codes lookup to the following location confidences:

LC Code	Location Confidence
1	Georeferenced to the site location / premise or part of site
2	Georeferenced with the confidence of the general/approximate area
3	Georeferenced to the road or rail
4	Georeferenced to the road intersection
5	Feature is a buffered point
6	Land adjacent to Georeferenced Site
7	Georeferenced to a network of features

Dataset Listing

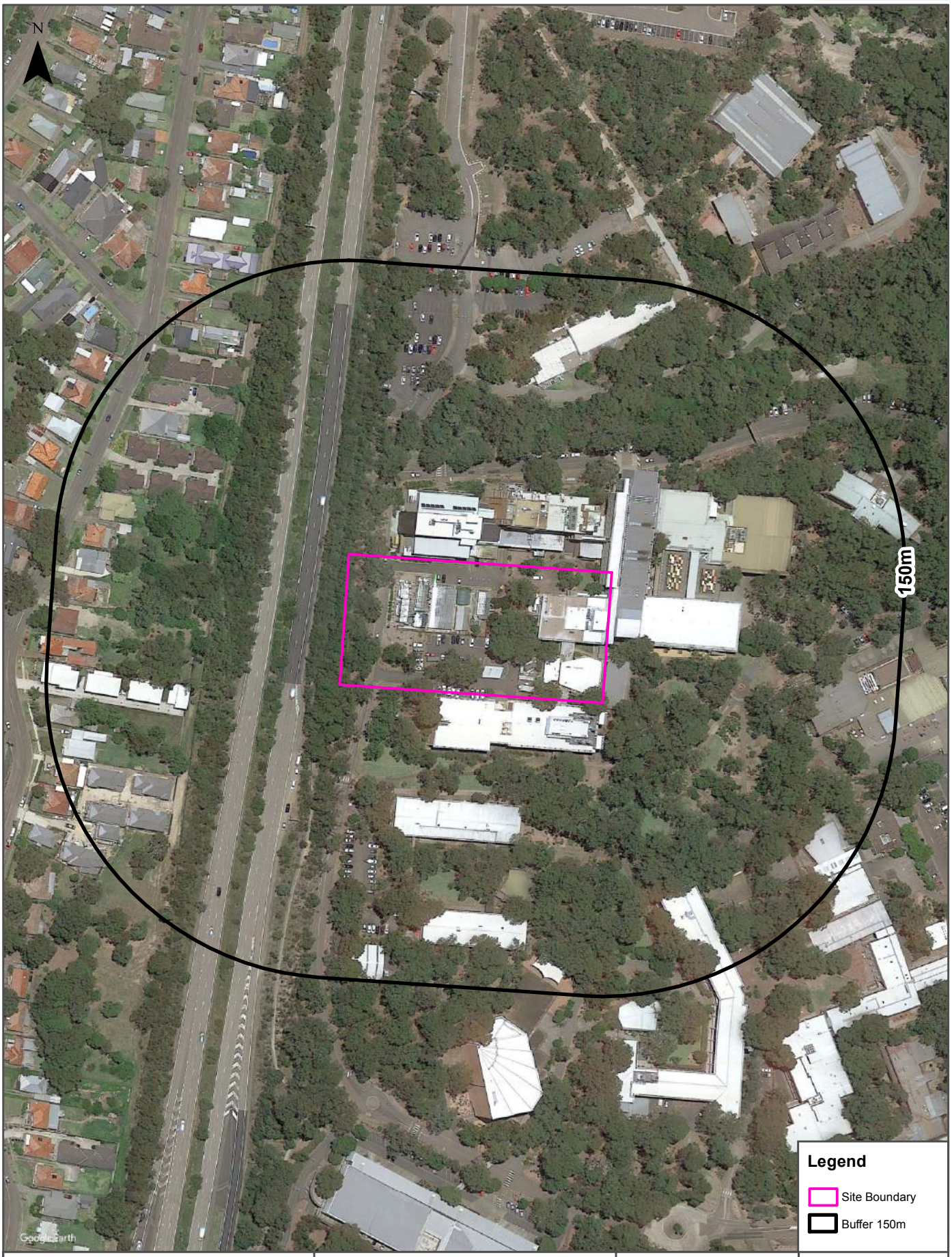
Datasets contained within this report, detailing their source and data currency:

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	Dataset Buffer (m)	No. Features Onsite	No. Features within 100m	No. Features within Buffer
Cadastre Boundaries	Department Finance, Services & Innovation	17/10/2017	17/10/2017	Daily	-	-	-	-
Topographic Data	Department Finance, Services & Innovation	10/04/2015	01/04/2015	As required	-	-	-	-
List of NSW contaminated sites notified to EPA	Environment Protection Authority	25/09/2017	04/09/2017	Monthly	1000	0	0	1
Contaminated Land: Records of Notice	Environment Protection Authority	03/10/2017	03/10/2017	Monthly	1000	0	0	0
Former Gasworks	Environment Protection Authority	24/09/2017	16/01/2017	Monthly	1000	0	0	0
National Waste Management Site Database	Geoscience Australia	24/09/2017	07/03/2017	Quarterly	1000	0	0	0
EPA PFAS Investigation Program	Environment Protection Authority	24/09/2017	24/09/2017	Monthly	2000	0	0	0
EPA Other Sites with Contamination Issues	Environment Protection Authority	24/09/2017	24/09/2017	Quarterly	1000	0	0	0
Licensed Activities under the POEO Act 1997	Environment Protection Authority	04/10/2017	04/10/2017	Monthly	1000	0	1	2
Delicensed POEO Activities still Regulated by the EPA	Environment Protection Authority	04/10/2017	04/10/2017	Monthly	1000	0	0	2
Former POEO Licensed Activities now revoked or surrendered	Environment Protection Authority	04/10/2017	04/10/2017	Monthly	1000	2	5	6
UPSS Environmentally Sensitive Zones	Department of Environment, Climate Change and Water	14/04/2015	12/01/2010	As required	1000	0	0	0
UBD Business Directory 1982 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business Directory 1982 (Road & Area Matches)	Hardie Grant			Not required	150	-	0	0
UBD Business Directory 1970 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	1
UBD Business Directory 1970 (Road & Area Matches)	Hardie Grant			Not required	150	-	0	0
UBD Business Directory 1961 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business Directory 1961 (Road & Area Matches)	Hardie Grant			Not required	150	-	0	0
UBD Business Directory 1950 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business Directory 1950 (Road & Area Matches)	Hardie Grant			Not required	150	-	0	0
UBD Business Directory Drycleaners & Motor Garages/Service Stations (Premise & Intersection Matches)	Hardie Grant			Not required	1000	0	0	9
UBD Business Directory Drycleaners & Motor Garages/Service Stations (Road & Area Matches)	Hardie Grant			Not required	1000	-	0	7
Points of Interest	Department Finance, Services & Innovation	01/02/2017	01/02/2017	Annually	1000	0	0	23
Tanks (Areas)	Department Finance, Services & Innovation	01/02/2017	01/02/2017	Annually	1000	0	0	1
Tanks (Points)	Department Finance, Services & Innovation	01/02/2017	01/02/2017	Annually	1000	0	0	1
Major Easements	Department Finance, Services & Innovation	01/02/2017	01/02/2017	As required	1000	0	0	15
State Forest	Department Finance, Services & Innovation	01/02/2017	29/06/2016	As required	1000	0	0	0
NSW National Parks and Wildlife Service Reserves	NSW Office of Environment and Heritage	01/02/2017	31/12/2016	Annually	1000	0	0	0
Hydrogeology Map of Australia	Commonwealth of Australia (Geoscience Australia)	08/10/2014	17/03/2000	As required	1000	1	1	1
Groundwater Boreholes	NSW Department of Primary Industries - Office of Water / Water Administration Ministerial Corporation; Commonwealth of Australia (Bureau of Meteorology) 2015	21/03/2016	01/12/2015	Annually	2000	0	0	17

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	Dataset Buffer (m)	No. Features Onsite	No. Features within 100m	No. Features within Buffer
Geological Units 1:250,000	NSW Department of Industry, Resources & Energy	20/08/2014		None planned	1000	1	-	4
Geological Structures 1:250,000	NSW Department of Industry, Resources & Energy	20/08/2014		None planned	1000	0	-	0
Naturally Occurring Asbestos Potential	NSW Department of Industry, Resources & Energy	04/12/2015	24/09/2015	Unknown	1000	0	0	0
Soil Landscapes	NSW Office of Environment and Heritage	12/08/2014		None planned	1000	1	-	4
Standard Local Environmental Plan Acid Sulfate Soils	NSW Planning and Environment	07/10/2016	07/10/2016	As required	500	1	-	-
Dryland Salinity - National Assessment	National Land and Water Resources Audit	18/07/2014	12/05/2013	None planned	1000	0	0	0
Dryland Salinity Potential of Western Sydney	NSW Office of Environment and Heritage	12/05/2017	01/01/2002	None planned	1000	-	-	-
Mining Subsidence Districts	Department Finance, Services & Innovation	13/07/2017	01/07/2017	As required	1000	0	0	1
SEPP 14 - Coastal Wetlands	NSW Planning and Environment	17/12/2015	24/10/2008	Annually	1000	0	0	1
SEPP 26 - Littoral Rainforest	NSW Planning and Environment	17/12/2015	05/02/1988	Annually	1000	0	0	0
SEPP 71 - Coastal Protection	NSW Planning and Environment	17/12/2015	01/08/2003	Annually	1000	0	0	1
SEPP Major Developments 2005	NSW Planning and Environment	09/03/2013	25/05/2005	Under Review	1000	0	0	0
SEPP Strategic Land Use Areas	NSW Planning and Environment	01/08/2017	28/01/2014	Annually	1000	0	0	0
LEP - Land Zoning	NSW Planning and Environment	23/09/2017	23/09/2017	Quarterly	1000	2	3	25
LEP - Minimum Subdivision Lot Size	NSW Planning and Environment	23/09/2017	23/09/2017	Quarterly	0	0	-	-
LEP - Height of Building	NSW Planning and Environment	23/09/2017	23/09/2017	Quarterly	0	0	-	-
LEP - Floor Space Ratio	NSW Planning and Environment	23/09/2017	23/09/2017	Quarterly	0	0	-	-
LEP - Land Application	NSW Planning and Environment	23/09/2017	23/09/2017	Quarterly	0	1	-	-
LEP - Land Reservation Acquisition	NSW Planning and Environment	23/09/2017	23/09/2017	Quarterly	0	0	-	-
State Heritage Items	NSW Office of Environment and Heritage	01/08/2017	27/05/2016	Quarterly	1000	0	0	0
Local Heritage Items	NSW Planning and Environment	23/09/2017	23/09/2017	Monthly	1000	0	0	3
Bush Fire Prone Land	NSW Rural Fire Service	24/09/2017	06/09/2017	Quarterly	1000	1	2	3
Lower Hunter and Central Coast Regional Vegetation Survey	NSW Office of Environment and Heritage	28/02/2015	16/11/2009	As required	1000	1	1	6
RAMSAR Wetlands	Commonwealth of Australia Department of the Environment	08/10/2014	24/06/2011	As required	1000	0	0	0
ATLAS of NSW Wildlife	NSW Office of Environment and Heritage	17/10/2017	17/10/2017	Daily	10000	-	-	-

Aerial Imagery 2016

130 University Drive, Callaghan, NSW 2308

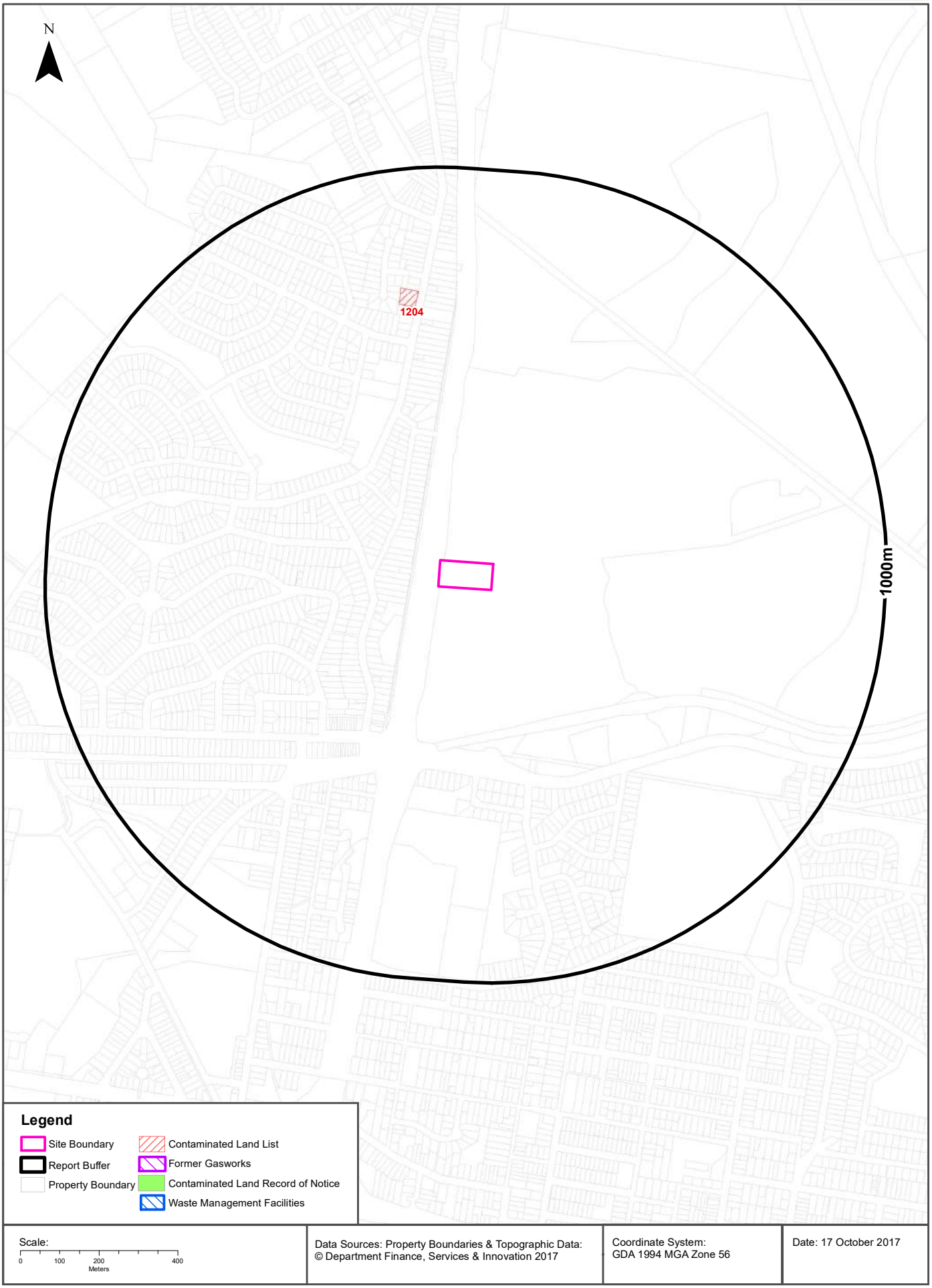


Scale:	Data Sources: Aerial Imagery © 2017 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.	Coordinate System: GDA 1994 MGA Zone 56	Date: 16 October, 2017

0 25 50 100 Meters

Contaminated Land & Waste Management Facilities

130 University Drive, Callaghan, NSW 2308



Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2017

Coordinate System: GDA 1994 MGA Zone 56

Date: 17 October 2017

Contaminated Land & Waste Management Facilities

130 University Drive, Callaghan, NSW 2308

List of NSW contaminated sites notified to EPA

Records from the NSW EPA Contaminated Land list within the dataset buffer:

Map Id	Site	Address	Suburb	Activity	Management Class	Status	Location Confidence	Dist (m)	Direction
1204	7-Eleven (Former BP) Service Station	298-302 Sandgate Road	Shortland	Service Station	Regulation under CLM Act not required	Current EPA List	Premise Match	646m	North

The values within the EPA site management class in the table above, are given more detailed explanations in the table below:

EPA site management class	Explanation
Contamination being managed via the planning process (EP&A Act)	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. The contamination of this site is managed by the consent authority under the Environmental Planning and Assessment Act 1979 (EP&A Act) planning approval process, with EPA involvement as necessary to ensure significant contamination is adequately addressed. The consent authority is typically a local council or the Department of Planning and Environment.
Contamination currently regulated under CLM Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the Contaminated Land Management Act 1997 (CLM Act). Management of the contamination is regulated by the EPA under the CLM Act. Regulatory notices are available on the EPA's Contaminated Land Public Record of Notices.
Contamination currently regulated under POEO Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. Management of the contamination is regulated under the Protection of the Environment Operations Act 1997 (POEO Act). The EPA's regulatory actions under the POEO Act are available on the POEO public register.
Contamination formerly regulated under the CLM Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation under the Contaminated Land Management Act 1997 (CLM Act). The contamination was addressed under the CLM Act.
Contamination formerly regulated under the POEO Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed under the Protection of the Environment Operations Act 1997 (POEO Act).
Contamination was addressed via the planning process (EP&A Act)	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed by the appropriate consent authority via the planning process under the Environmental Planning and Assessment Act 1979 (EP&A Act).
Ongoing maintenance required to manage residual contamination (CLM Act)	The EPA has determined that ongoing maintenance, under the Contaminated Land Management Act 1997 (CLM Act), is required to manage the residual contamination. Regulatory notices under the CLM Act are available on the EPA's Contaminated Land Public Record of Notices.
Regulation being finalised	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the Contaminated Land Management Act 1997. A regulatory approach is being finalised.
Regulation under the CLM Act not required	The EPA has completed an assessment of the contamination and decided that regulation under the Contaminated Land Management Act 1997 is not required.
Under assessment	The contamination is being assessed by the EPA to determine whether regulation is required. The EPA may require further information to complete the assessment. For example, the completion of management actions regulated under the planning process or Protection of the Environment Operations Act 1997. Alternatively, the EPA may require information via a notice issued under s77 of the Contaminated Land Management Act 1997 or issue a Preliminary Investigation Order.

NSW EPA Contaminated Land List Data Source: Environment Protection Authority

Contaminated Land & Waste Management Facilities

130 University Drive, Callaghan, NSW 2308

Contaminated Land: Records of Notice

Record of Notices within the dataset buffer:

Map Id	Name	Address	Suburb	Notices	Area No	Location Confidence	Distance	Direction
N/A	No records in buffer							

Contaminated Land Records of Notice Data Source: Environment Protection Authority

Former Gasworks

Former Gasworks within the dataset buffer:

Map Id	Location	Council	Further Info	Location Confidence	Distance	Direction
N/A	No records in buffer					

Former Gasworks Data Source: Environment Protection Authority

National Waste Management Site Database

Sites on the National Waste Management Site Database within the dataset buffer:

Site Id	Owner	Name	Address	Suburb	Class	Landfill	Reprocess	Transfer	Comments	Loc Conf	Dist (m)	Direction
N/A	No records in buffer											

Wate Management Facilities Data Source: Australian Governement Geoscience Australia

EPA PFAS Investigation Program

130 University Drive, Callaghan, NSW 2308

EPA PFAS Investigation Program

Sites that are part of the EPA PFAS investigation program, within the dataset buffer:

Id	Site	Address	Location Confidence	Distance	Direction
N/A	No records in buffer				

EPA PFAS Investigation Program: Environment Protection Authority

EPA Other Sites with Contamination Issues

130 University Drive, Callaghan, NSW 2308

EPA Other SIte s with Contamination Issues

This dataset contains other sites identified on the EPA website as having contamination issues. This dataset currently includes:

- James Hardie asbestos manufacturing and waste disposal sites
- Radiological investigation sites in Hunter's Hill

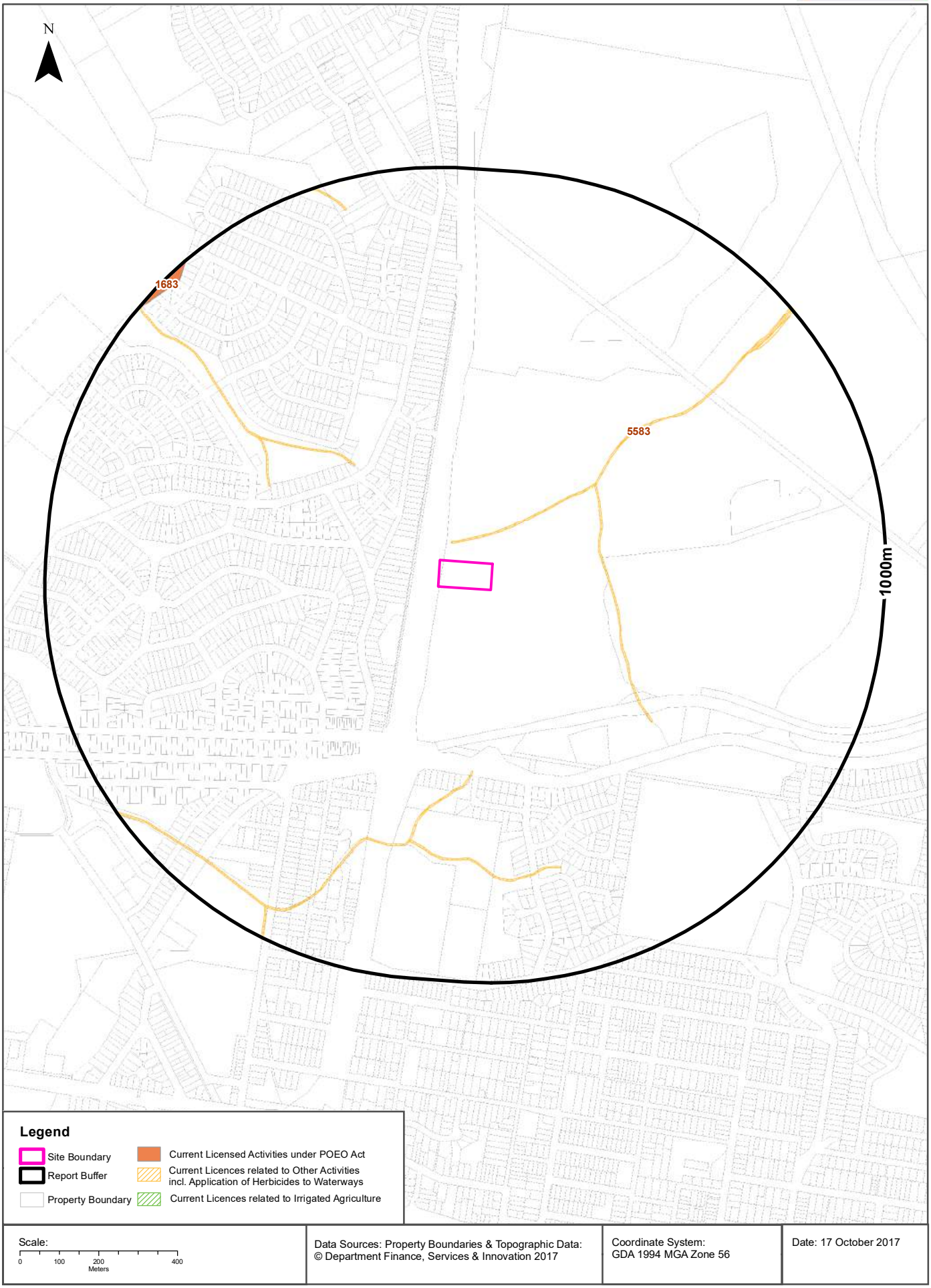
Sites within the dataset buffer:

Site Id	Site Name	Site Address	Dataset	Comments	Location Confidence	Distance	Direction
N/A	No records in buffer						

EPA Other Sites with Contamination Issues: Environment Protection Authority

Current EPA Licensed Activities

130 University Drive, Callaghan, NSW 2308



EPA Activities

130 University Drive, Callaghan, NSW 2308

Licensed Activities under the POEO Act 1997

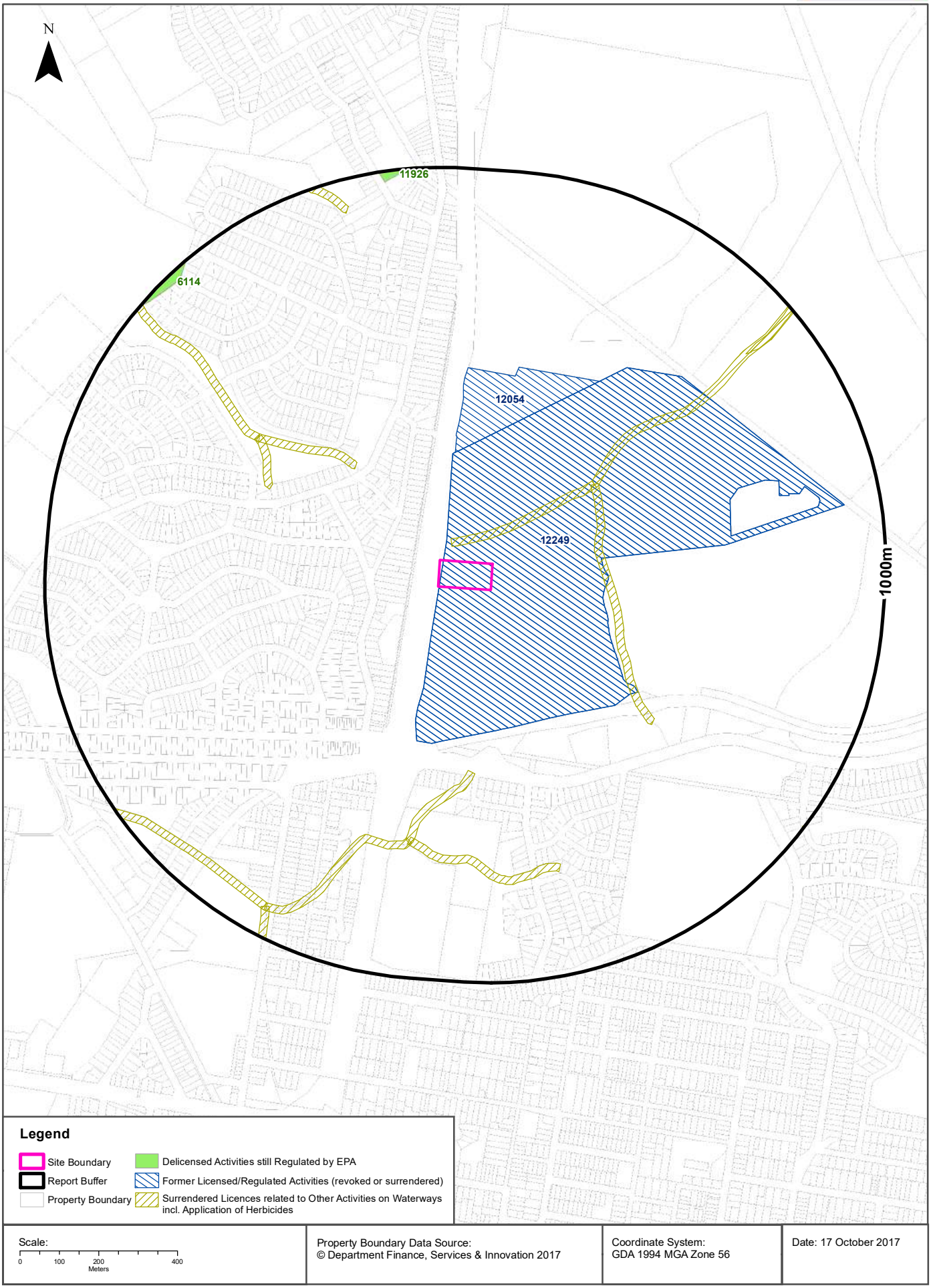
Licensed activities under the Protection of the Environment Operations Act 1997, within the dataset buffer:

EPL	Organisation	Name	Address	Suburb	Activity	Loc Conf	Distance	Direction
5583	NEWCASTLE CITY COUNCIL	WATERWAYS OF NEWCASTLE CITY	-	NEWCASTLE	Other activities	7	45m	North East
1683	HUNTER WATER CORPORATION	NEWCASTLE SEWERAGE SYSTEM including BURWOOD BEACH WASTEWATER TREATMENT PLANT AND SHORTLAND WASTEWATER TREATMENT PLANT	OFF SCENIC DRIVE	MEREWETHER	Sewage treatment processing by large plants	1	973m	South

POEO Licence Data Source: Environment Protection Authority

Delicensed & Former Licensed EPA Activities

130 University Drive, Callaghan, NSW 2308



EPA Activities

130 University Drive, Callaghan, NSW 2308

Delicensed Activities still regulated by the EPA

Delicensed activities still regulated by the EPA, within the dataset buffer:

Licence No	Organisation	Name	Address	Suburb	Activity	Loc Conf	Distance	Direction
6114	HUNTER WATER CORPORATION	SHORTLAND CHEMICAL STORAGE FACILITY	OFF ADEN ST	SHORTLAND	Hazardous, Industrial or Group A Waste Generation or Storage	1	973m	North West
11926	THE HUNTER VALLEY PRIVATE HOSPITAL PTY LTD	HUNTER VALLEY PRIVATE HOSPITAL	20 MAWSON STREET	SHORTLAND	Hazardous, Industrial or Group A Waste Generation or Storage	1	973m	North

Delicensed Activities Data Source: Environment Protection Authority

Former Licensed Activities under the POEO Act 1997, now revoked or surrendered

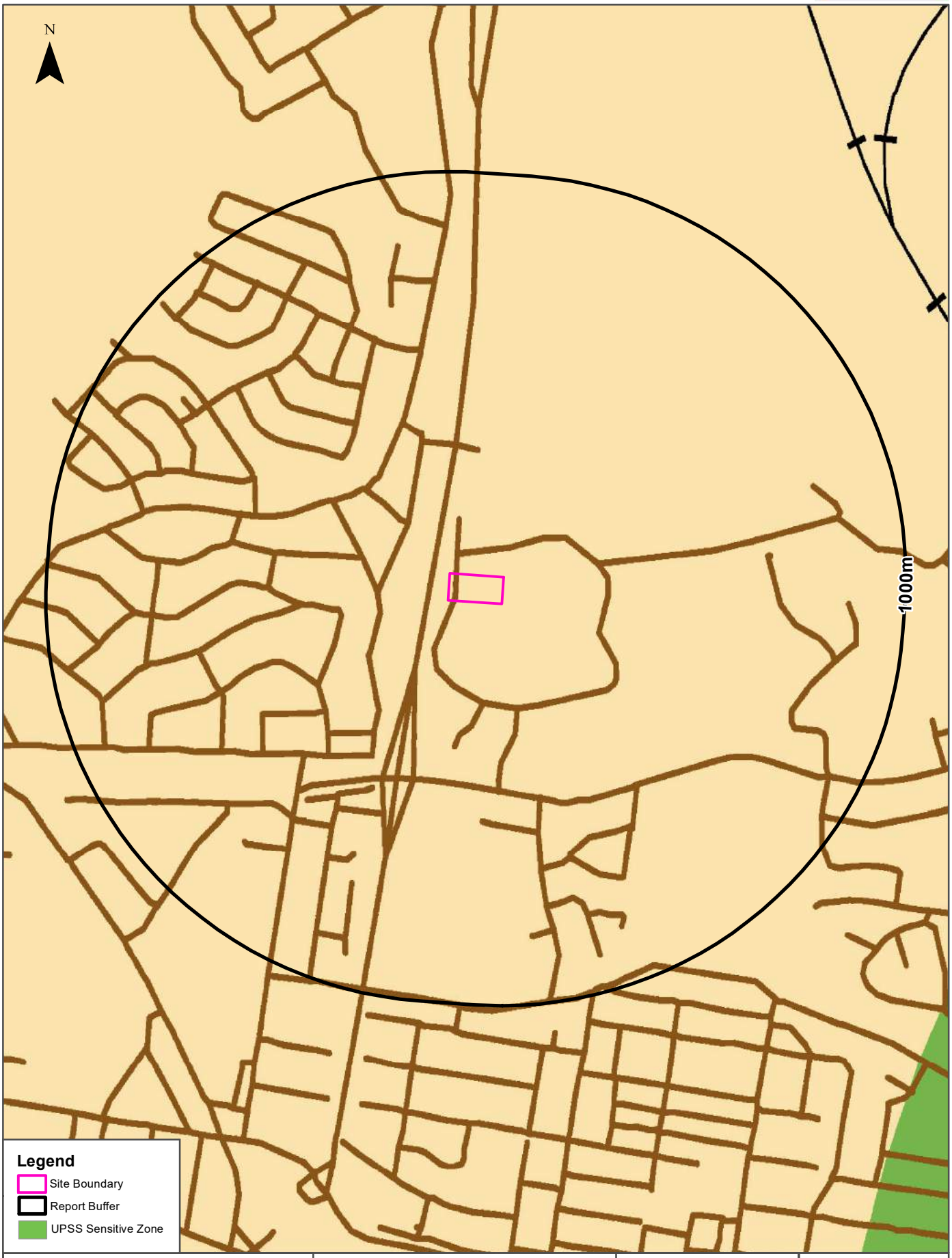
Former Licensed activities under the Protection of the Environment Operations Act 1997, now revoked or surrendered, within the dataset buffer:

Licence No	Organisation	Location	Status	Issued Date	Activity	Loc Conf	Distance	Direction
12249	THE UNIVERSITY OF NEWCASTLE	Groundwater Remediation Test Site (GRTS), University of Newcastle, University Drive, CALLAGHAN	Surrendered	04/01/2005	Non-thermal treatment of hazardous and other waste	1	0m	Onsite
12249	THE UNIVERSITY OF NEWCASTLE	Groundwater Remediation Test Site (GRTS), University of Newcastle, University Drive, CALLAGHAN	Surrendered	04/01/2005	Waste storage - hazardous, restricted solid, liquid, clinical and related waste and asbestos waste	1	0m	Onsite
4653	LUHRMANN ENVIRONMENT MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW	Surrendered		Other Activities / Non Scheduled Activity - Application of Herbicides	7	37m	-
4838	Robert Orchard	Various Waterways throughout New South Wales - SYDNEY NSW 2000	Surrendered		Other Activities / Non Scheduled Activity - Application of Herbicides	7	37m	-
6630	SYDNEY WEED & PEST MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW - PROSPECT, NSW, 2148	Surrendered		Other Activities / Non Scheduled Activity - Application of Herbicides	7	37m	-
12054	BHP BILLITON INNOVATION PTY. LTD.	Off Vale Street, SHORTLAND, NSW 2307	Surrendered	06/02/2004	Chemical production waste generation; Chemical storage waste generation	1	276m	North

Former Licensed Activities Data Source: Environment Protection Authority

UPSS Sensitive Zones

130 University Drive, Callaghan, NSW 2308



Historical Business Directories

130 University Drive, Callaghan, NSW 2308

1982 Business Directory Records
Premise or Road Intersection Matches

Records from the 1982 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Feature Point	Direction
N/A	No records in buffer				

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

1982 Business Directory Records
Road or Area Matches

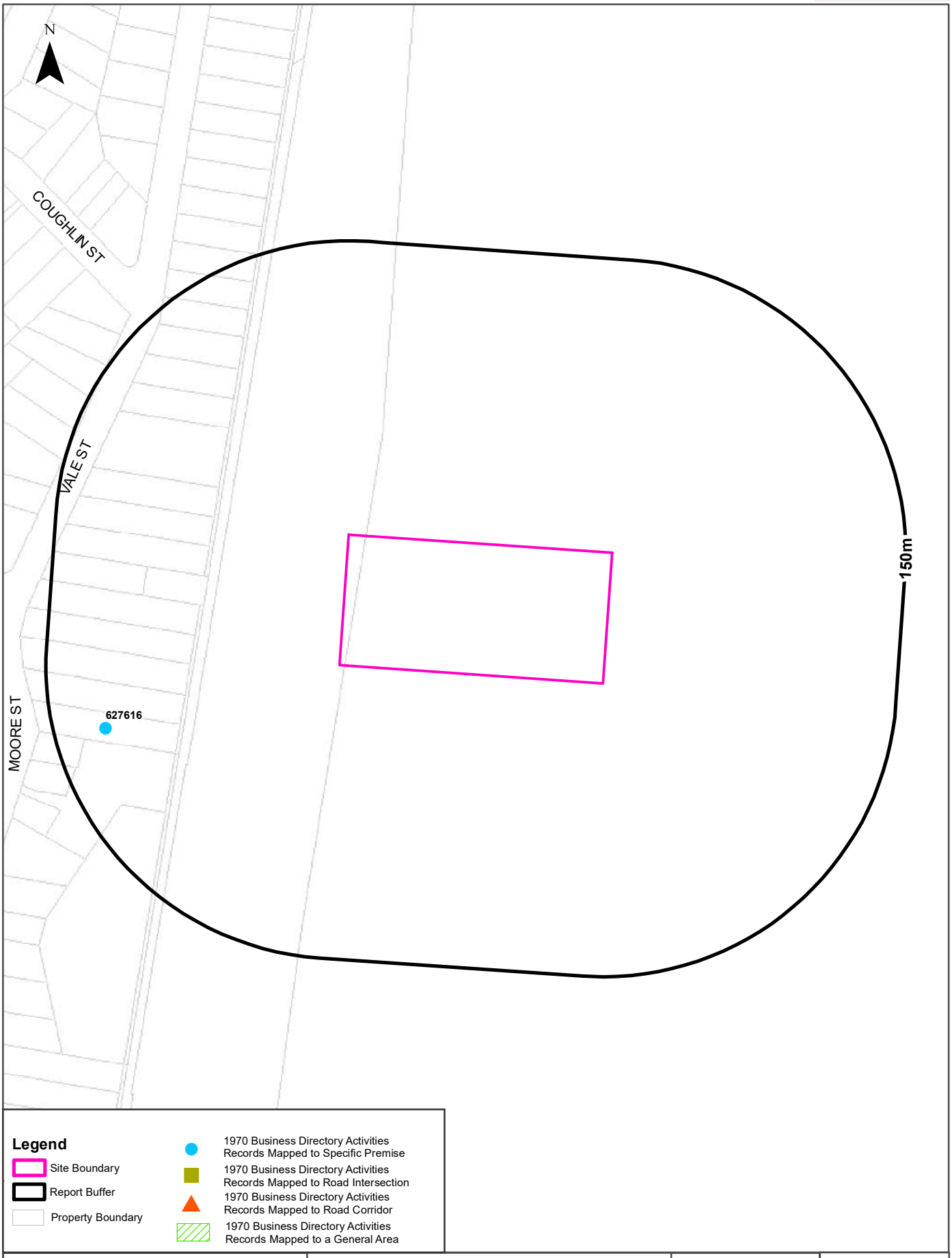
Records from the 1982 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
N/A	No records in buffer			

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

1970 Historical Business Directory Records

130 University Drive, Callaghan, NSW 2308



Historical Business Directories

130 University Drive, Callaghan, NSW 2308

1970 Business Directory Records
Premise or Road Intersection Matches

Records from the 1970 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Feature Point	Direction
ELECTRICAL CONTRACTORS-LICENSED	Threlfall, N., 46 Moore St., Birmingham Gardens, Newcastle	627616	Premise Match	124m	West

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

1970 Business Directory Records
Road or Area Matches

Records from the 1970 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
N/A	No records in buffer			

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

Historical Business Directories

130 University Drive, Callaghan, NSW 2308

1961 Business Directory Records
Premise or Road Intersection Matches

Records from the 1961 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Feature Point	Direction
N/A	No records in buffer				

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

1961 Business Directory Records
Road or Area Matches

Records from the 1961 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
N/A	No records in buffer			

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

Historical Business Directories

130 University Drive, Callaghan, NSW 2308

1950 Business Directory Records
Premise or Road Intersection Matches

Records from the 1950 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Feature Point	Direction
N/A	No records in buffer				

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

1950 Business Directory Records
Road or Area Matches

Records from the 1950 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
N/A	No records in buffer			

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

Historical Business Directories

130 University Drive, Callaghan, NSW 2308

Dry Cleaners, Motor Garages & Service Stations
Premise or Road Intersection Matches

Dry Cleaners, Motor Garages & Service Stations from UBD Business Directories, mapped to a premise or road intersection, within the dataset buffer:

Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Feature Point	Direction
MOTOR SERVICE STATIONS-PETROL, OIL, ETC..	Shortland Service Station, 231 Sandgate Rd., Shortland, Newcastle	136691	1961	Premise Match	271m	North West
MOTOR GARAGES &/OR ENGINEERS	Simpson's Service Station, 278 Sandgate Rd., Shortland,, Newcastle	631945	1970	Premise Match	533m	North
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	Amoco Service Station, 300 Sandgate Rd., Shortland Newcastle	177086	1982	Premise Match	673m	North
MOTOR SERVICE STATIONS	Esso Servicenter, 302 Sandgate Rd., Shortland, Newcastle	632150	1970	Premise Match	673m	North
MOTOR SERVICE STATIONS-PETROL, OIL, ETC..	K.B. Service Station, 302 Sandgate Rd., Shortland, Newcastle	136647	1961	Premise Match	673m	North
MOTOR GARAGES &/OR ENGINEERS	K.B. Service Station, 302 Sandgate Rd., Shortland, Newcastle	136313	1961	Premise Match	673m	North
MOTOR GARAGES &/OR ENGINEERS	Shortland Service Station, 321 Sandgate Rd., Shortland,, Newcastle	631944	1970	Premise Match	917m	North
MOTOR GARAGES &/OR ENGINEERS	Gray, Wal, 321 Sandgate Rd., Shortland, Newcastle	136296	1961	Premise Match	917m	North
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	Total Shortland Service Station, 321 Sandgate Rd.. Shortland Newcastle	177299	1982	Premise Match	918m	North

Historical Business Directories

130 University Drive, Callaghan, NSW 2308

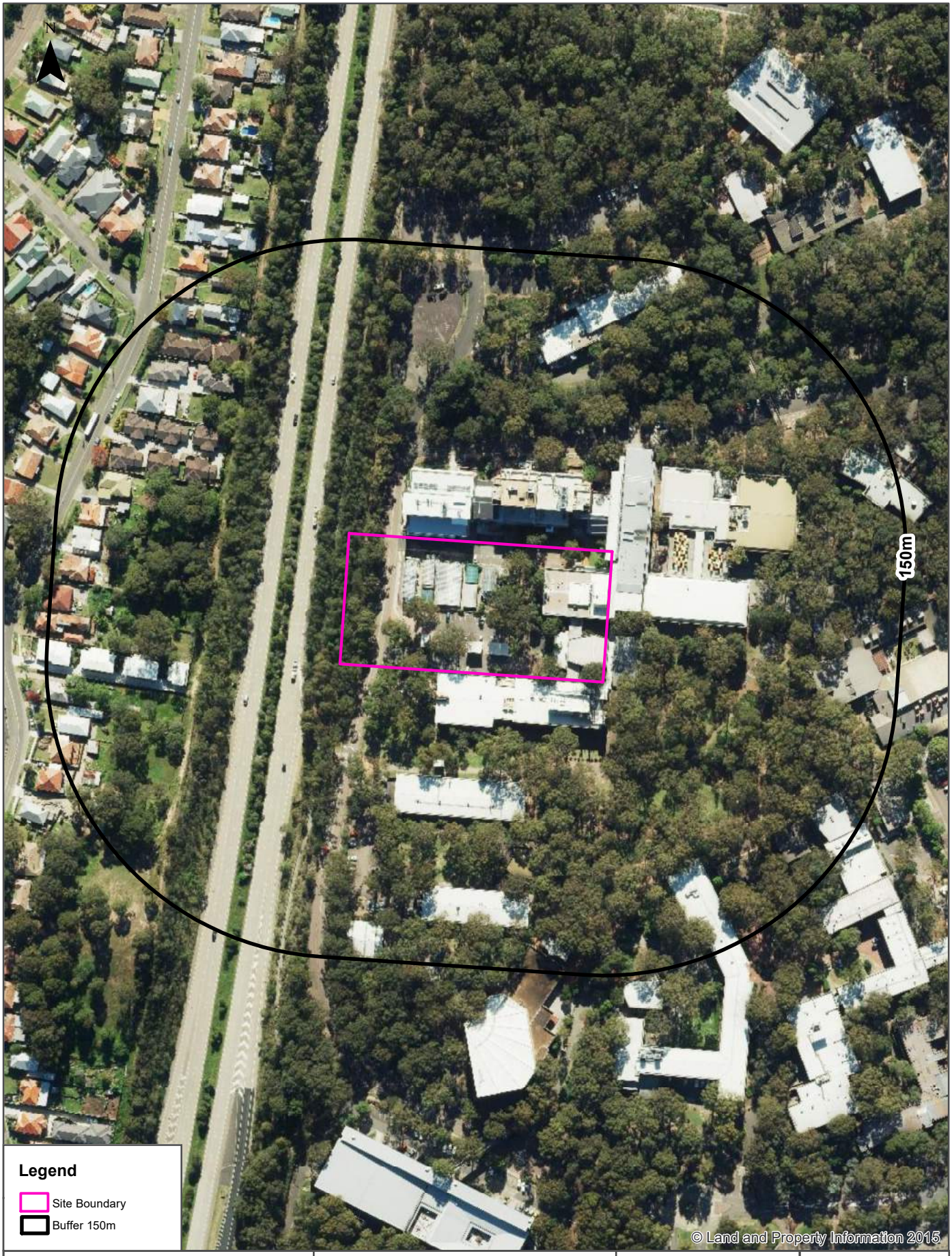
Dry Cleaners, Motor Garages & Service Stations Road or Area Matches

Dry Cleaners, Motor Garages & Service Stations from UBD Business Directories, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
MOTOR GARAGES &/OR ENGINEERS	BP Birmingham Station, Sandgate Rd., Birmingham Gar-dens, Newcastle	631844	**1970**	Road Match	284m
MOTOR SERVICE STATIONS-PETROL, OIL, ETC.	Blue Gum Service Station, Blue Gum Rd., Jesmond, Newcastle	632176	**1970**	Road Match	604m
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	BP Jesmond, Blue Gum Rd., Jesmond Newcastle	177126	**1982**	Road Match	604m
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	Caltex Service Station, Blue Gum Rd Newcastle	177146	**1982**	Road Match	604m
MOTOR SERVICE STATIONS-PETROL, OIL, ETC.	Hugo's Garage & Service Station, Blue Gum Rd., Jesmond, Newcastle	632238	**1970**	Road Match	604m
MOTOR GARAGES &/OR ENGINEERS	Hugos Garage & Service Station, Blue Gum Rd., Jesmond., Newcastle	631892	**1970**	Road Match	604m
MOTOR GARAGES &/OR ENGINEERS	Collins, C. E., Bourke Pl., Birmingham Gardens Newcastle	126967	**1950**	Road Match	689m

Aerial Imagery 2014

130 University Drive, Callaghan, NSW 2308

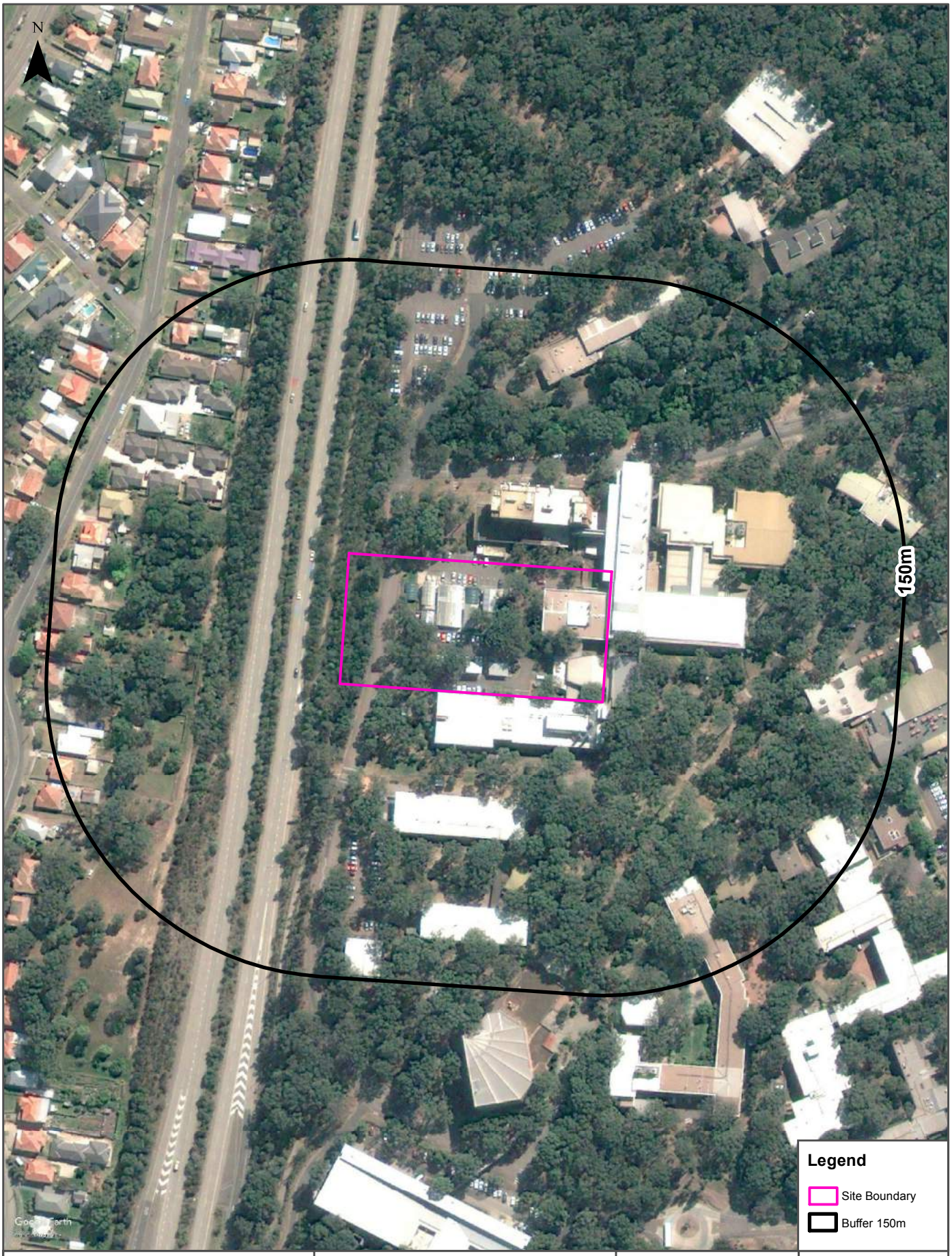


Scale:	Data Sources: Historical Aerials: © Department Finance, Services & Innovation	Coordinate System: GDA 1994 MGA Zone 56	Date: 17 October 2017

0 25 50 100
Meters

Aerial Imagery 2009

130 University Drive, Callaghan, NSW 2308



Scale: 0 25 50 100 Meters

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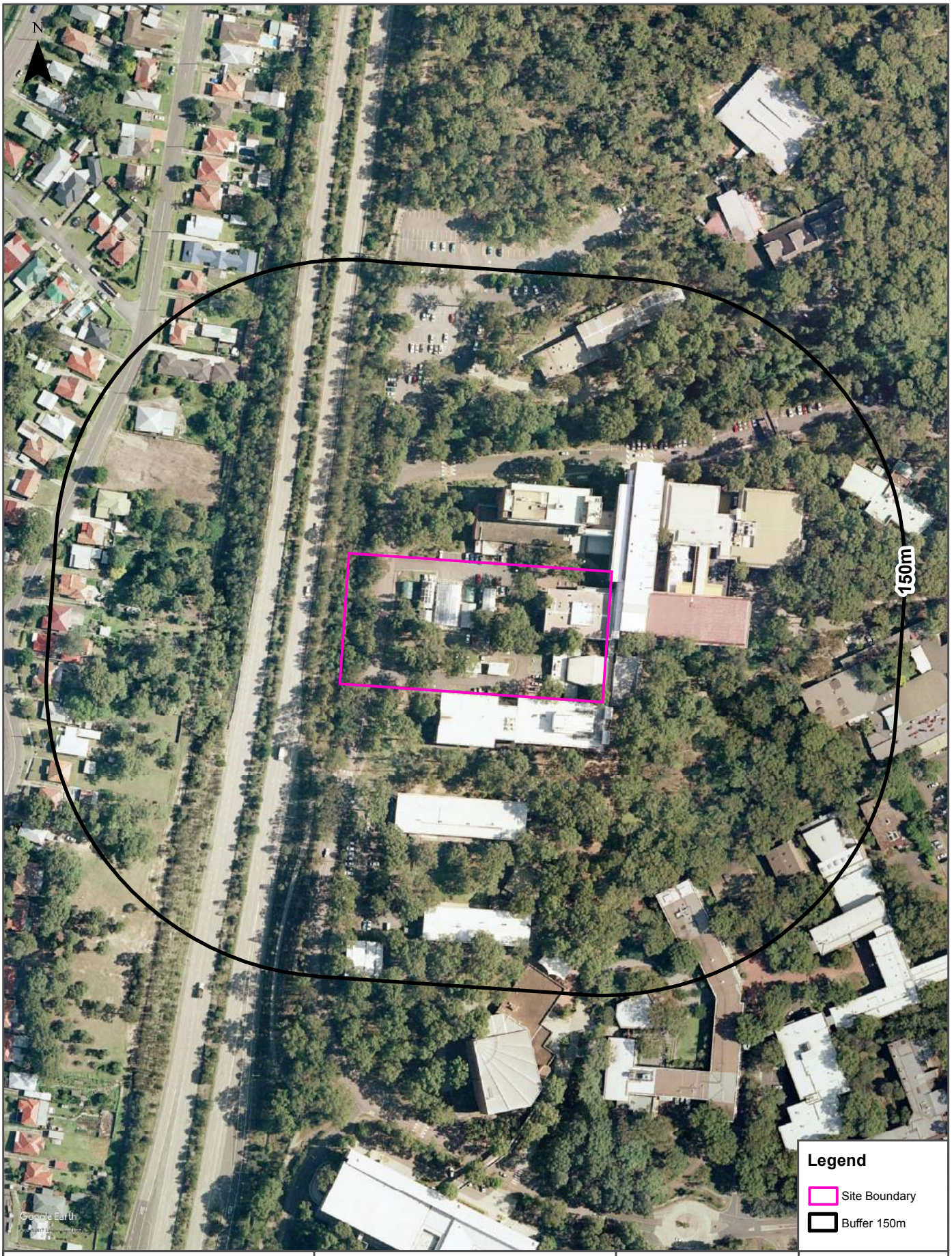
Coordinate System: GDA 1994 MGA Zone 56

Date: 16 October, 2017

Aerial Imagery 2007

130 University Drive, Callaghan, NSW 2308



Scale: 0 25 50 100 Meters

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Coordinate System: GDA 1994 MGA Zone 56

Date: 16 October, 2017

Aerial Imagery 1993

130 University Drive, Callaghan, NSW 2308v

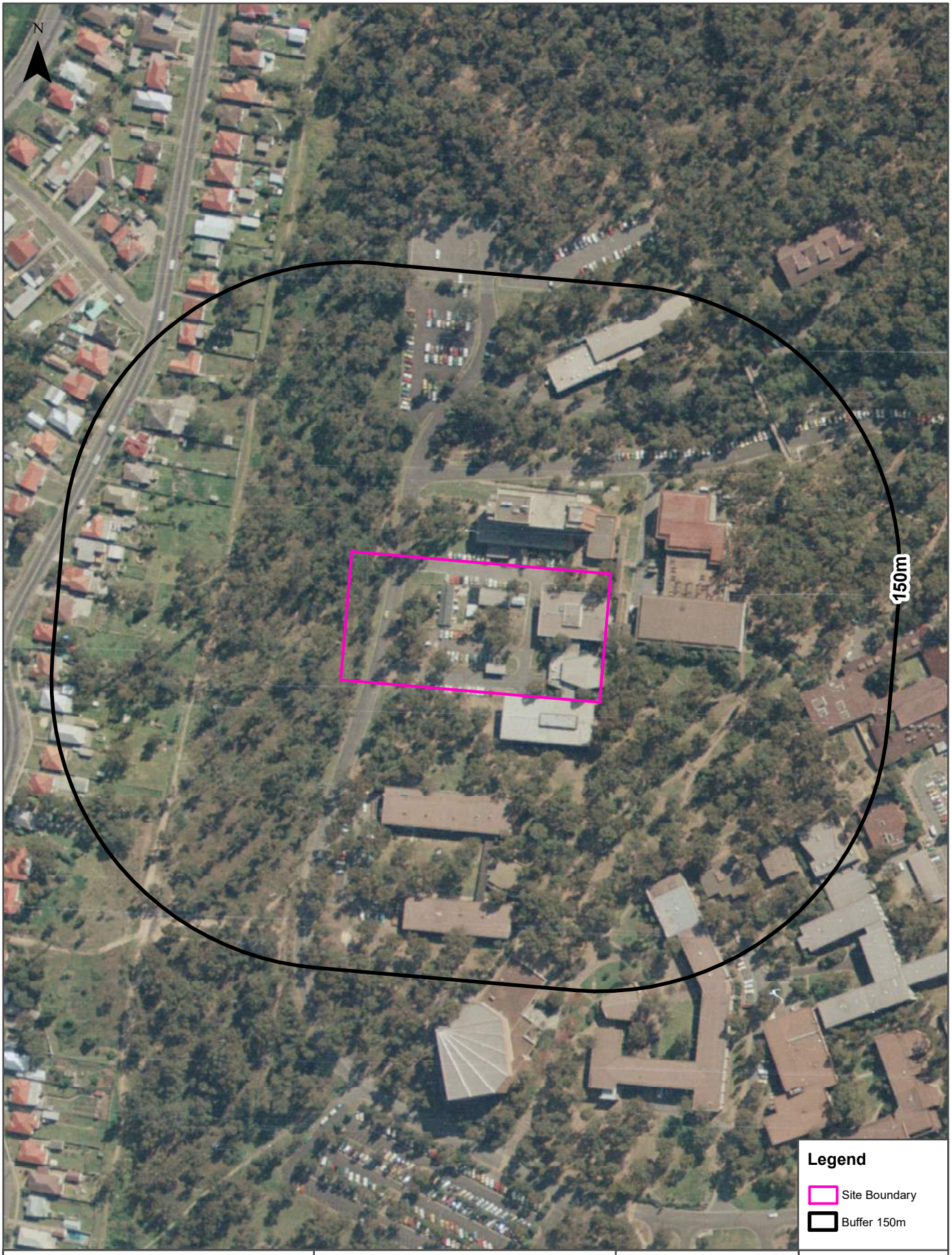
Data Sources: Historical Aerials: © Department Finance, Services & Innovation

Coordinate System: GDA 1994 MGA Zone 56

Date: 16 October 2017

Aerial Imagery 1983

130 University Drive, Callaghan, NSW 2308v



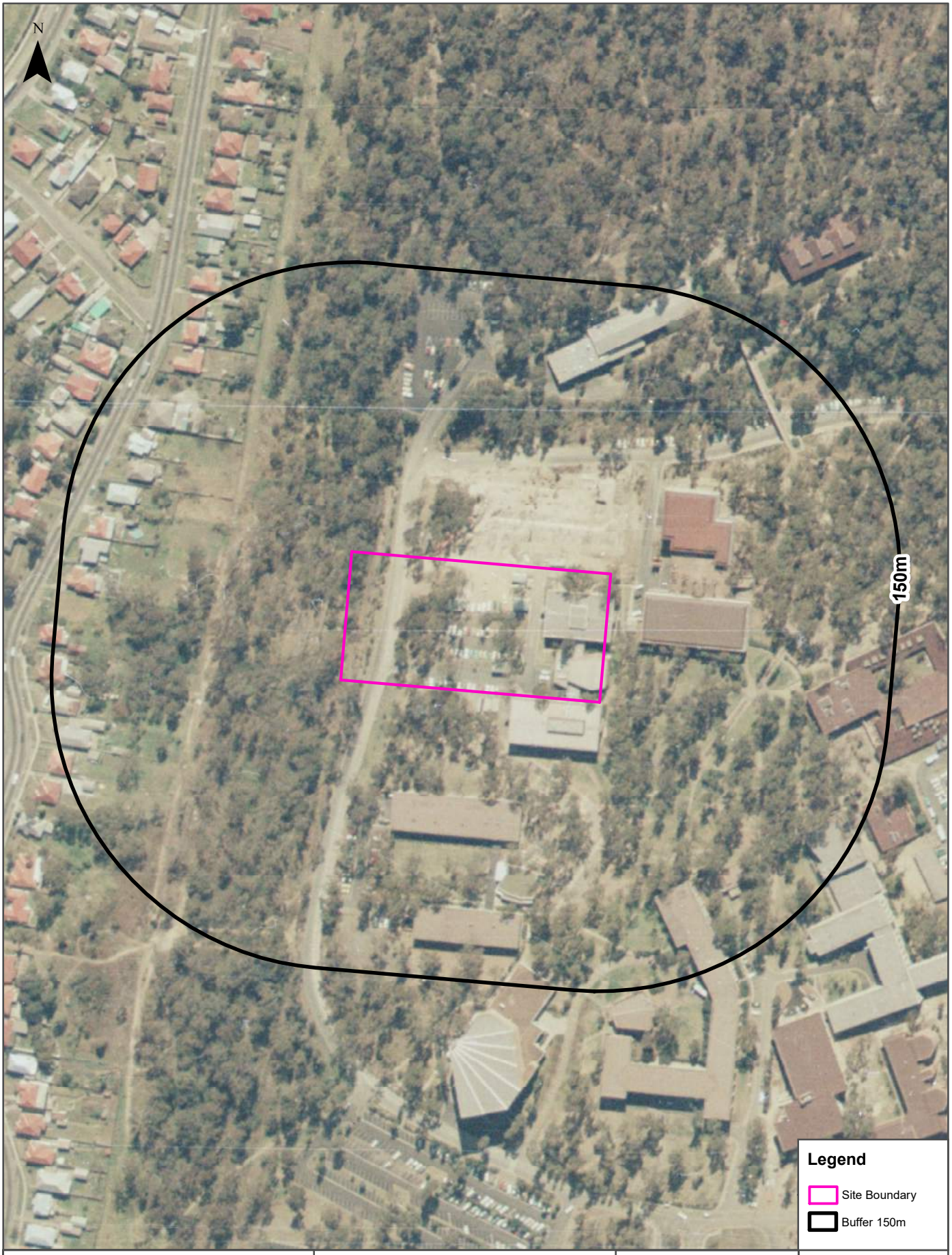
Data Sources: Historical Aerials: © Department Finance, Services & Innovation

Coordinate System: GDA 1994 MGA Zone 56

Date: 16 October 2017

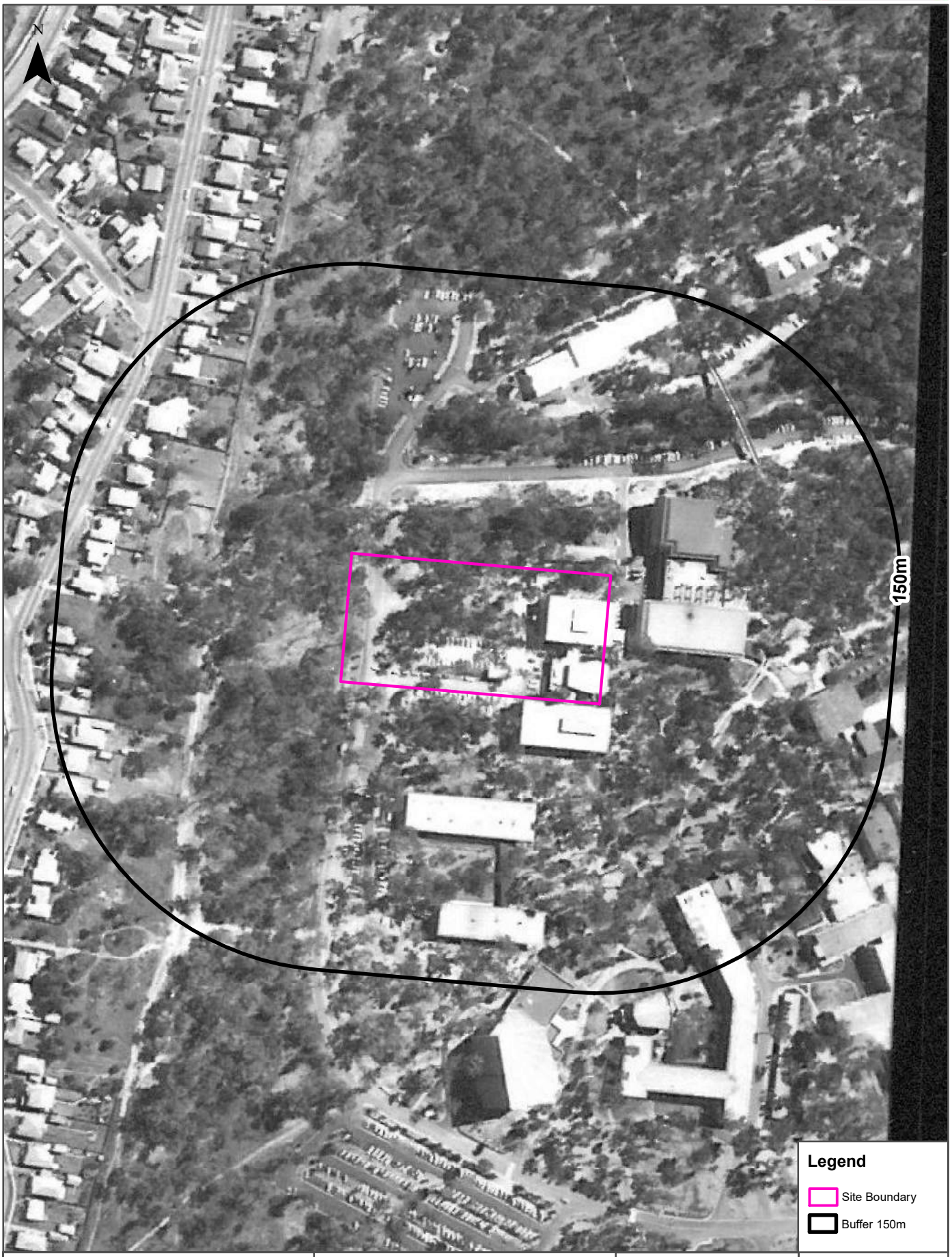
Aerial Imagery 1976

130 University Drive, Callaghan, NSW 2308v



Aerial Imagery 1974

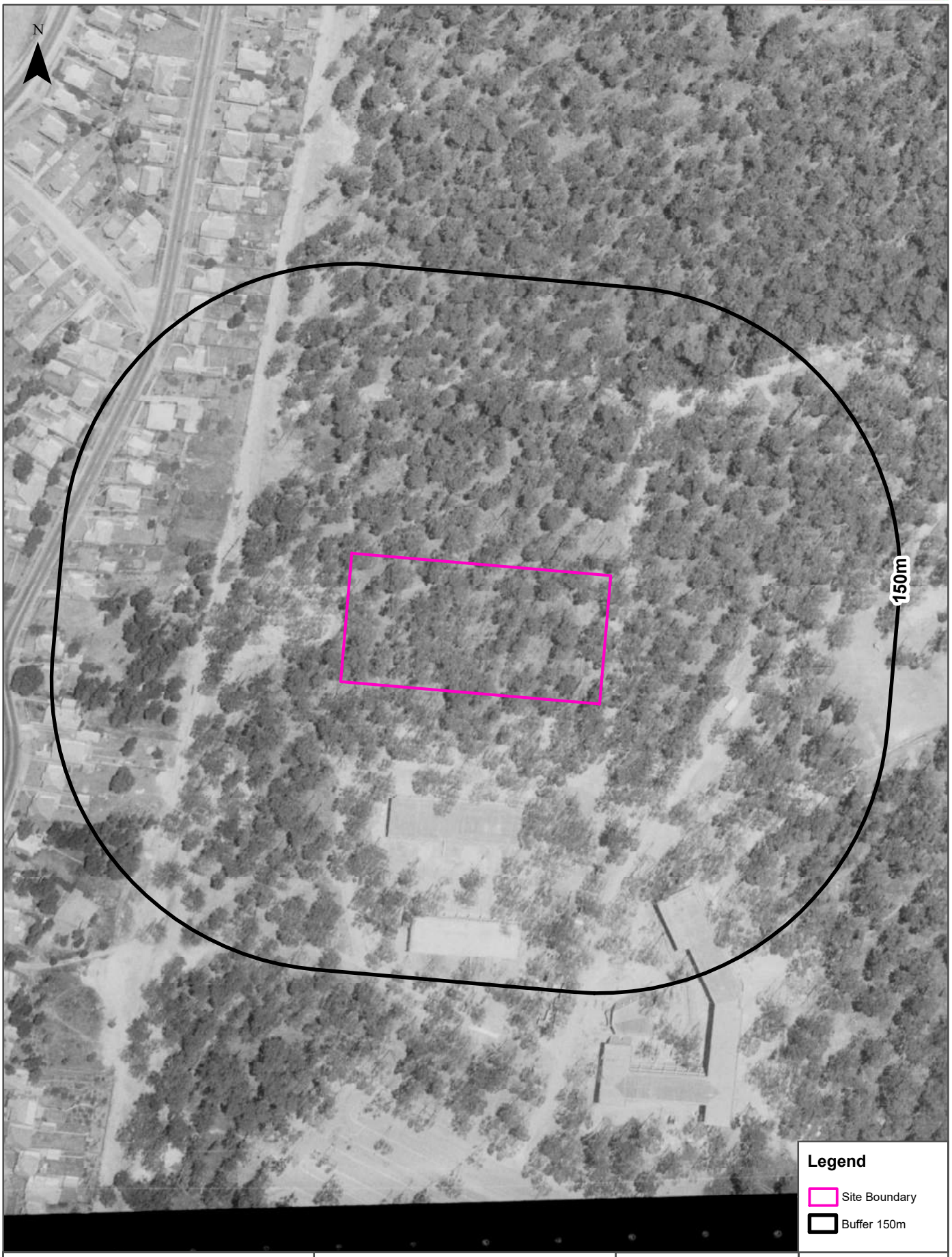
130 University Drive, Callaghan, NSW 2308v



Scale: 0 25 50 100 Meters	Data Sources: Historical Aerials: © Department Finance, Services & Innovation	Coordinate System: GDA 1994 MGA Zone 56	Date: 16 October 2017

Aerial Imagery 1965

130 University Drive, Callaghan, NSW 2308v



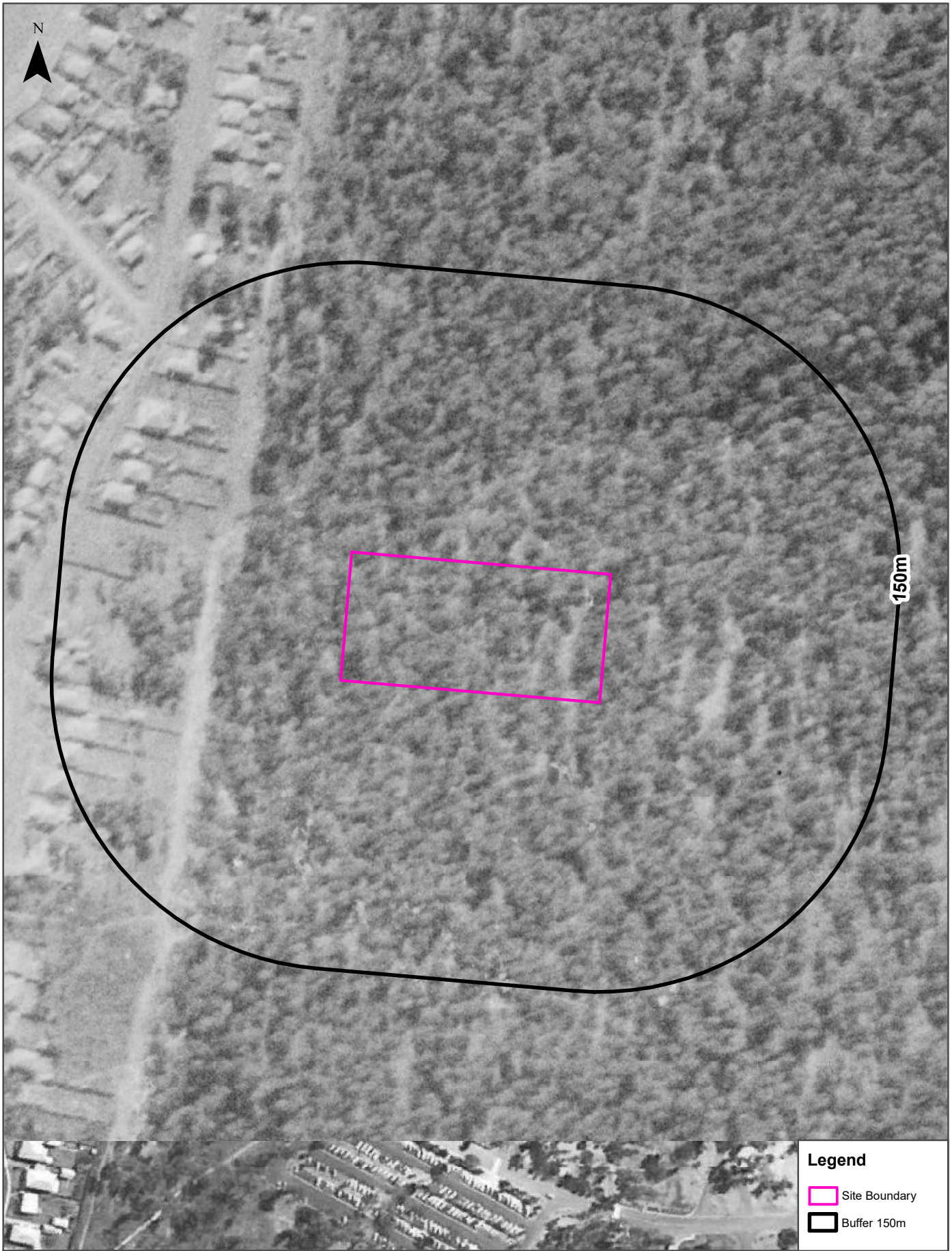
Data Sources: Historical Aerials: © Department Finance, Services & Innovation

Coordinate System: GDA 1994 MGA Zone 56

Date: 16 October 2017

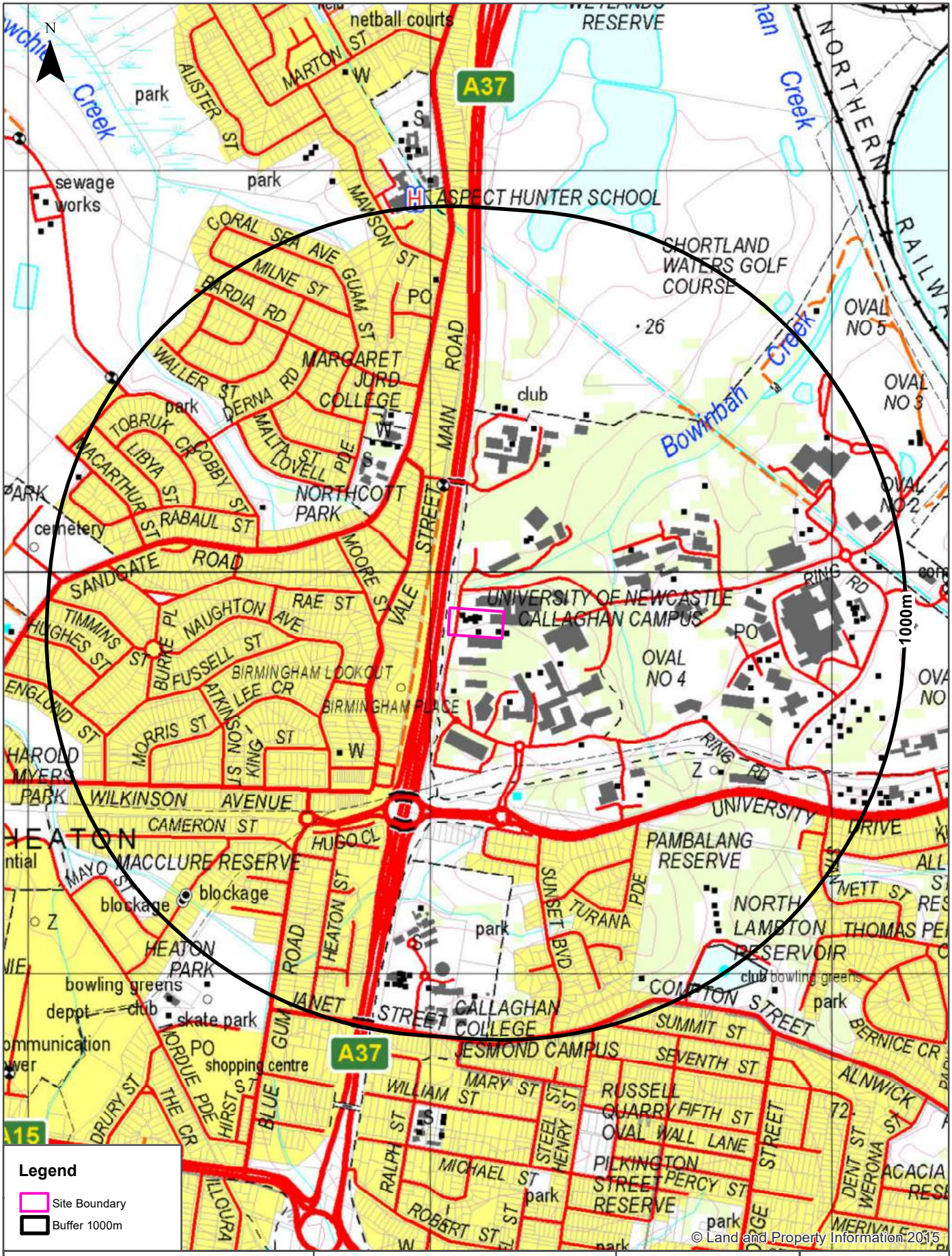
Aerial Imagery 1954

130 University Drive, Callaghan, NSW 2308v



Topographic Map 2015

130 University Drive, Callaghan, NSW 2308



Scale: 0 50 100 200 300 400 500 Meters

Data Sources: Topographic Map Data © NSW Land and Property Information

Coordinate System: GDA 1994 MGA Zone 56

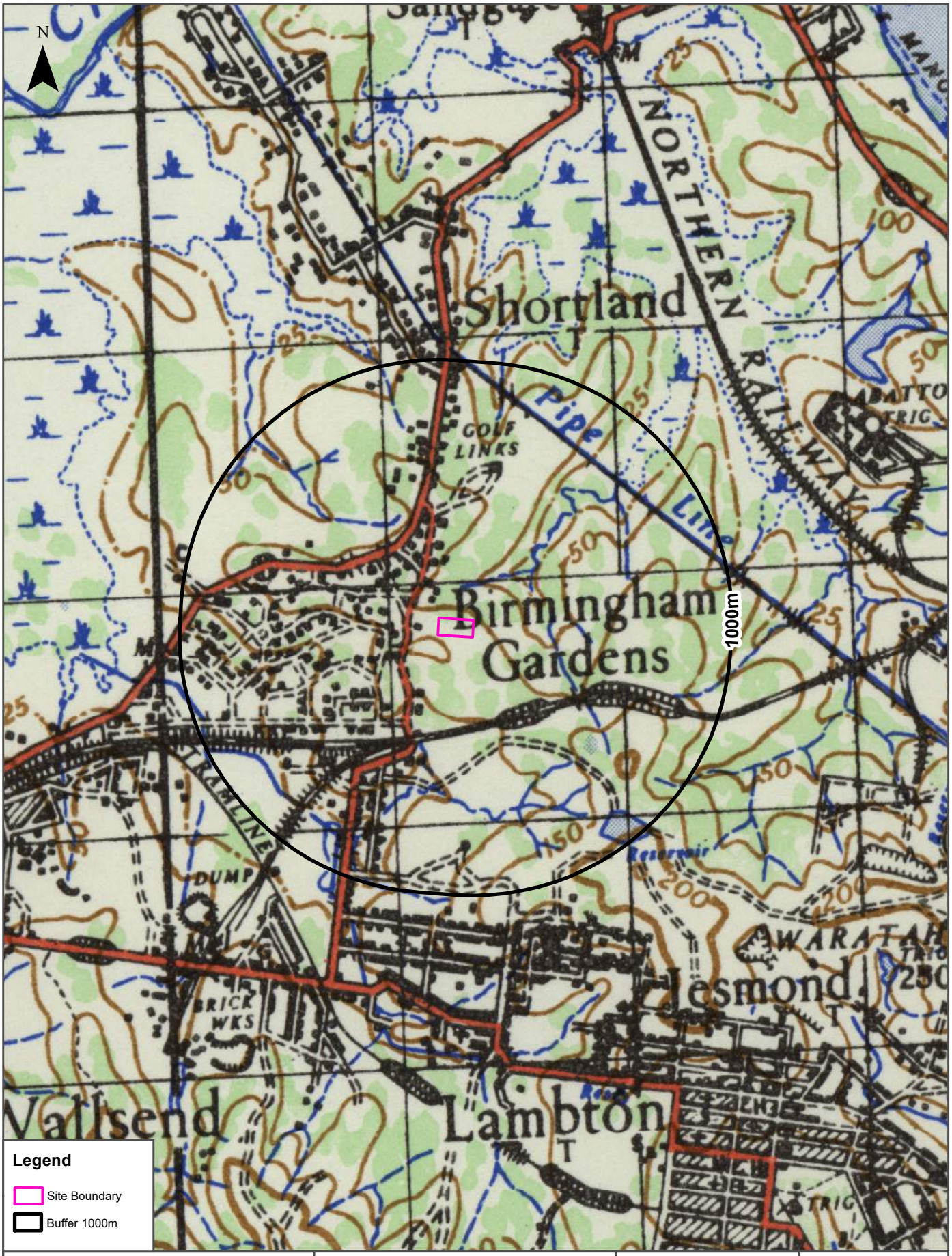
Date: 17 October 2017

Historical Map 1981

130 University Drive, Callaghan, NSW 2308

Historical Map 1941

130 University Drive, Callaghan, NSW 2308



Scale: 0 250 500 Meters 1,000

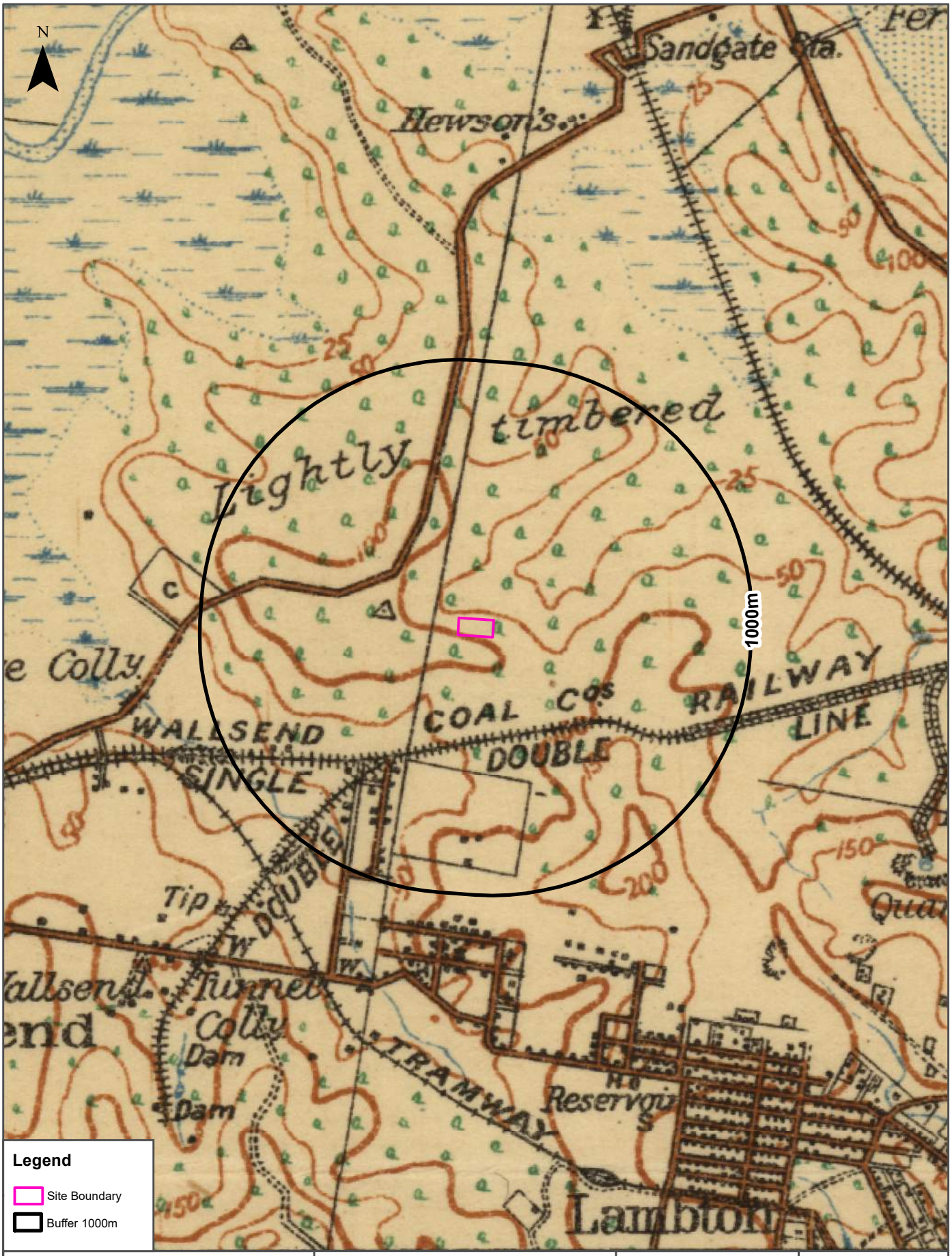
Data Sources: Australia 1:63360 Sheet 396 Newcastle, New South Wales
Prepared by Commonwealth Section Imperial General Staff

Coordinate System: GDA 1994 MGA Zone 56

Date: 17 October 2017

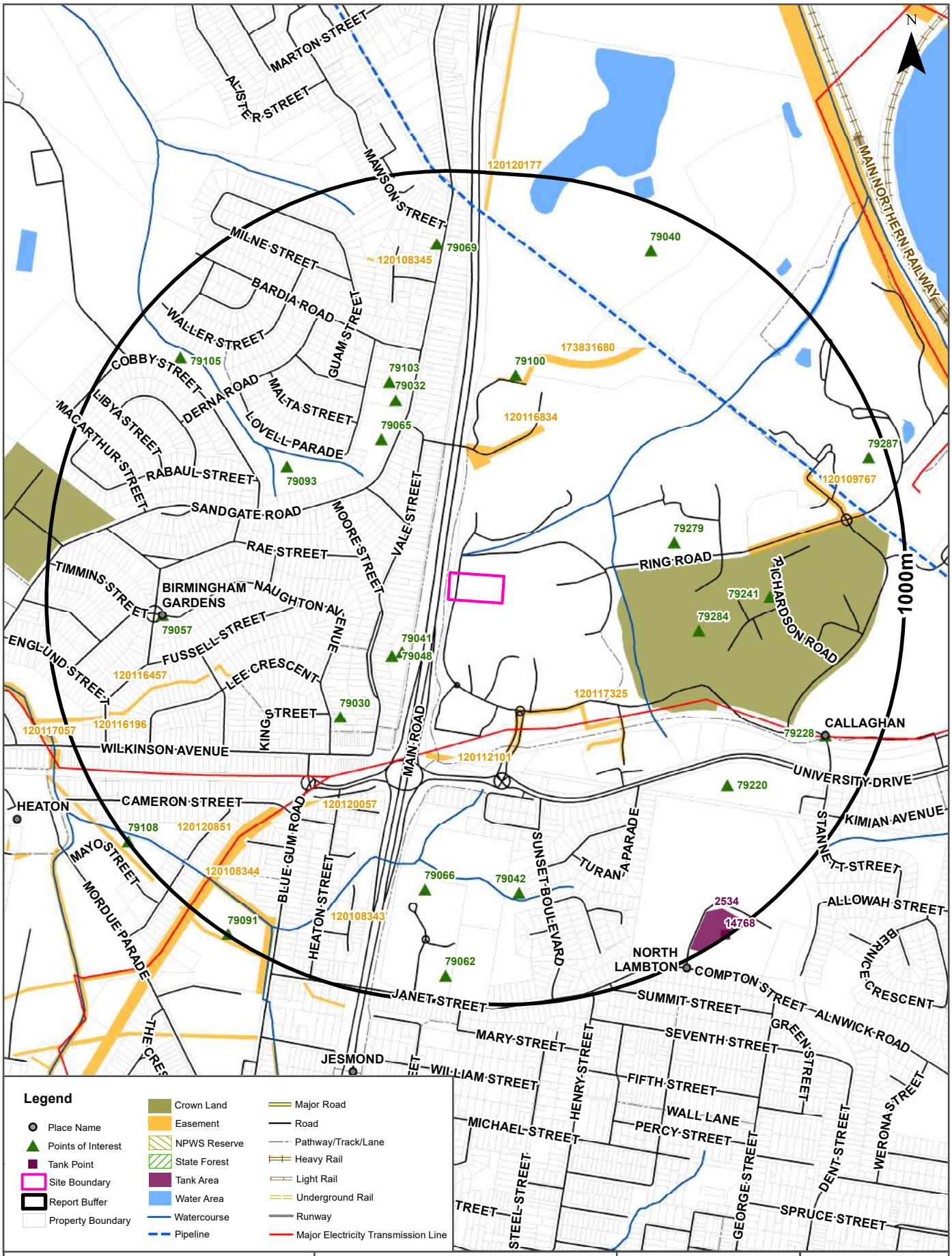
Historical Map 1913

130 University Drive, Callaghan, NSW 2308



Topographic Features

130 University Drive, Callaghan, NSW 2308



Topographic Features

130 University Drive, Callaghan, NSW 2308

Points of Interest

What Points of Interest exist within the dataset buffer?

Map Id	Feature Type	Label	Distance	Direction
79041	Lookout	BIRMINGHAM LOOKOUT	175m	South West
79048	Park	BIRMINGHAM PLACE	199m	South West
79065	Primary School	OUR LADY OF VICTORIES PRIMARY SCHOOL	373m	North West
79030	Place Of Worship	ANGLICAN CHURCH	398m	South West
79279	University	UNIVERSITY OF NEWCASTLE CALLAGHAN CAMPUS	430m	East
79032	Place Of Worship	CATHOLIC CHURCH	450m	North West
79093	Park	NORTHCOTT PARK	485m	North West
79284	Sports Field	OVAL NO 4	493m	East
79103	High School	MARGARET JURD COLLEGE	498m	North West
79100	Club	SHORTLAND WATERS GOLF CLUB	502m	North
79241	Post Office	NEWCASTLE UNIVERSITY POST OFFICE	663m	East
79057	Suburb	BIRMINGHAM GARDENS	713m	West
79220	Park	PAMBALANG RESERVE	719m	South East
79042	Park	Park	722m	South
79066	Primary School	HEATON PUBLIC SCHOOL	724m	South
79069	Post Office	SHORTLAND POST OFFICE	819m	North
79105	Park	Park	859m	North West
79228	Suburb	CALLAGHAN	868m	South East
79040	Golf Course	SHORTLAND WATERS GOLF COURSE	889m	North East
79062	High School	CALLAGHAN COLLEGE JESMOND CAMPUS	934m	South
79287	Sports Field	OVAL NO 2	953m	East
79091	Sports Field	HEATON PARK	998m	South West
79108	Park	MACCLURE RESERVE	999m	South West

Topographic Features

130 University Drive, Callaghan, NSW 2308

Tanks (Areas)

What are the Tank Areas located within the dataset buffer?
Note. The large majority of tank features provided by LPI are derived from aerial imagery & are therefore primarily above ground tanks.

Map Id	Tank Type	Status	Name	Feature Currency	Distance	Direction
2534	Water	Operational	NORTH LAMBTON RESERVOIR	04/12/2012	921m	South East

Tanks (Points)

What are the Tank Points located within the dataset buffer?
Note. The large majority of tank features provided by LPI are derived from aerial imagery & are therefore primarily above ground tanks.

Map Id	Tank Type	Status	Name	Feature Currency	Distance	Direction
14768	Water	Operational	NORTH LAMBTON RESERVOIR	01/01/2012	996m	South East

Major Easements

What Major Easements exist within the dataset buffer?
Note. Easements provided by LPI are not at the detail of local governments. They are limited to major easements such as Right of Carriageway, Electrical Lines (66kVa etc.), Easement to drain water & Significant subterranean pipelines (gas, water etc.).

Map Id	Easement Class	Easement Type	Easement Width	Distance	Direction
120116834	Primary	Undefined		261m	North
120117325	Primary	Undefined		265m	South East
120112101	Primary	Undefined		387m	South
173831680	Primary	Right of way	Var	481m	North East
120119606	Primary	Undefined		566m	West
120120057	Primary	Undefined		597m	South West
120109767	Primary	Undefined		610m	East
120116457	Primary	Undefined		626m	West
120120851	Primary	Undefined		669m	South West
120108345	Primary	Undefined		801m	North
120108343	Primary	Undefined		840m	South West
120116196	Primary	Undefined		884m	West
120108344	Primary	Undefined		904m	South West
120120177	Primary	Undefined		908m	North

Map Id	Easement Class	Easement Type	Easement Width	Distance	Direction
120117057	Primary	Undefined		956m	West

Topographic Features

130 University Drive, Callaghan, NSW 2308

State Forest

What State Forest exist within the dataset buffer?

State Forest Number	State Forest Name	Distance	Direction
N/A	No records in buffer		

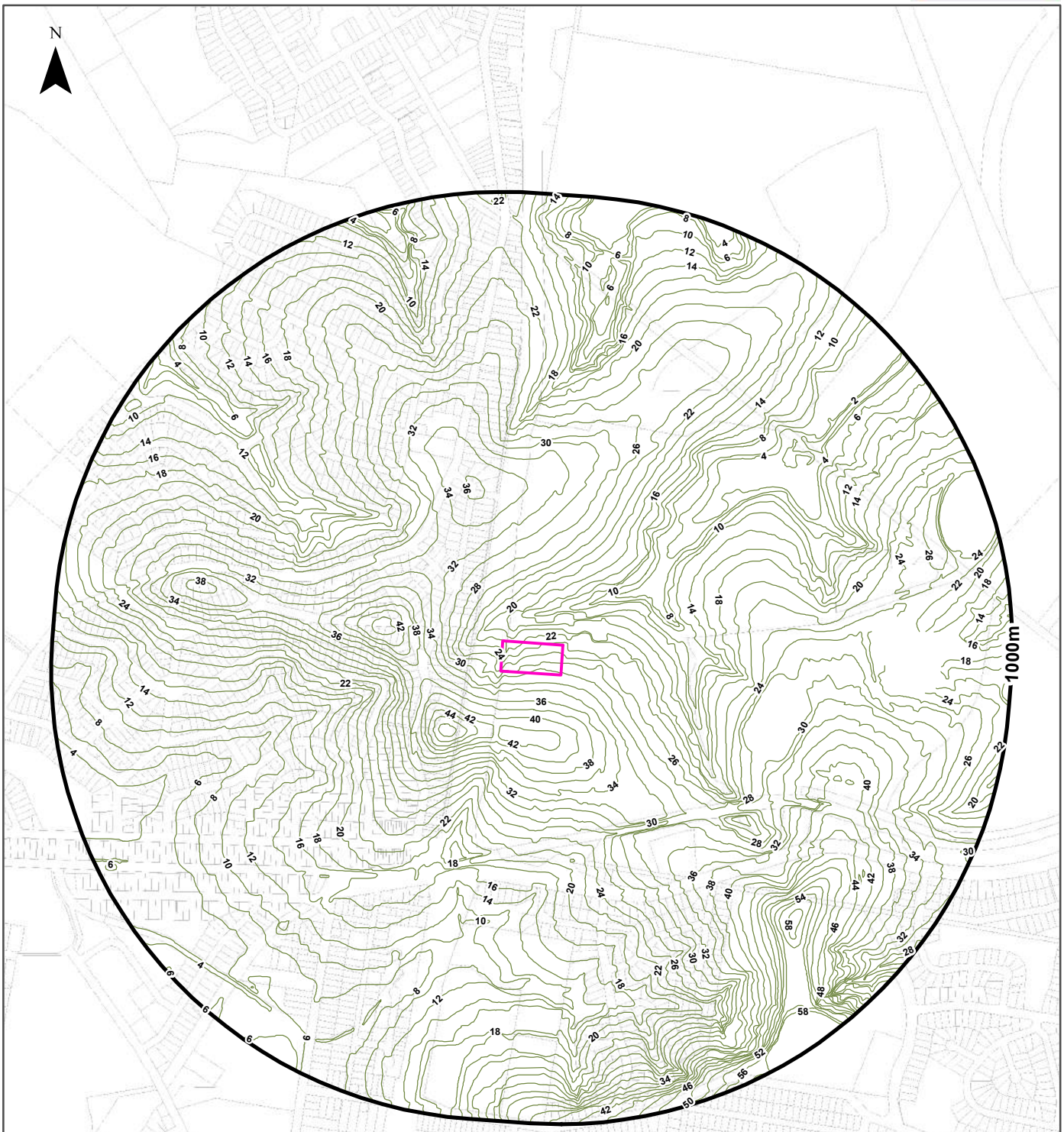
National Parks and Wildlife Service Reserves

What NPWS Reserves exist within the dataset buffer?

Reserve Number	Reserve Type	Reserve Name	Gazetted Date	Distance	Direction
N/A	No records in buffer				

Elevation Contours (m AHD)

130 University Drive, Callaghan, NSW 2308



Legend

- Elevation Contour (m AHD)
- Site Boundary
- Report Buffer
- Property Boundary

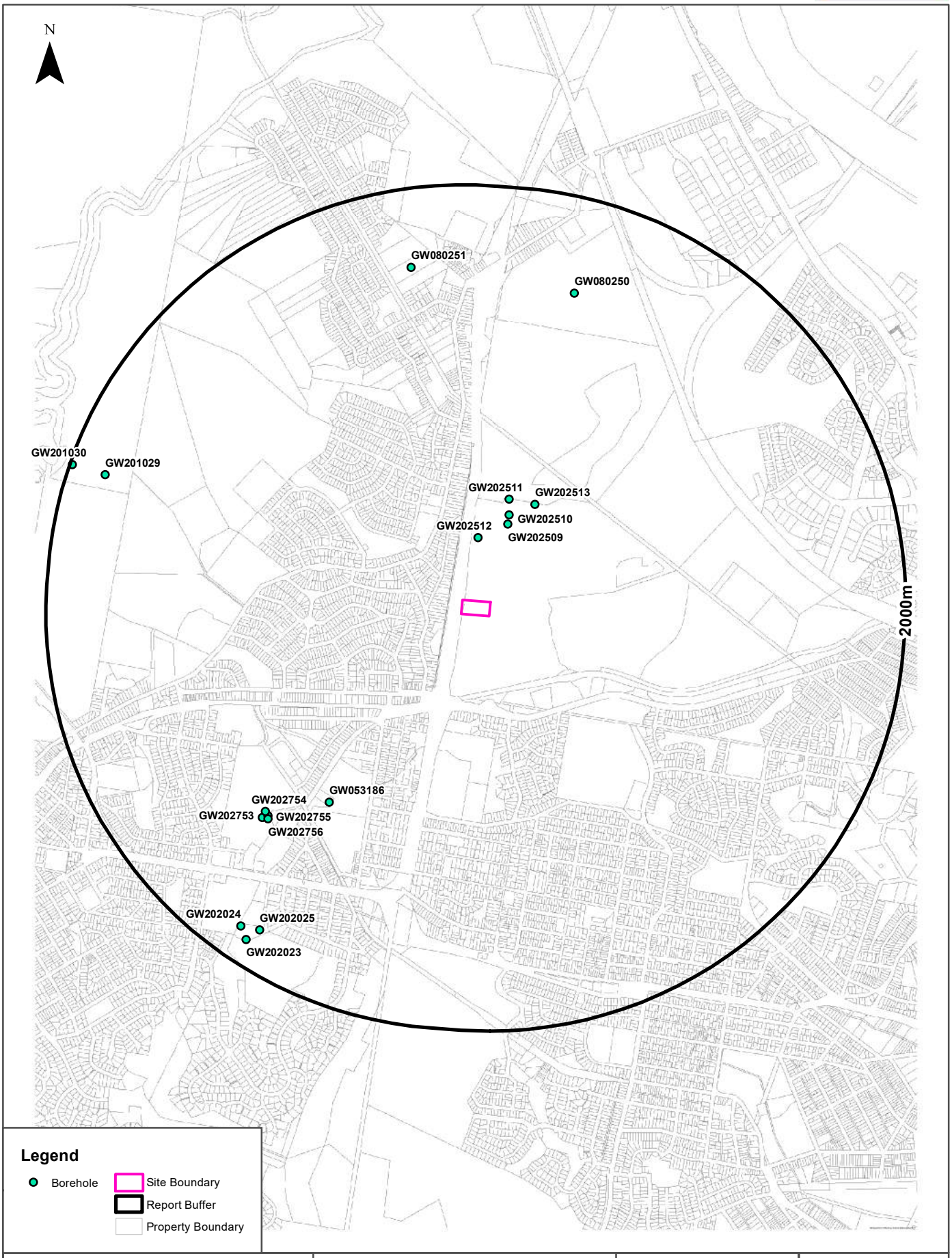
Accuracy & Currency: This contour data can be up to 0.4 of the contour interval out in height and must therefore not be used for any design or engineering works, but only as a general guide to topography. Gaps may occur along contour lines due to vertical topography, obscured topography in the source photography such as buildings, dense vegetation or dead ground, or the fact that original buildings have been replaced in the intervening thirty years since the original contour capture.

Scale:	Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2017	Coordinate System: GDA 1994 MGA Zone 56	Date: 17 October 2017

0 100 200 400 Meters

Groundwater Boreholes

130 University Drive, Callaghan, NSW 2308



Hydrogeology & Groundwater

130 University Drive, Callaghan, NSW 2308

Hydrogeology

Description of aquifers on-site:

Description
Fractured or fissured, extensive aquifers of low to moderate productivity

Description of aquifers within the dataset buffer:

Description
Fractured or fissured, extensive aquifers of low to moderate productivity

Hydrogeology Map of Australia : Commonwealth of Australia (Geoscience Australia)

Groundwater Boreholes

Boreholes within the dataset buffer:

GW No.	Licence No	Work Type	Owner Type	Purpose	Contractor	Complete Date	Final Depth (m)	Drilled Depth (m)	Salinity (mg/L)	SWL (m)	Yield (L/s)	Elev (AHD)	Dist	Dir
GW202512	20BL173130	Bore	Private	Monitoring		20/07/2012	18.00	18.00					305m	North
GW202509	20BL173130	Bore	Private	Monitoring		20/07/2012	11.60	11.60					384m	North
GW202510	20BL173130	Bore	Private	Monitoring		20/07/2012	12.80	12.80					429m	North
GW202511	20BL173130	Bore	Private	Monitoring		20/07/2012	9.80	9.80					503m	North
GW202513	20BL173130	Bore	Private	Monitoring		20/07/2012	4.60	4.60					517m	North East
GW053186	20BL118687	Bore	Private	Recreation		01/01/1981	32.00	32.00	V.Salty				1108 m	South West
GW202754	20BL173083	Bore	Private	Monitoring	Total Drilling	09/02/2012	3.00	3.00	527	0.88			1340 m	South West
GW202755	20BL173083	Bore	Private	Monitoring	Total Drilling	09/02/2012	3.40	3.40	632	1.47			1346 m	South West
GW202756	20BL173083	Bore	Private	Monitoring	Total Drilling	09/02/2012	3.50	3.50	788	1.79			1357 m	South West
GW202753	20BL173083	Bore	Private	Monitoring	Total Drilling	09/02/2012	4.20	4.20	1862	1.62			1372 m	South West
GW080250	20BL168280	Bore				01/01/2002	4.50	4.50					1541 m	North
GW080251	20BL168281	Bore	Local Govt		Total Drilling	01/04/2002	10.50	10.50					1620 m	North
GW202025	20BL168685	Bore	Private	Monitoring	McDermott Drilling	01/07/2002	10.00	10.00		2.00			1806 m	South West
GW201029	20BL172655	Bore	Other Govt	Monitoring		18/09/2008	2.00						1821 m	West
GW202024	20BL168685	Bore	Private	Monitoring	McDermott Drilling	01/07/2002	4.30	4.30		1.00			1839 m	South West
GW202023	20BL168685	Bore	Private	Monitoring	McDermott Drilling	01/07/2002	5.30	5.30		3.00			1879 m	South West
GW201030	20BL172655	Bore	Other Govt	Monitoring		18/09/2008	2.00						1985 m	West

Borehole Data Source : NSW Department of Primary Industries - Office of Water / Water Administration Ministerial Corporation for all bores prefixed with GW. All other bores

Hydrogeology & Groundwater

130 University Drive, Callaghan, NSW 2308

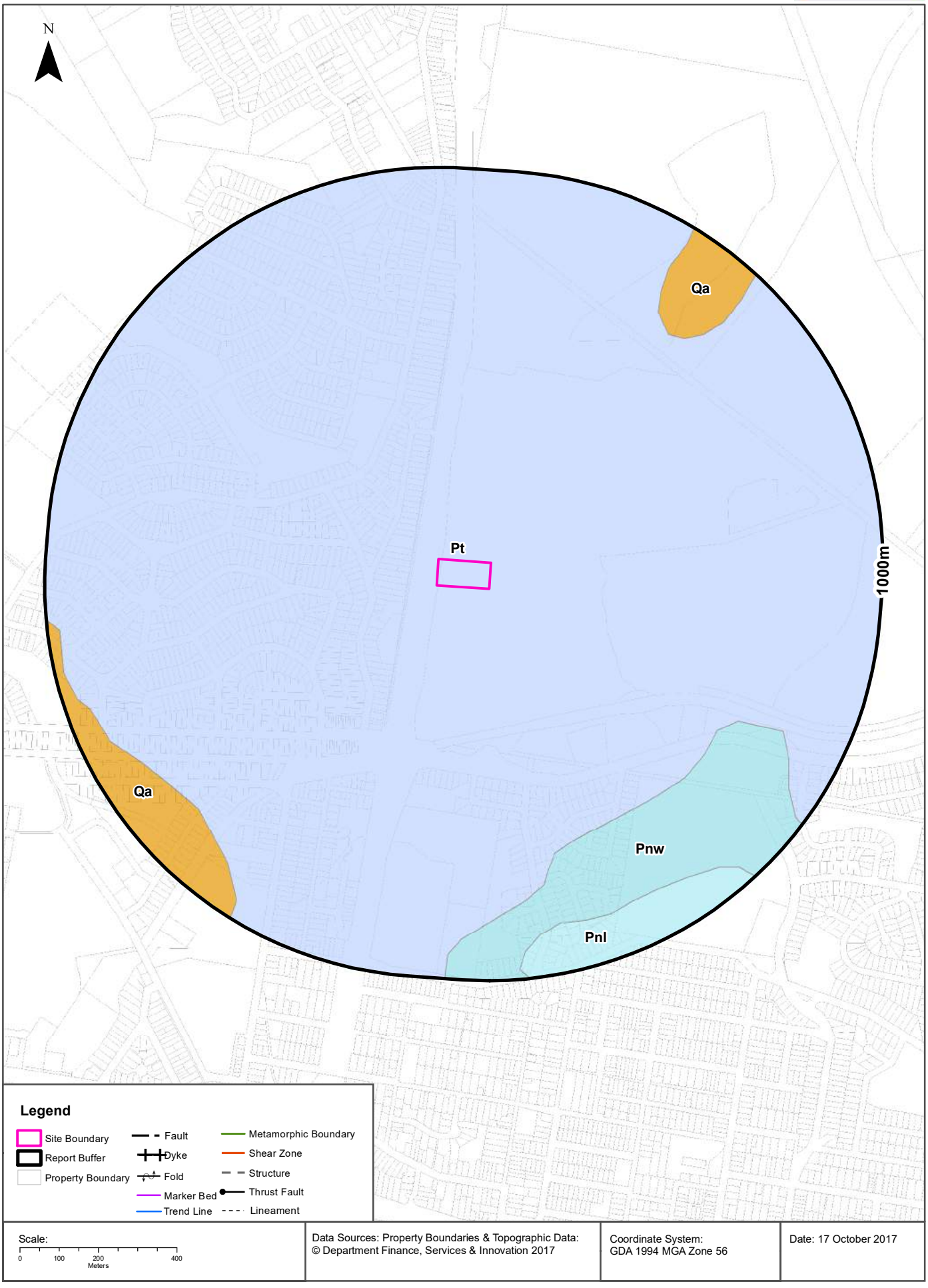
Driller's Logs

Drill log data relevant to the boreholes within the dataset buffer:

Groundwater No	Drillers Log	Distance	Direction
GW202512	0.00m-0.15m Silty CLAY; brown 0.15m-1.20m Silty CLAY; brown-orange mottled 1.20m-9.50m SILTSTONE, extremely weathered; light brown with some gravel, soft lense from 3.7m-3.8m & softer lense from ~6.0m-6.2m 9.50m-16.60m SILTSTONE; dark grey-dark brown 16.60m-17.50m COAL; soft, dark grey-black, presumed groundwater encountered 17.50m-18.00m TUFF; white	305m	North
GW202509	0.00m-0.15m Fill, Clayey Sandy SILT; brown, some gravel & rootlets 0.15m-0.75m Fill, Sandy GRAVEL; red-brown, with coal fragments, angular & round gravel/cobbles to 30mm 0.75m-1.50m Silty CLAY; orange-brown, with some gravel, becoming grey from 0.95m 1.50m-1.80m Siltstone/Claystone; extremely weathered, light brown-grey, some gravel 1.80m-2.50m Silty Clay/weathered Siltstone; mottled brown-orange 2.50m-3.40m Siltstone. weathered; orange-brown 3.40m-6.00m Sandstone, weathered; orange-brown 6.00m-7.50m Tuff; white 7.50m-8.80m Coal; black 8.80m-11.60m Tuff; white, near refusal	384m	North
GW202510	0.00m-0.05m FILL, Clayey SAND; dark brown, with some rootlets 0.05m-0.50m FILL, Clayey SAND; grey with some orange mottling, some gravel 0.50m-2.00m Silty CLAY; grey with some orange mottling 2.00m-2.35m SANDSTONE/SILTSTONE, extremely weathered; brown to orange-brown 2.35m-7.00m SANDSTONE; orange-brown 7.00m-7.50m COAL; dark grey-black 7.50m-12.80m TUFF; pale grey-white, soft lense from ~8.0-8.3m	429m	North
GW202511	0.00m-0.15m Silty CLAY; dark brown 0.15m-0.80m FILL, Clayey Gravelly SAND; dark brown, with slag/cement clasts 0.80m-2.60m SANDSTONE; pale brown, becoming orange-brown from ~2.0m 2.60m-3.50m COAL; black 3.50m-3.60m Silty CLAY; pale pink-brown, with trace-some gravel 3.60m-4.90m COAL; black 4.90m-9.80m TUFF; pale grey-white, soft lense from 8.0-8.2m	503m	North
GW202513	0.00m-0.20m FILL, Clayey Silty SAND; dark brown, some gravel & roots 0.20m-0.25m FILL, Concrete Slab 0.25m-0.30m FILL; Woodchips/Mulch 0.30m-0.35m FILL, Silty SAND; pale brown, trace of gravel 0.35m-0.45m FILL, Silty CLAY; dark grey 0.45m-0.60m FILL, Sandy GRAVEL; dark grey-black, angular 0.60m-1.20m Silty CLAY; dark grey 1.20m-2.10m Silty CLAY; pale grey - wood fragments/fibres, hard lense at 2.0-2.1m 2.10m-4.20m CLAYSTONE/SANDSTONE; pale brown 4.20m-4.60m CLAYSTONE/SILTSTONE; pale brown	517m	North East
GW053186	0.00m-0.15m Topsoil 0.15m-3.00m Clay 3.00m-24.38m Shale 24.38m-27.38m Coal 27.38m-32.00m Mudstone Water Supply	1108m	South West
GW202754	0.00m-0.26m Fill; Concrete 0.26m-0.30m Sand, gravelly; light brown & grey, fine to coarse grained 0.30m-0.50m Gravel, sandy; orange/brown & grey/brown 0.50m-1.30m Clay; with sand & gravel, grey/black, fine to coarse grained 1.30m-3.00m Clay, sandy; with silt, black with grey & brown mottling	1340m	South West
GW202755	0.00m-0.22m Fill; concrete 0.22m-0.30m Gravel; sandy, wet 0.30m-1.20m Sand; black, fine grained 1.20m-3.40m Gravel; silty sandy, black, stiff	1346m	South West
GW202756	0.00m-0.19m Fill; Concrete 0.19m-0.50m Sand; gravelly clayey, dark grey/brown 0.50m-3.50m Clay; sandy gravelly	1357m	South West
GW202753	0.00m-0.34m Fill; Concrete 0.34m-2.90m Sand, silty; black, coarse grained 2.90m-4.20m Clay; light grey/brown, fine grained, stiff	1372m	South West

Geology 1:250,000

130 University Drive, Callaghan, NSW 2308



Geology

130 University Drive, Callaghan, NSW 2308

Geological Units

What are the Geological Units onsite?

Symbol	Description	Unit Name	Group	Sub Group	Age	Dom Lith	Map Sheet	Dataset
Pt	Siltstone, sandstone, coal, tuff, claystone, conglomerate, minor clay	Tomago Coal Measures	Tomago Coal Measures		Palaeozoic			1:250,000

What are the Geological Units within the dataset buffer?

Symbol	Description	Unit Name	Group	Sub Group	Age	Dom Lith	Map Sheet	Dataset
Pnl	Sandstone, siltstone, claystone, coal, tuff	Lambton Subgroup	Newcastle Coal Measures	Lambton Subgroup	Palaeozoic			1:250,000
Pnw	Sandstone	Waratah Sandstone	Newcastle Coal Measures		Palaeozoic			1:250,000
Pt	Siltstone, sandstone, coal, tuff, claystone, conglomerate, minor clay	Tomago Coal Measures	Tomago Coal Measures		Palaeozoic			1:250,000
Qa	Undifferentiated alluvial deposits; sand, silt, clay and gravel; some residual and colluvial deposits. Includes some channel, levee, lacustrine, floodplain and swamp deposits. May include some higher level Tertiary terraces	undifferentiated			Cainozoic			1:250,000

Geological Structures

What are the Geological Structures onsite?

Feature	Name	Description	Map Sheet	Dataset
No features				1:250,000

What are the Geological Structures within the dataset buffer?

Feature	Name	Description	Map Sheet	Dataset
No features				1:250,000

Geological Data Source : NSW Department of Industry, Resources & Energy

Naturally Occurring Asbestos Potential

130 University Drive, Callaghan, NSW 2308

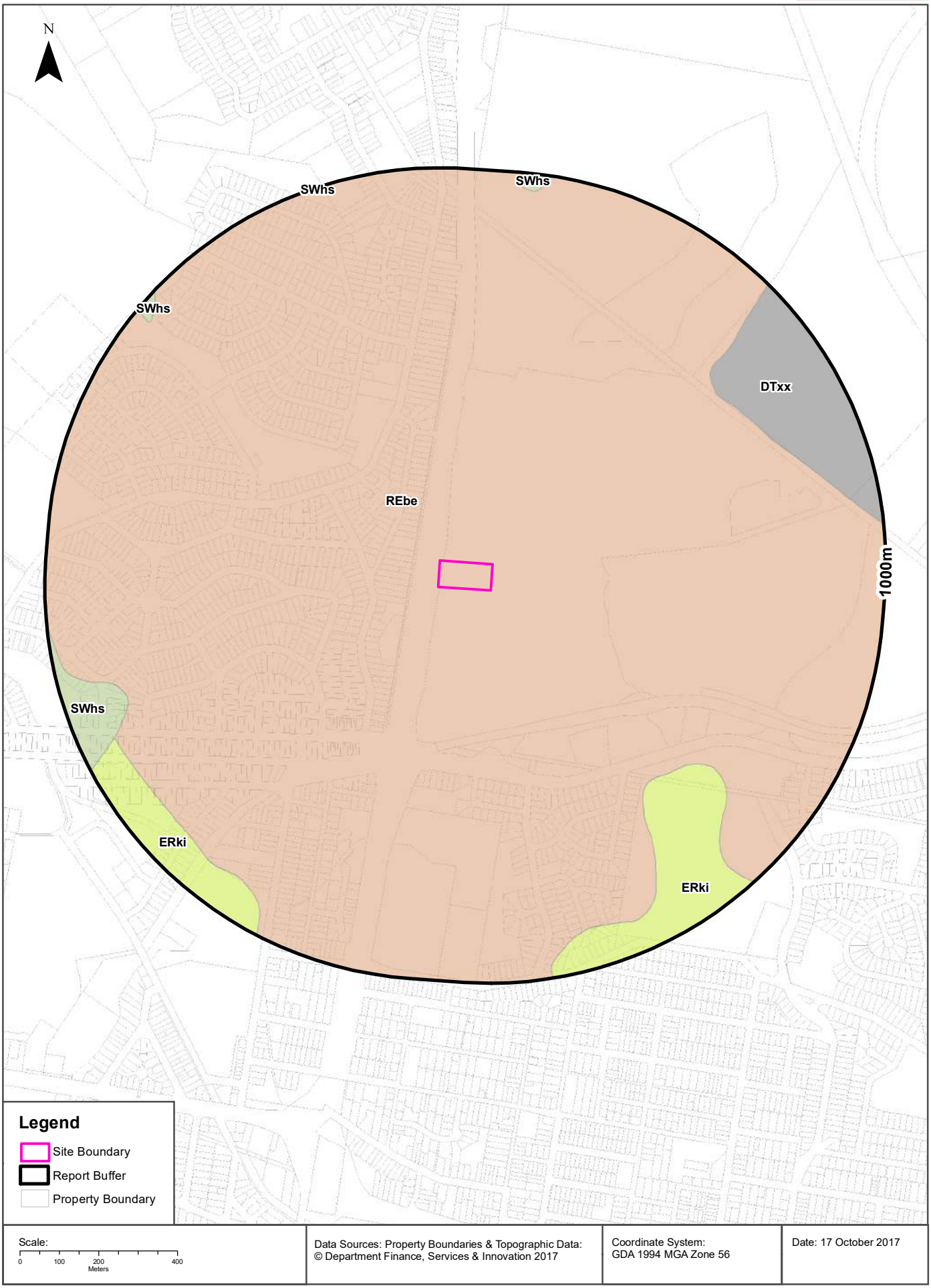
Naturally Occurring Asbestos Potential

Naturally Occurring Asbestos Potential within the dataset buffer:

Potential	Sym	Strat Name	Group	Formation	Scale	Min Age	Max Age	Rock Type	Dom Lith	Description	Dist	Dir
No records in buffer												

Soil Landscapes

130 University Drive, Callaghan, NSW 2308



Soils

130 University Drive, Callaghan, NSW 2308

Soil Landscapes

What are the onsite Soil Landscapes?

Soil Code	Name	Group	Process	Map Sheet	Scale
REbe	BERESFIELD		RESIDUAL	Newcastle	1:100,000

What are the Soil Landscapes within the dataset buffer?

Soil Code	Name	Group	Process	Map Sheet	Scale
DTxx	DISTURBED TERRAIN		DISTURBED TERRAIN	Newcastle	1:100,000
ERki	KILLINGWORTH		EROSIONAL	Newcastle	1:100,000
REbe	BERESFIELD		RESIDUAL	Newcastle	1:100,000
SWhs	HEXHAM SWAMP		SWAMP	Newcastle	1:100,000

Acid Sulfate Soils

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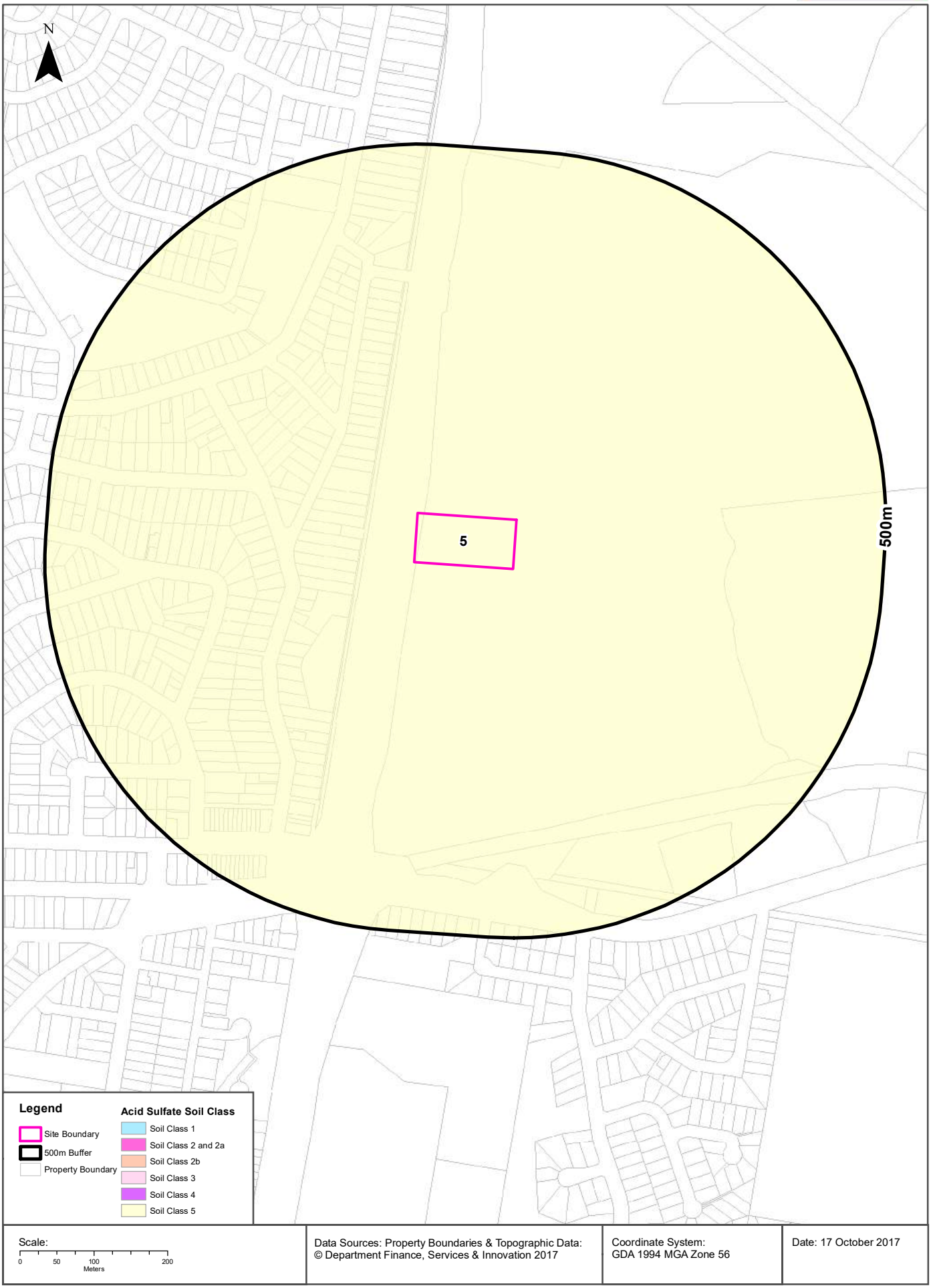

Standard Local Environmental Plan Acid Sulfate Soils

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Standard Local Environmental Plan Acid Sulfate Soils

What is the on-site Acid Sulfate Soil Plan Class that presents the largest environmental risk?

Soil Class	Description	LEP
5	Works within 500 metres of adjacent Class 1, 2, 3, or 4 land that is below 5 metres AHD and by which the watertable is likely to be lowered below 1 metre AHD on adjacent Class 1, 2, 3 or 4 land, present an environmental risk	Newcastle Local Environmental Plan 2012

If the on-site Soil Class is 5, what other soil classes exist within 500m?

Soil Class	Description	LEP	Distance	Direction
None				

Dryland Salinity

130 University Drive, Callaghan, NSW 2308

Dryland Salinity - National Assessment

Is there Dryland Salinity - National Assessment data onsite?

No

Is there Dryland Salinity - National Assessment data within the dataset buffer?

No

What Dryland Salinity assessments are given?

Assessment 2000	Assessment 2020	Assessment 2050	Distance	Direction
N/A	N/A	N/A	N/A	N/A

Dryland Salinity Data Source : National Land and Water Resources Audit
The Commonwealth and all suppliers of source data used to derive the maps of "Australia, Forecast Areas Containing Land of High Hazard or Risk of Dryland Salinity from 2000 to 2050" do not warrant the accuracy or completeness of information in this product. Any person using or relying upon such information does so on the basis that the Commonwealth and data suppliers shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information. Any persons using this information do so at their own risk.
In many cases where a high risk is indicated, less than 100% of the area will have a high hazard or risk.

Dryland Salinity Potential of Western Sydney

Dryland Salinity Potential of Western Sydney within the dataset buffer?

Feature Id	Classification	Description	Distance	Direction
N/A	Outside Data Coverage			

Dryland Salinity Potential of Western Sydney Data Source : NSW Office of Environment and Heritage

Mining Subsidence Districts

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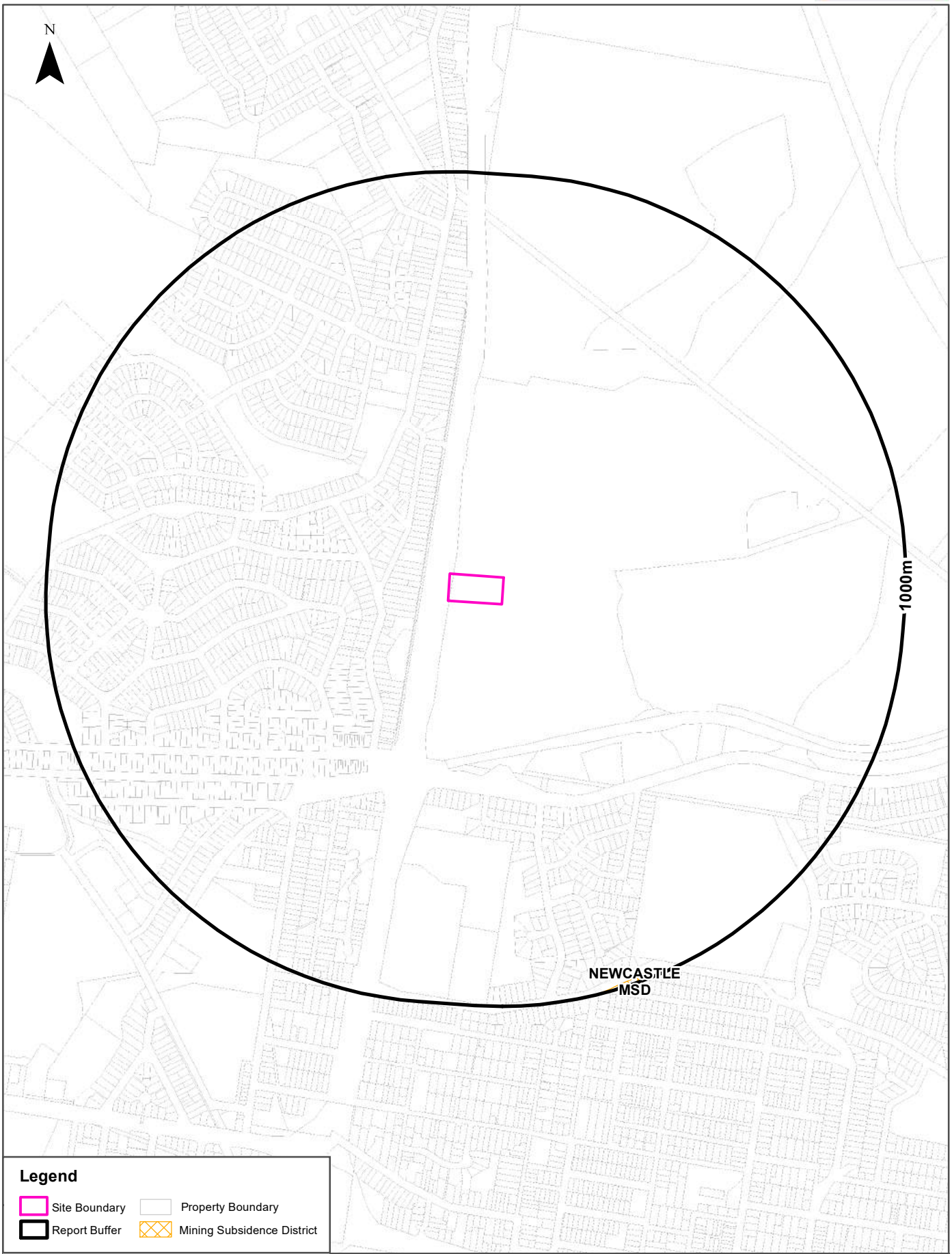

Mining Subsidence Districts

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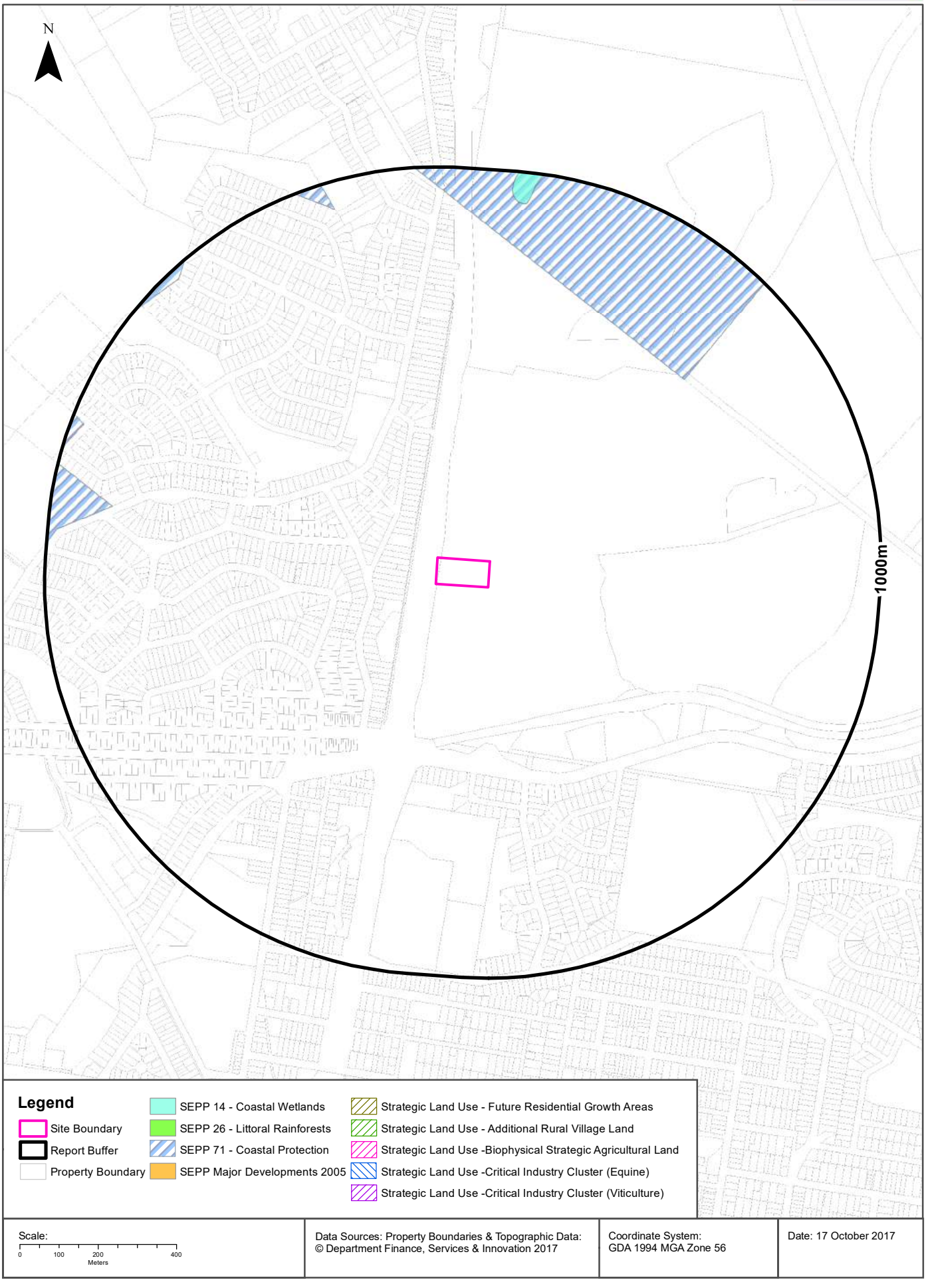
Mining Subsidence Districts

Mining Subsidence Districts within the dataset buffer:

District	Distance	Direction
NEWCASTLE	983m	South

State Environmental Planning Policy

130 University Drive, Callaghan, NSW 2308



Environmental Zoning

130 University Drive, Callaghan, NSW 2308

State Environmental Planning Policy Protected Areas

Are there any State Environmental Planning Policy Protected Areas onsite or within the dataset buffer?

Dataset	Onsite	Within Site Buffer	Distance
SEPP14 - Coastal Wetlands	No	Yes	920m
SEPP26 - Littoral Rainforests	No	No	N/A
SEPP71 - Coastal Protection Zone	No	Yes	672m

SEPP Protected Areas Data Source: NSW Department of Planning & Environment

State Environmental Planning Policy Major Developments (2005)

State Environmental Planning Policy Major Developments within the dataset buffer:

Map Id	Feature	Effective Date	Distance	Direction
N/A	No records within buffer			

SEPP Major Development Data Source: NSW Department of Planning & Environment

State Environmental Planning Policy Strategic Land Use Areas

State Environmental Planning Policy Strategic Land Use Areas onsite or within the dataset buffer:

Strategic Land Use	SEPPNo	Effective Date	Amendment	Amendment Year	Distance	Direction
No records within buffer						

SEPP Strategic Land Use Data Source: NSW Department of Planning & Environment

LEP Planning Zones

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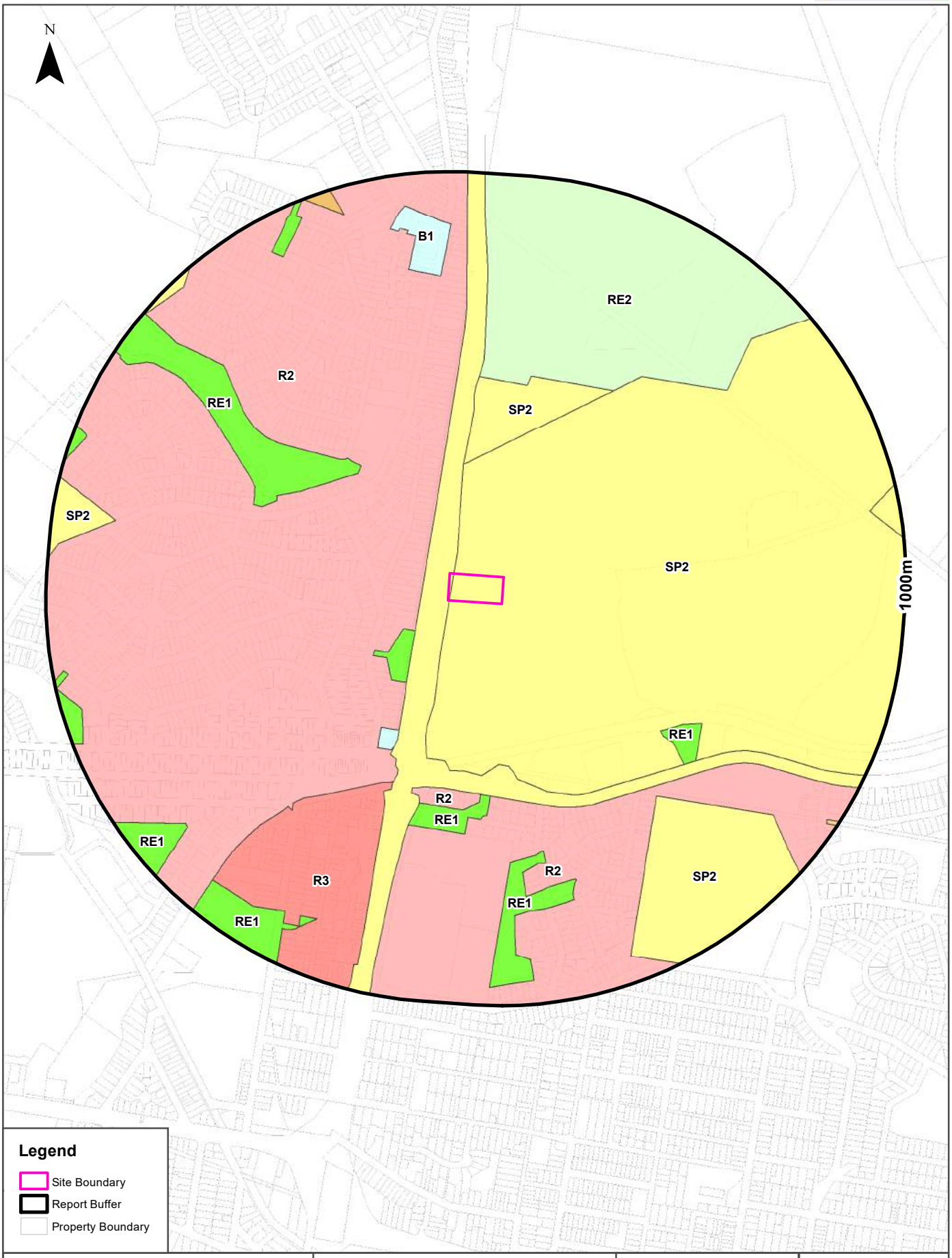

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2017
Planning: NSW Crown Copyright - Planning & Environment

Coordinate System: GDA 1994 MGA Zone 56

Date: 17 October 2017

Local Environmental Plan

130 University Drive, Callaghan, NSW 2308

Land Zoning

What Local Environmental Plan Land Zones exist within the dataset buffer?

Zone	Description	Purpose	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
SP2	Infrastructure	Educational Establishment	Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	07/07/2017		0m	Onsite
SP2	Infrastructure	Classified Road	Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	07/07/2017		0m	Onsite
R2	Low Density Residential		Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	07/07/2017		62m	North West
RE1	Public Recreation		Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	07/07/2017		113m	South West
SP2	Infrastructure	Educational Establishment	Newcastle Local Environmental Plan 2012	14/03/2014	14/03/2014	07/07/2017	Amendment No 4	273m	North
RE1	Public Recreation		Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	07/07/2017		339m	North West
B1	Neighbourhood Centre		Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	07/07/2017		345m	South West
R2	Low Density Residential		Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	07/07/2017		467m	South
R3	Medium Density Residential		Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	07/07/2017		472m	South West
RE1	Public Recreation		Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	07/07/2017		477m	South
R2	Low Density Residential		Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	07/07/2017		479m	South East
RE2	Private Recreation		Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	07/07/2017		481m	North East
RE1	Public Recreation		Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	07/07/2017		503m	South East
SP2	Infrastructure	Water Supply System	Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	07/07/2017		612m	South East
RE1	Public Recreation		Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	07/07/2017		624m	South
B1	Neighbourhood Centre		Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	07/07/2017		741m	North
SP2	Infrastructure	Cemetery	Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	07/07/2017		842m	West
RE1	Public Recreation		Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	07/07/2017		857m	South West
RE1	Public Recreation		Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	07/07/2017		891m	North West
SP2	Infrastructure	Electircity Transmission	Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	07/07/2017		922m	East
E2	Environmental Conservation		Newcastle Local Environmental Plan 2012	01/03/2013	01/03/2013	07/07/2017	State Environmental Planning Policy Amendment (Minmi-Newcastle Link Road) 2013	930m	North West
RE1	Public Recreation		Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	07/07/2017		949m	West
RE1	Public Recreation		Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	07/07/2017		966m	West
E3	Environmental Management		Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	07/07/2017		969m	South East
SP2	Infrastructure	Sewerage System	Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	07/07/2017		973m	North West

Local Environmental Plan

130 University Drive, Callaghan, NSW 2308

Minimum Subdivision Lot Size

What are the onsite Local Environmental Plan Minimum Subdivision Lot Sizes?

Symbol	Minimum Lot Size	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Percentage of Site Area
No Data							

Maximum Height of Building

What are the onsite Local Environmental Plan Maximum Height of Buildings?

Symbol	Maximum Height of Building	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Percentage of Site Area
No Data							

Floor Space Ratio

What are the onsite Local Environmental Plan Floor Space Ratios?

Symbol	Floor Space Ratio	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Percentage of Site Area
No Data							

Land Application

What are the onsite Local Environmental Plan Land Applications?

Application Type	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Percentage of Site Area
Included	Newcastle Local Environmental Plan 2012	31/05/2014	31/05/2014	31/05/2014	State Environmental Planning Policy Amendment (Newcastle) 2014	100

Land Reservation Acquisition

What are the onsite Local Environmental Plan Land Reservation Acquisitions?

Reservation	LEP	Published Date	Commenced Date	Currency Date	Amendment	Comments	Percentage of Site Area
No Data							

Heritage Items

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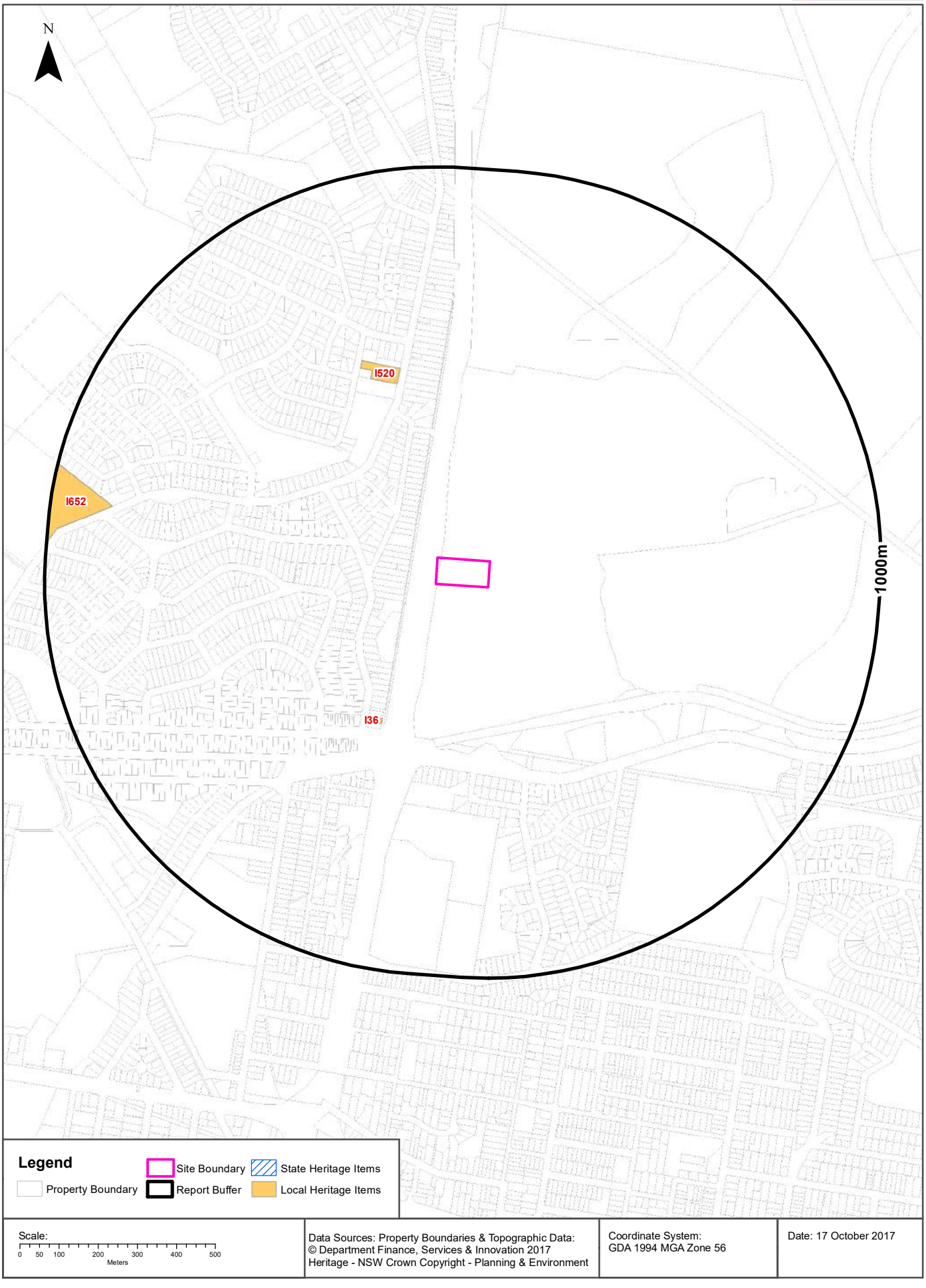


Heritage

130 University Drive, Callaghan, NSW 2308

State Heritage Items

What are the State Heritage Items located within the dataset buffer?

Map Id	Name	Address	LGA	Listing Date	Listing No	Plan No	Distance	Direction
N/A	No records in buffer							

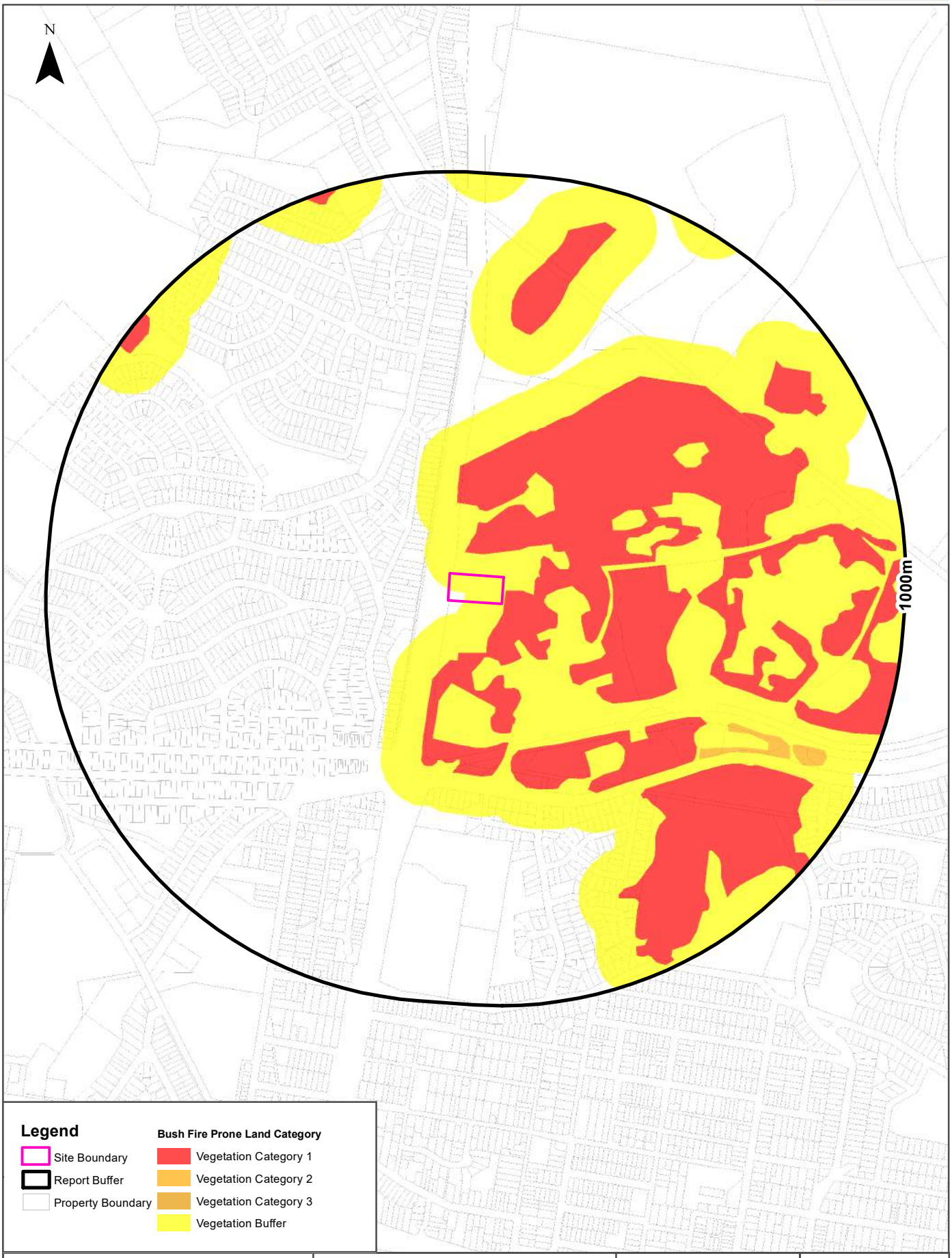
Local Heritage Items

What are the Local Heritage Items located within the dataset buffer?

Map Id	Name	Classification	Significance	LEP or Act	Published Date	Commenced Date	Currency Date	Distance	Direction
I36	The Regal Cinema	Item - General	Local	Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	11/07/2016	372m	South West
I520	Uniting Church	Item - General	Local	Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	11/07/2016	457m	North
I652	Wallsend General Cemetery	Item - General	Local	Newcastle Local Environmental Plan 2012	15/06/2012	15/06/2012	11/07/2016	842m	West

Natural Hazards - Bush Fire Prone Land

130 University Drive, Callaghan, NSW 2308



Data Sources: Bush Fire Prone Land: © NSW Rural Fire Service 2017. Property Boundaries: © Department Finance, Services & Innovation 2017

Coordinate System: GDA 1994 MGA Zone 56

Date: 17 October 2017

Natural Hazards

130 University Drive, Callaghan, NSW 2308

Bush Fire Prone Land

What are the nearest Bush Fire Prone Land Categories that exist within the dataset buffer?

Bush Fire Prone Land Category	Distance	Direction
Vegetation Buffer	0m	Onsite
Vegetation Category 1	3m	North East
Vegetation Category 2	610m	South East

Ecological Constraints - Vegetation & RAMSAR Wetlands

130 University Drive, Callaghan, NSW 2308

Ecological Constraints

130 University Drive, Callaghan, NSW 2308

Lower Hunter and Central Coast Regional Vegetation Survey

What vegetation from the Lower Hunter and Central Coast Regional Survey exists within the dataset buffer?

Map id	Unit Desc	Canopy Code	Canopy Cover	Species	Distance	Direction
15	Coastal Foothills Spotted Gum - Ironbark Forest	OF	Mid Dense (Open Forest) 50-<100% cover	C. maculata / E. umbra / E. siderophloia	0m	Onsite
15	Coastal Foothills Spotted Gum - Ironbark Forest	W	Wetland	C. maculata / E. umbra / E. siderophloia	532m	North East
30	Coastal Plains Smooth-barked Apple Woodland	OF	Mid Dense (Open Forest) 50-<100% cover	A. costata / C. gummifera / E. capitellata / E. umbra	633m	South East
46	Freshwater Wetland Complex	W	Wetland	Ludwigia peploides subsp montevidensis / Paspalum distichum / Eleocharis sphacelata / Juncus usitatus	714m	North East
46	Freshwater Wetland Complex	OF	Mid Dense (Open Forest) 50-<100% cover	Ludwigia peploides subsp montevidensis / Paspalum distichum / Eleocharis sphacelata / Juncus usitatus	776m	North East
30	Coastal Plains Smooth-barked Apple Woodland	WO	Sparse (Woodland) 20-<50% cover	A. costata / C. gummifera / E. capitellata / E. umbra	909m	South East

Lower Hunter and Central Coast Regional Vegetation Survey: NSW Office of Environment and Heritage

RAMSAR Wetlands

What RAMSAR Wetland areas exist within the dataset buffer?

Map Id	RAMSAR Name	Wetland Name	Designation Date	Source	Distance	Direction
N/A	No records in buffer					

RAMSAR Wetlands Data Source: © Commonwealth of Australia - Department of Environment

Ecological Constraints

130 University Drive, Callaghan, NSW 2308

ATLAS of NSW Wildlife

Endangered &Vulnerable Species on the ATLAS of NSW Wildlife database, within 10km of the site?

Class	Family	Scientific	Common	Exotic	NSW Status	Commonwealth Status
Amphibia	Hylidae	Litoria aurea	Green and Golden Bell Frog	No	Endangered, Protected	Vulnerable
Aves	Accipitridae	Circus assimilis	Spotted Harrier	No	Vulnerable, Protected	
Aves	Accipitridae	Haliaeetus leucogaster	White-bellied Sea-Eagle	No	Vulnerable, Protected	CAMBA
Aves	Accipitridae	Hieraaetus morphnoides	Little Eagle	No	Vulnerable, Protected	
Aves	Accipitridae	Lophoictinia isura	Square-tailed Kite	No	Vulnerable, Protected, Category 3 Sensitive Species	
Aves	Accipitridae	Pandion cristatus	Eastern Osprey	No	Vulnerable, Protected, Category 3 Sensitive Species	
Aves	Anatidae	Oxyura australis	Blue-billed Duck	No	Vulnerable, Protected	
Aves	Anatidae	Stictonetta naevosa	Freckled Duck	No	Vulnerable, Protected	
Aves	Anseranatidae	Anseranas semipalmata	Magpie Goose	No	Vulnerable, Protected	
Aves	Ardeidae	Botaurus poiciloptilus	Australasian Bittern	No	Endangered, Protected	Endangered
Aves	Ardeidae	Ixobrychus flavicollis	Black Bittern	No	Vulnerable, Protected	
Aves	Artamidae	Artamus cyanopterus cyanopterus	Dusky Woodswallow	No	Vulnerable, Protected	
Aves	Burhinidae	Burhinus grallarius	Bush Stone-curlew	No	Endangered, Protected	
Aves	Cacatuidae	Callocephalon fimbriatum	Gang-gang Cockatoo	No	Vulnerable, Protected, Category 3 Sensitive Species	
Aves	Cacatuidae	Calyptorhynchus lathami	Glossy Black-Cockatoo	No	Vulnerable, Protected, Category 2 Sensitive Species	
Aves	Charadriidae	Charadrius leschenaultii	Greater Sand-plover	No	Vulnerable, Protected	V,C,J,K
Aves	Charadriidae	Charadrius mongolus	Lesser Sand-plover	No	Vulnerable, Protected	E,C,J,K
Aves	Ciconiidae	Ephippiorhynchus asiaticus	Black-necked Stork	No	Endangered, Protected	
Aves	Climacteridae	Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	No	Vulnerable, Protected	
Aves	Columbidae	Ptilinopus magnificus	Wompoo Fruit-Dove	No	Vulnerable, Protected	
Aves	Columbidae	Ptilinopus regina	Rose-crowned Fruit-Dove	No	Vulnerable, Protected	
Aves	Columbidae	Ptilinopus superbus	Superb Fruit-Dove	No	Vulnerable, Protected	
Aves	Diomedeidae	Diomedea exulans	Wandering Albatross	No	Endangered, Protected	E,J
Aves	Estrildidae	Stagonopleura guttata	Diamond Firetail	No	Vulnerable, Protected	
Aves	Falconidae	Falco subniger	Black Falcon	No	Vulnerable, Protected	
Aves	Haematopodidae	Haematopus fuliginosus	Sooty Oystercatcher	No	Vulnerable, Protected	
Aves	Haematopodidae	Haematopus longirostris	Pied Oystercatcher	No	Endangered, Protected	
Aves	Jacanidae	Irediparra gallinacea	Comb-crested Jacana	No	Vulnerable, Protected	
Aves	Laridae	Sternula albifrons	Little Tern	No	Endangered, Protected	CAMBA, JAMBA, ROKAMBA
Aves	Meliphagidae	Anthochaera phrygia	Regent Honeyeater	No	Critically Endangered Species, Protected	Critically Endangered

Class	Family	Scientific	Common	Exotic	NSW Status	Commonwealth Status
Aves	Meliphagidae	Epthianura albifrons	White-fronted Chat	No	Vulnerable, Protected	
Aves	Neosittidae	Daphoenositta chrysoptera	Varied Sittella	No	Vulnerable, Protected	
Aves	Petroicidae	Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	No	Vulnerable, Protected	
Aves	Petroicidae	Petroica boodang	Scarlet Robin	No	Vulnerable, Protected	
Aves	Pomatostomidae	Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	No	Vulnerable, Protected	
Aves	Procellariidae	Ardenna carneipes	Flesh-footed Shearwater	No	Vulnerable, Protected	J,K
Aves	Procellariidae	Macronectes giganteus	Southern Giant Petrel	No	Endangered, Protected	Endangered
Aves	Procellariidae	Pterodroma solandri	Providence Petrel	No	Vulnerable, Protected	JAMBA
Aves	Psittacidae	Glossopsitta pusilla	Little Lorikeet	No	Vulnerable, Protected	
Aves	Psittacidae	Lathamus discolor	Swift Parrot	No	Endangered, Protected, Category 3 Sensitive Species	Critically Endangered
Aves	Psittacidae	Neophema pulchella	Turquoise Parrot	No	Vulnerable, Protected, Category 3 Sensitive Species	
Aves	Rostratulidae	Rostratula australis	Australian Painted Snipe	No	Endangered, Protected	Endangered
Aves	Scolopacidae	Calidris ferruginea	Curlew Sandpiper	No	Endangered, Protected	CE,C,J,K
Aves	Scolopacidae	Calidris tenuirostris	Great Knot	No	Vulnerable, Protected	CE,C,J,K
Aves	Scolopacidae	Limicola falcinellus	Broad-billed Sandpiper	No	Vulnerable, Protected	CAMBA, JAMBA, ROKAMBA
Aves	Scolopacidae	Limosa limosa	Black-tailed Godwit	No	Vulnerable, Protected	CAMBA, JAMBA, ROKAMBA
Aves	Scolopacidae	Xenus cinereus	Terek Sandpiper	No	Vulnerable, Protected	CAMBA, JAMBA, ROKAMBA
Aves	Strigidae	Ninox connivens	Barking Owl	No	Vulnerable, Protected, Category 3 Sensitive Species	
Aves	Strigidae	Ninox strenua	Powerful Owl	No	Vulnerable, Protected, Category 3 Sensitive Species	
Aves	Sulidae	Sula dactylatra	Masked Booby	No	Vulnerable, Protected	J,K
Aves	Tytonidae	Tyto longimembris	Eastern Grass Owl	No	Vulnerable, Protected, Category 3 Sensitive Species	
Aves	Tytonidae	Tyto novaehollandiae	Masked Owl	No	Vulnerable, Protected, Category 3 Sensitive Species	
Aves	Tytonidae	Tyto tenebricosa	Sooty Owl	No	Vulnerable, Protected, Category 3 Sensitive Species	
Mammalia	Balaenopteridae	Megaptera novaeangliae	Humpback Whale	No	Vulnerable, Protected	Vulnerable
Mammalia	Dasyuridae	Phascogale tapoatafa	Brush-tailed Phascogale	No	Vulnerable, Protected	
Mammalia	Dugongidae	Dugong dugon	Dugong	No	Endangered, Protected	
Mammalia	Emballonuridae	Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	No	Vulnerable, Protected	
Mammalia	Molossidae	Mormopterus norfolkensis	Eastern Freetail-bat	No	Vulnerable, Protected	
Mammalia	Otariidae	Arctocephalus forsteri	New Zealand Fur-seal	No	Vulnerable, Protected	
Mammalia	Petauridae	Petaurus norfolcensis	Squirrel Glider	No	Vulnerable, Protected	
Mammalia	Phascolarctidae	Phascolarctos cinereus	Koala	No	Vulnerable, Protected	Vulnerable
Mammalia	Pteropodidae	Pteropus poliocephalus	Grey-headed Flying-fox	No	Vulnerable, Protected	Vulnerable
Mammalia	Vespertilionidae	Chalinolobus dwyeri	Large-eared Pied Bat	No	Vulnerable, Protected	Vulnerable
Mammalia	Vespertilionidae	Falsistrellus tasmaniensis	Eastern False Pipistrelle	No	Vulnerable, Protected	
Mammalia	Vespertilionidae	Miniopterus australis	Little Bentwing-bat	No	Vulnerable, Protected	

Class	Family	Scientific	Common	Exotic	NSW Status	Commonwealth Status
Mammalia	Vespertilionidae	Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	No	Vulnerable, Protected	
Mammalia	Vespertilionidae	Myotis macropus	Southern Myotis	No	Vulnerable, Protected	
Mammalia	Vespertilionidae	Scoteanax rueppellii	Greater Broad-nosed Bat	No	Vulnerable, Protected	
Mammalia	Vespertilionidae	Vespadelus troughtoni	Eastern Cave Bat	No	Vulnerable, Protected	
Reptilia	Cheloniidae	Chelonia mydas	Green Turtle	No	Vulnerable, Protected	Vulnerable
Flora	Apocynaceae	Cynanchum elegans	White-flowered Wax Plant	No	Endangered, Protected	Endangered
Flora	Asteraceae	Rutidosis heterogama	Heath Wrinklewort	No	Vulnerable, Protected	Vulnerable
Flora	Elaeocarpaceae	Tetratheca glandulosa		No	Vulnerable, Protected	
Flora	Elaeocarpaceae	Tetratheca juncea	Black-eyed Susan	No	Vulnerable, Protected	Vulnerable
Flora	Fabaceae (Faboideae)	Pultenaea maritima	Coast Headland Pea	No	Vulnerable, Protected	
Flora	Juncaginaceae	Maundia triglochinoides		No	Vulnerable, Protected	
Flora	Myrtaceae	Angophora inopina	Charmhaven Apple	No	Vulnerable, Protected	Vulnerable
Flora	Myrtaceae	Callistemon linearifolius	Netted Bottle Brush	No	Vulnerable, Protected, Category 3 Sensitive Species	
Flora	Myrtaceae	Eucalyptus parramattensis subsp. decadens		No	Vulnerable, Protected	Vulnerable
Flora	Myrtaceae	Melaleuca biconvexa	Biconvex Paperbark	No	Vulnerable, Protected	Vulnerable
Flora	Myrtaceae	Syzygium paniculatum	Magenta Lilly Pilly	No	Endangered, Protected	Vulnerable
Flora	Orchidaceae	Diuris praecox	Rough Doubletail	No	Vulnerable, Protected, Category 2 Sensitive Species	Vulnerable
Flora	Orobanchaceae	Euphrasia arguta		No	Critically Endangered Species, Protected	Critically Endangered
Flora	Polygonaceae	Muehlenbeckia costata	Scrambling Lignum	No	Vulnerable, Protected	
Flora	Proteaceae	Grevillea parviflora subsp. parviflora	Small-flower Grevillea	No	Vulnerable, Protected	Vulnerable
Flora	Proteaceae	Grevillea shiressii		No	Vulnerable, Protected	Vulnerable
Flora	Zannichelliaceae	Zannichellia palustris		No	Endangered, Protected	

Data does not include records not defined as either endangered or vulnerable, and category 1 sensitive species are also excluded. NSW Office of Environment and Heritage's Atlas of NSW Wildlife, which holds data from a number of custodians. Data obtained 16/10/2017

USE OF REPORT – APPLICABLE TERMS

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      (i) content provided to Lotsearch by third party content suppliers with whom Lotsearch has contractual arrangements or content which is freely available (**Third Party Content Suppliers**);
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University of Newcastle Proposed Bio-Resources Facility

APPENDIX E

TILTE SEARCH

ADVANCE LEGAL SEARCHERS PTY LTD

(ACN 147 943 842)
ABN 82 147 943 842

18/36 Osborne Road,
Manly NSW 2095

Telephone: +612 9977 6713
Mobile: 0412 169 809
Email: search@alsearchers.com.au

24th October 2017

LOTSEARCH PTY LTD
Level 3, 68 Alfred Street,
MILSONS POINT, NSW 2061

Attention: Howard Waldron,

RE: **130 University Drive,**
Callaghan
Reference: LS002209

Note: Historical Search is of part Lot 1 DP 1188100, being part indicated in site diagram.

Current Search

Folio Identifier 1/1188100 (title attached)
DP 1188100 (plan attached)
Dated 23rd October 2017
Registered Proprietor:
THE UNIVERSITY OF NEWCASTLE

Title Tree
Lot 1 DP 1188100

Folio Identifier 1/1188100

Folio Identifier 7/804087

Folio Identifier 11/531665

Certificate of Title Volume 11573 Folio 117

Certificate of Title Volume 9812 Folio 210

PA 43800

Government Gazette 18th January 1963

Government Gazette 29th October 1954

Crown Land

****

Summary of proprietor(s)
Lot 1 DP 1188100

Year	Proprietor(s)
	(Lot 1 DP 1188100)
2000 – todate	The University of Newcastle
(2000 – todate)	*(various current leases shown on Folio Identifier 1/1188100)*
(2000 – todate)	*(various leases shown on Historical Folio 1/1188100)*
	(Lot 16 DP 817507)
1991 – 2000	The University of Newcastle
(1991 – 2000)	*(various leases shown on Historical Folio 16/817507)*
	(Lot 7 DP 804087)
1991 – 1991	The University of Newcastle
	(Lot 11 DP 531665)
1991 – 1991	The University of Newcastle
	(Lot 11 DP 531665 & Lots 3 & 4 DP 216528 – CTVol 11573 Fol 117)
1971 – 1991	The University of Newcastle
(1990 – 1991)	*(lease to Commonwealth Savings Bank of Australia and 2 car spaces)*
(1983 – 1986)	*(lease to Commonwealth Savings Bank of Australia and 2 car spaces)*
	(Lots 2, 3 & 4 DP 216528 – CTVol 9812 Fol 210)
1968 – 1971	The University of Newcastle
1964 – 1968	The University of New South Wales
1964 – 1964	The Minister for Education
	(Lots 2, 3 & 4 DP 216528 – Area 235 Acres 0 Roods 39 ¾ Perches)
1963 – 1964	Crown Land
(1963 – 1964)	*(Acquired for Technical Education and University vide Resumption Government Gazette 18th January 1963)*
	(Crown Land Parish Newcastle)
Prior – 1963	Crown Land
(1954 – 1963)	*(Dedicated for University and Teachers College Site, Government Gazette 29th October 1954)*

****

G. 1

NEW SOUTH WALES

[redacted]IFICATE OF TITLE

[redacted]ERTY ACT, 1900, as amended.

Application No. 43800

Vol. 9812 Fol. 210

CANCELLED W 21-9-1984

EH 1st Edition issued 22-9-1954

(Page 1) Vol. 9812 Fol. 210

I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second Schedule.

Witness

Registrar-General.

ESTATE AND LAND REFERRED TO

Estate in Fee Simple in Lots 2, 3 and 4 in Deposited Plan 216528 at Shortland in the City of Newcastle Parish of Newcastle and County of Northumberland. Excepting thereout the minerals specified by Section 141 of the Public Works Act, 1912.

Registrar General.

FIRST SCHEDULE (continued overleaf)

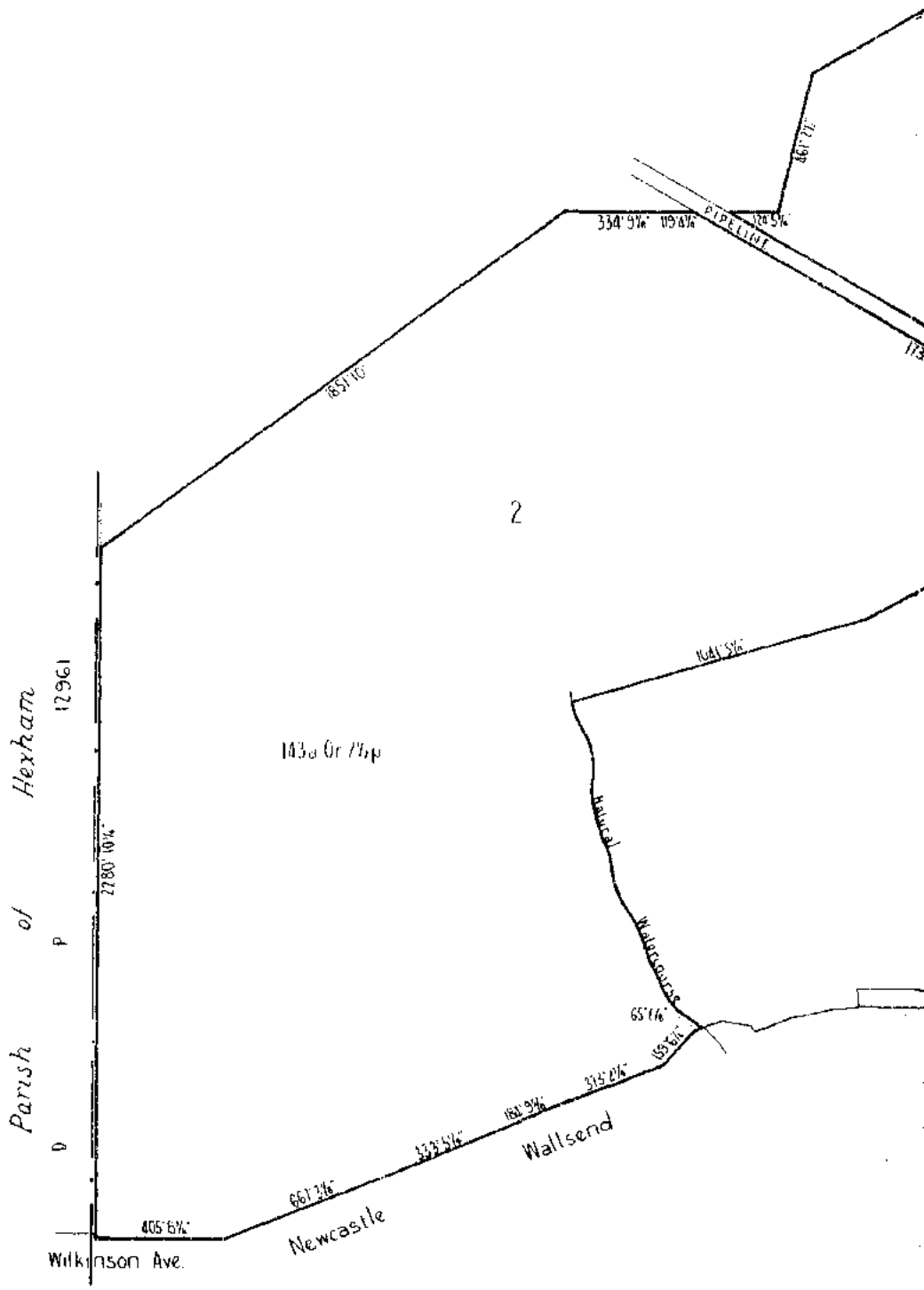
THE MINIST[redacted] EDUCATION.

Registrar General.

SECOND SCHEDULE (continued overleaf)

20941:52(25)

PLAN SHOWING LOCA

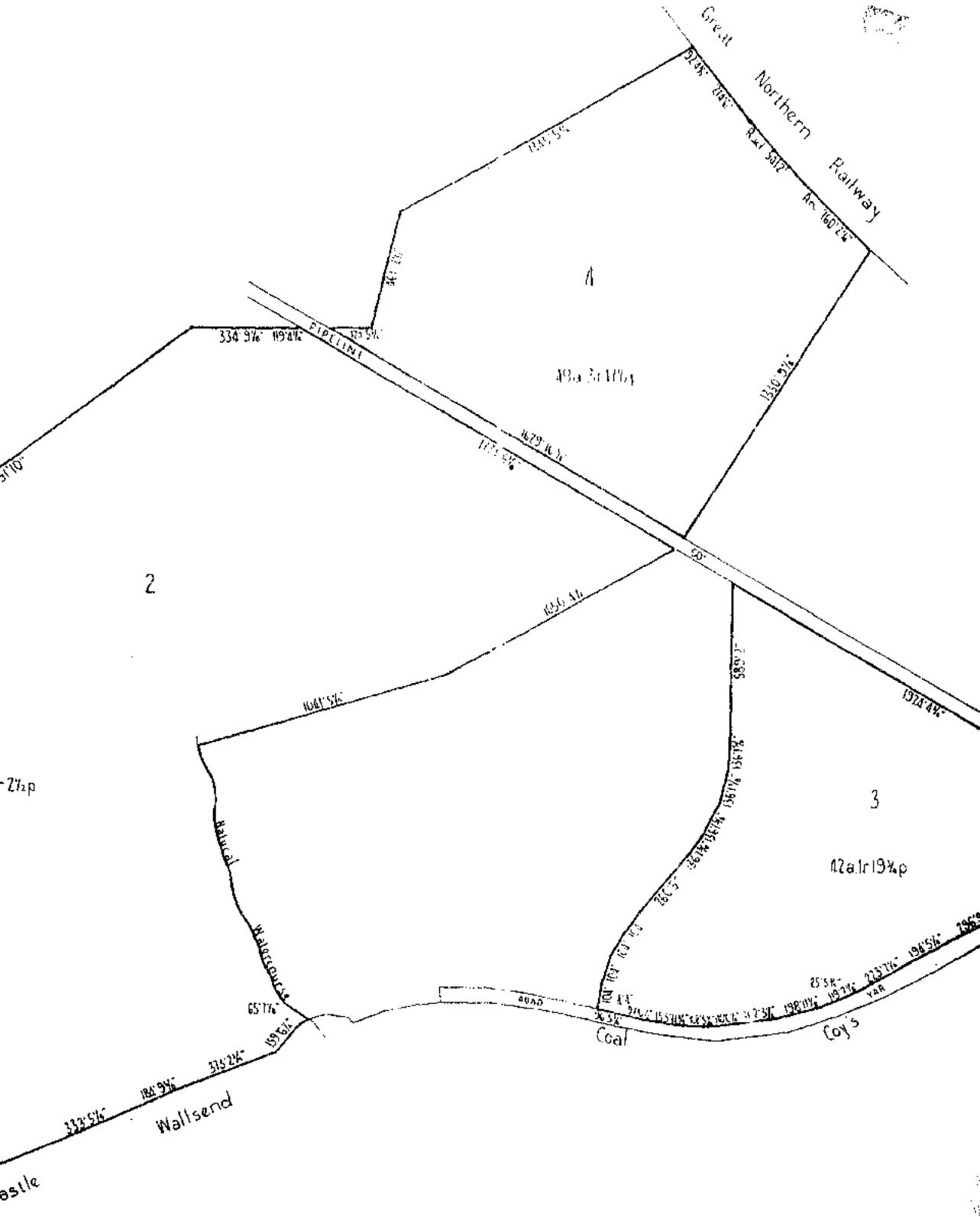


DP 216528 M.M.K.

Total Area 235a. 0r 39½p.

Scale 400 feet to one inch

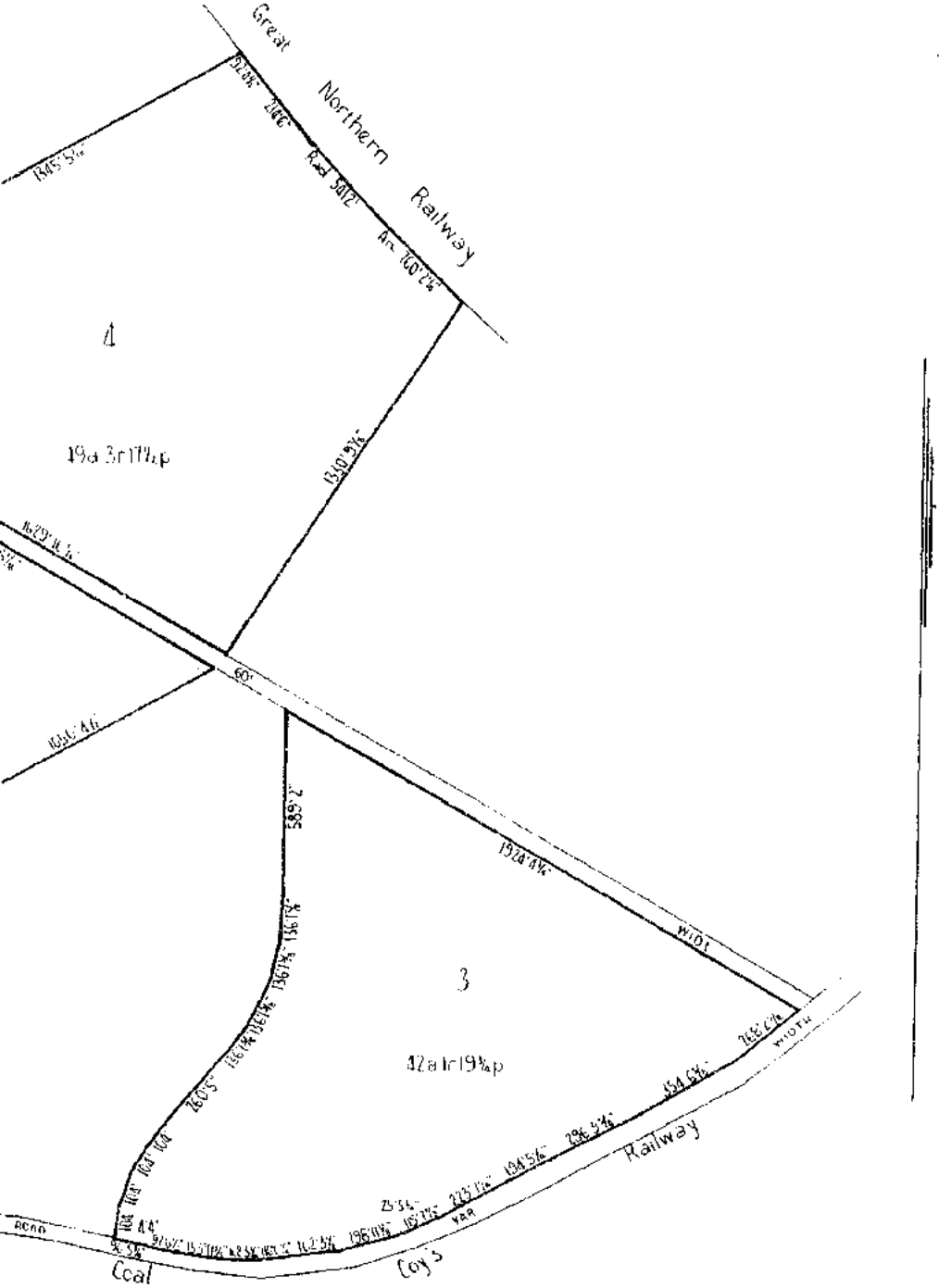
PLAN SHOWING LOCATION OF LAND



Total Area 235a 0r 39¾p

Scale 400 feet to one inch

ION OF LAND



St 1609 V. C. N. Blight, Government Printer

FIRST SCHEDULE (continued)

REGISTERED PROPRIETOR	INSTRUMENT NATURE	INSTRUMENT NUMBER	INSTRUMENT DATE	ENTERED	Signature of Registrar-General
~~The University of New South Wales.~~	~~Application~~	~~J682450~~	~~21.5.1964~~	~~21.9.1964~~	[signature]
The University of Newcastle	Transfer	K958243	15-12-1967	27-2-1968	[signature]
The Commissioner for Main Roads as regards land being lot ... in DP 53 ... freed from all other interest.	Resumption	L909948		29-7-1970	[signature]

This deed is cancelled as to Whole (~~as to part~~)
New Certificate of ... issued on 23-4-1971
for lots in Deposited ... No. 531665 as follows:
~~Lots~~ 11 & 12 ... 11573 Fol 117
and also LOTS 3 and 4 D.P. 216528
& 12/531665 [seal] 12.2.1990
[signature]
REGISTRAR-GENERAL

J682450 ... 531665 ... DP 53350

SECOND SCHEDULE (continued)

INSTRUMENT NATURE	INSTRUMENT NUMBER	INSTRUMENT DATE	PARTICULARS	ENTERED	Signature of Registrar-General	CANCELLATION
Covenant	M110023	...12-1970	as regards Lot ... in DP 53 ...	5-3-1971	[signature]	

FORM No. [redacted] 161A NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR-GENERAL ARE CANCELLED

[redacted]ICATE OF TITLE
[redacted]TY ACT, 1900, as amended.

11573117

NEW SOUTH WALES

Appln. No. 43800

Prior Title Vol. 9812 Fol. 210

Vol. 11573 Fol. 117
CANCELLED
Edition issued 23-4-1971
DEPOSITED PLAN 531665

SEE AUTO FOLIO

I certify that the person described in the First Schedule is the registered proprietor of the undermentioned estate in the land within described subject nevertheless to such exceptions encumbrances and interests as are shown in the Second Schedule.

Witness G Barnes

Registrar General

(Page 1) Vol. 11573 Fol. 117

OKN

ESTATE AND LAND REFERRED TO

Estate in Fee Simple in Lot 11 in Deposited Plan 531665 and Lots 3 and 4 in Deposited Plan 216528 at Shortland in the City of Newcastle Parish of Newcastle and County of Northumberland being land for which no Crown Grant has issued. EXCEPTING THEREOUT the minerals specified by Section 141 of the Public Works Act, 1912.

FIRST SCHEDULE

THE UNIVERSITY OF NEWCASTLE.

XC

Registrar General.

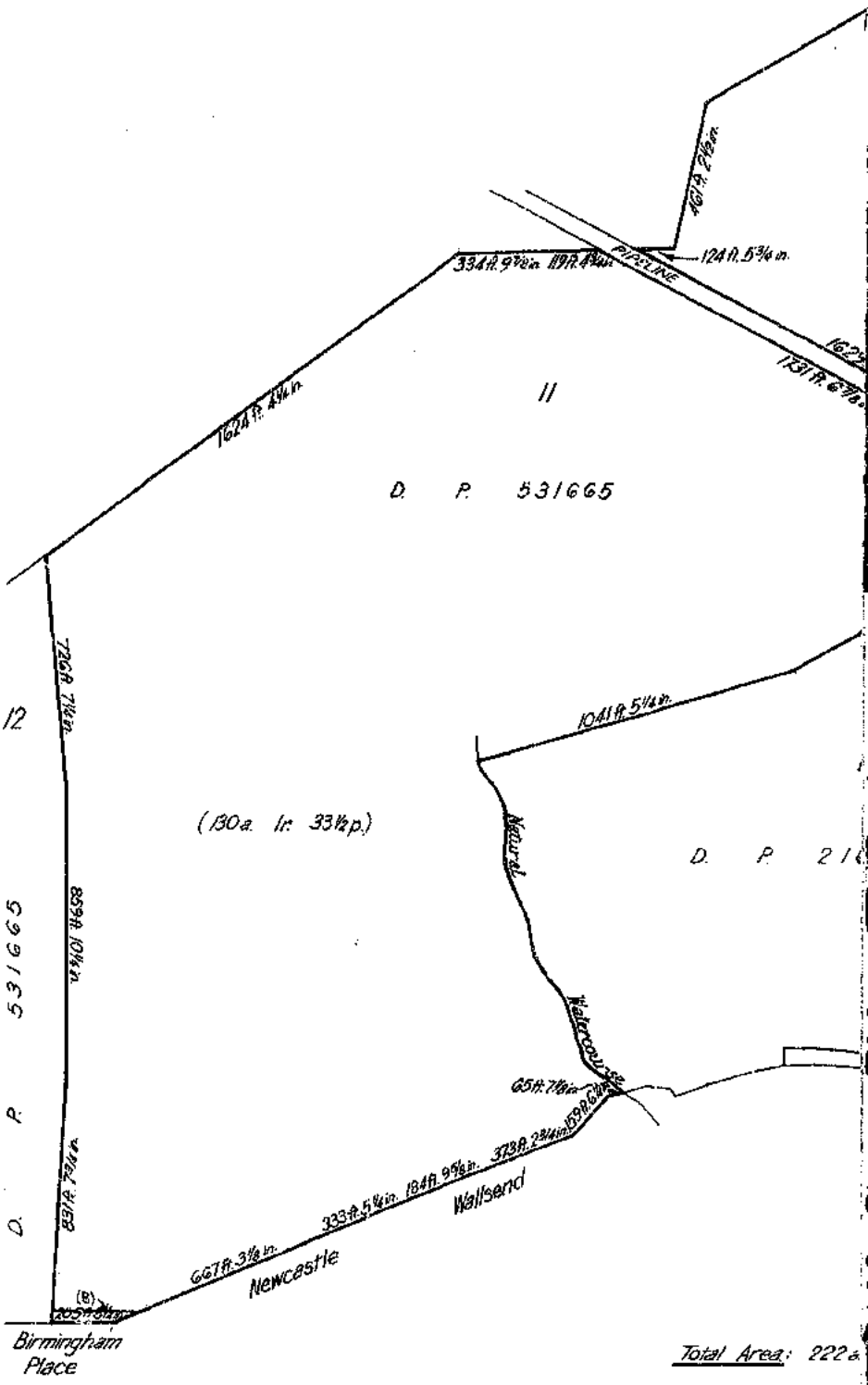
SECOND SCHEDULE

CV 1. Covenant created by Transfer No.M110023 as regards Lot 11 in Deposited Plan 531665.

Registrar General.

Vol. 11573 Fol. 117

Plan Showing Location o

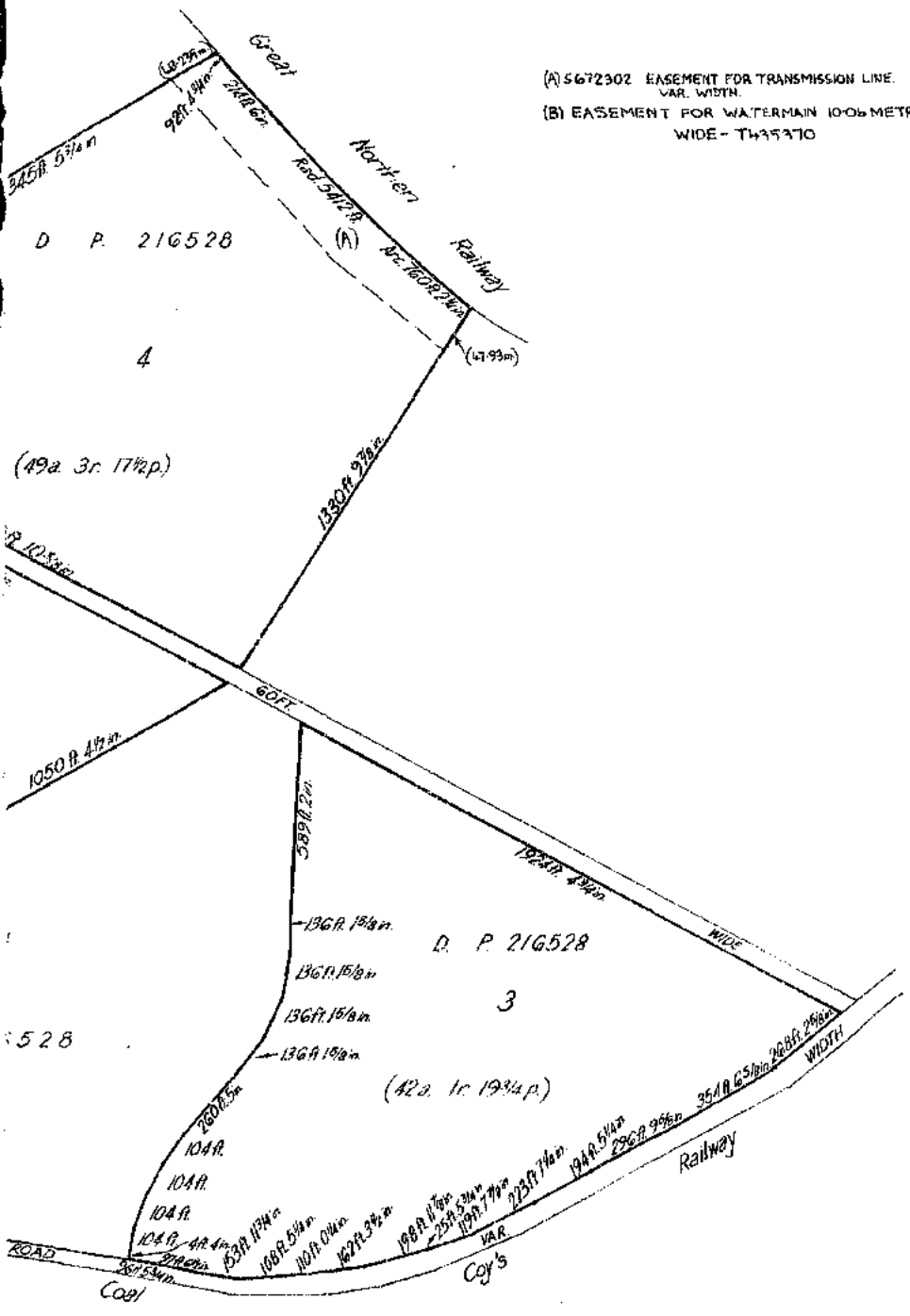


Total Area: 222a

Scale: 400 feet

D. P. 531665

Land



2r. 30¾p.

to one inch

Vol. 11573 Fol. 117

FIRST SCHEDULE (continued)

REGISTERED PROPRIETOR	INSTRUMENT NATURE	INSTRUMENT NUMBER	INSTRUMENT DATE	ENTERED	Signature of Registrar General
CANCELLED					

THIS IS THE LAST FOLIO

SECOND SCHEDULE (continued)

INSTRUMENT NATURE	INSTRUMENT NUMBER	INSTRUMENT DATE	PARTICULARS	ENTERED	Signature of Registrar General	CANCELLATION
Transfer EF	N615928	27-7-1973	Easement for Water Supply Pipeline & Access as more fully set out in the said instrument, affecting that part of the land within described 12 feet wide shown in the plan lodged with Transfer No N615928	24-1-1974		
S672302	Transfer Easement for Transmission Lines affecting the part of the land above described shown so burdened in the plan hereon. Registered 6-10-1981					
T435370	Transfer Easement for watermain affecting the land shown so burdened in the plan hereon. Registered 10-5-1983.					
T662693	Lease to Commonwealth Savings Bank of Australia of premises being the building known as The Commonwealth Bank, together with two (2) car parking spaces adjacent thereto. Expires 31-12-1986. Registered 5-8-1983					
DP 637869	RIGHT OF CARRIAGEWAY AFFECTING THE PART OF THE LAND ABOVE DESCRIBED SHOWN SO BURDENED IN DP 637869			19-9-1985		
DP 637869	RIGHT OF CARRIAGEWAY APPURTENANT TO THE LAND ABOVE DESCRIBED			19-9-1985		
D.P. 772130	RIGHTS OF WAY 5.5 WIDE, 6 WIDE & 9 WIDE AFFECTING THE PART OF THE LAND ABOVE DESCRIBED SHOWN SO BURDENED IN D.P. 772130.		Regd.	25-2-1988		

(Page 4 of 4 pages)

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

Vol. [illegible] Fol. [illegible]

FIRST SCHEDULE (continued)

REGISTERED PROPRIETOR	Registrar General
224360 LEASE TO COMMONWEALTH SAVINGS BANK OF AUSTRALIA OF THE COMMONWEALTH BANK BUILDING BETWEEN THE NORTHERN END OF THE McMULLIN BUILDING AND THE DRAMA STUDIO WITH ADJACENT CARPARK SPACES AT THE UNIVERSITY OF NEWCASTLE, SHORTLAND. EXPIRES 31-12-1991. REGISTERED 24-10-1990.	

SEE [illegible]

SECOND SCHEDULE (continued)

PARTICULARS	Registrar General	CANCELLATION

NOTATIONS AND UNREGISTERED DEALINGS

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

Vol. 11573 Fol. 117

FIRST SCHEDULE (continued)

REGISTERED PROPRIETOR	Registrar General

SECOND SCHEDULE (continued)

PARTICULARS	Registrar General	CANCELLATION

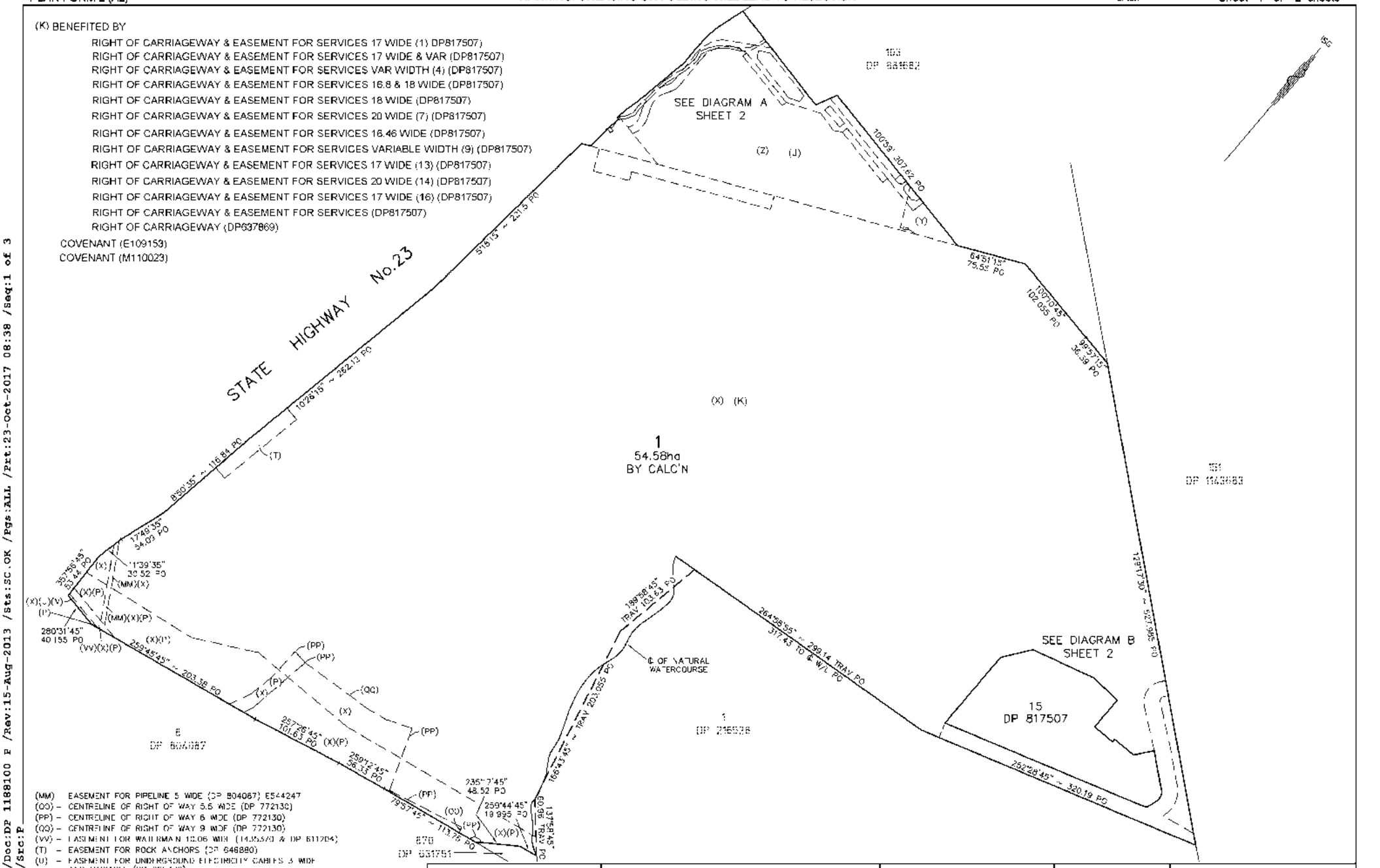
NOTATIONS AND UNREGISTERED DEALINGS

NOTE: ENTRIES RULED THROUGH AND AUTHENTICATED BY THE SEAL OF THE REGISTRAR GENERAL ARE CANCELLED

(K) BENEFITED BY

RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES 17 WIDE (1) DP817507)
RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES 17 WIDE & VAR (DP817507)
RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES VAR WIDTH (4) (DP817507)
RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES 16.8 & 18 WIDE (DP817507)
RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES 18 WIDE (DP817507)
RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES 20 WIDE (7) (DP817507)
RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES 16.46 WIDE (DP817507)
RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES VARIABLE WIDTH (9) (DP817507)
RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES 17 WIDE (13) (DP817507)
RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES 20 WIDE (14) (DP817507)
RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES 17 WIDE (16) (DP817507)
RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES (DP817507)
RIGHT OF CARRIAGEWAY (DP637869)

COVENANT (E109153)
COVENANT (M110023)



(MM) – EASEMENT FOR PIPELINE 5 WIDE (DP 804087) E544247
(OO) – CENTRELINE OF RIGHT OF WAY 5.5 WIDE (DP 772130)
(PP) – CENTRELINE OF RIGHT OF WAY 6 WIDE (DP 772130)
(QQ) – CENTRELINE OF RIGHT OF WAY 9 WIDE (DP 772130)
(VV) – EASEMENT FOR WATERMAIN 12.06 WIDE (1435670 & DP 811704)
(T) – EASEMENT FOR ROCK ANCHORS (DP 646880)
(U) – EASEMENT FOR UNDERGROUND ELECTRICITY CABLES 3 WIDE AND VARIABLE (DP 265379)
(V) – EASEMENT FOR GAS PIPELINE 3 WIDE AND VARIABLE (DP 265379)
(X) – LAND EXCLUDES MINERALS (S.141 PUBLIC WORKS ACT 1912)
(Y) – LAND EXCLUDES MINERALS – SEE BK 1210 No.935
(Z) – LAND EXCLUDES MINERALS – SEE BK 1210 No.935

Surveyor:	BENJAMEN JOHN BELFIELD
Date of Survey:	07/03/2012
Surveyor's Ref:	10227DPA 2012 M7100 (126) COMP

PLAN OF CONSOLIDATION OF LOT 101 DP 881682 & LOT 15 DP 817507

LGA: NEWCASTLE
Locality: CALLAGHAN / SHORTLAND
Subdivision No: -
Lengths are in metres Reduction Ratio 1: 2500

Registered 15.8.2013

DP1188100

(J) RESERVATIONS & CONDITIONS IN THE CROWN GRANT(S)
COVENANT (Z207914)

BENEFITED BY

RIGHT OF CARRIAGEWAY 15 & 25 WIDE (DP637869)
RIGHT OF CARRIAGEWAY 8 WIDE & VAR (DP637869)
PARKING VAR WIDTH (DP881682)
DRAINAGE OF WATER OF EXISTING LINE OF PIPES (DP881682)

15
DP 817507

DIAGRAM B
SCALE 1:1000

DIAGRAM A
SCALE 1:800

(A) – RIGHT OF CARRIAGEWAY 8 WIDE AND VARIABLE WIDTH (DP 881682)
(B) – EASEMENT FOR PARKING VARIABLE WIDTH (DP 881682)
(C) EASEMENT FOR PARKING VARIABLE WIDTH (DP 881682)
(D) – RIGHT OF CARRIAGEWAY 15 & 25 WIDE (VIDE DP 637869)
(E) RIGHT OF CARRIAGEWAY 15.24 WIDE AND VARIABLE (VIDE DP 637869)
(F) – EASEMENT FOR DRAINAGE OF WATER OVER EXISTING LINE OF PIPES AND PIT (APPROXIMATE POSITION) (DP 881682)
(G) – RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES 17 WIDE AND VARIABLE WIDTH (DP 817507)
(H) EASEMENT FOR ELECTRICITY PURPOSES 3 WIDE AND VARIABLE WIDTH (DP 881682)
(P) – EASEMENT FOR TRANSMISSION LINE (DP 648897) (0291562) AND ACCESS THERETO VARIABLE WIDT-
(I) – EASEMENT FOR ELECTRICITY SUBSTATION 3.5 WIDE (DP 881682)
(X) – LAND EXCLUDES MINERALS (S.141 PUBLIC WORKS ACT 1912)
(Y) – LAND EXCLUDES MINERALS – SEE BK 1210 No.935
(Z) LAND EXCLUDES MINERALS SEE BK 1210 No.935

Surveyor: BENJAMEN JOHN BELFIELD Date of Survey: 07/03/2012 Surveyor's Ref: 10227DPA 2012 M7100 (126) COMP	PLAN OF CONSOLIDATION OF LOT 101 DP 881682 & LOT 16 DP 817507	LGA: NEWCASTLE Locality: CALLAGHAN / SHORTLAND Subdivision No: -	Registered 15.8.2013	DP1188100

PLAN FORM 6 **WARNING: Creasing or folding will lead to rejection** ePlan

DEPOSITED PLAN ADMINISTRATION SHEET

Sheet 1 of 1 sheet(s)

Office Use Only

DP1188100

Office Use Only

Registered: 15.8.2013
Title System: TORRENS
Purpose: CONSOLIDATION

PLAN OF CONSOLIDATION OF LOT 101 DP 881682 AND LOT 16 DP 817507

LGA: Newcastle
Locality: Shortland / Callaghan
Parish: Newcastle
County: Northumberland

SIGNATURES, SEALS AND STATEMENTS of intention to dedicate public roads, public reserves and drainage reserves or create easements, restrictions on the use of land and positive covenants

Neil McGregor
Chief Operating Officer
25/7/13

If space is insufficient use PLAN FORM 6A annexure sheet

Crown Lands NSW/Western Lands Office Approval

I.....in approving this plan certify
(Authorised Officer)
that all necessary approvals in regard to the allocation of the land shown herein have been given

Signature: .....
Date: .....
File Number: .....
Office: .....

Subdivision Certificate

I certify that the provisions of s.109J of the Environmental Planning and Assessment Act 1979 have been satisfied in relation to:

the proposed ..... set out herein
(insert 'subdivision' or 'new road')

.....
* Authorised Person/*General Manager/*Accredited Certifier

Consent Authority: .....
Date of Endorsement: .....
Accreditation no: .....
Subdivision Certificate no: .....
File no: .....

Survey Certificate

I, Benjamen John Belfield of Monteath & Powys Pty Limited a surveyor registered under the Surveying and Spatial Information Act 2002, certify that the survey represented in this plan is accurate, has been made in accordance with the Surveying and Spatial Information Regulation 2006 and was completed on: 07/03/2012

The survey relates to .....
.....
(specify the land actually surveyed or specify any land shown in the plan that is not the subject of the survey)

Signature .....Dated: 28/03/12
Surveyor registered under the Surveying and Spatial Information Act 2002

Datum Line: N/A
Type: Urban/~~Rural~~

Plans used in the preparation of ~~survey~~/compilation

DP 881682
DP 817507

(If space is insufficient use PLAN FORM 6A annexure sheet)

* Strike through inapplicable parts.

Surveyor's Reference: 10-227DPA
2012M7100(126) COMP

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
23/10/2017 4:00PM

FOLIO: 1/1188100

First Title(s): OLD SYSTEM
Prior Title(s): 16/817507 101/881682

Recorded	Number	Type of Instrument	C.T. Issue
15/8/2013	DP1188100	DEPOSITED PLAN	FOLIO CREATED EDITION 1
14/5/2014	AH999805	REJECTED - SUB-LEASE	
22/9/2014	AI908770	REQUEST	
4/10/2014	AI937358	LEASE	EDITION 2
24/6/2015	AJ597277	DEPARTMENTAL DEALING	
29/6/2015	AJ607665	DEPARTMENTAL DEALING	
29/6/2015	AJ515311	SURRENDER OF LEASE	
29/6/2015	AJ515312	SURRENDER OF LEASE	
29/6/2015	AJ515313	SURRENDER OF LEASE	
29/6/2015	AJ515314	SURRENDER OF LEASE	EDITION 3
20/7/2015	AJ666679	DEPARTMENTAL DEALING	
25/1/2016	AJ682912	LEASE	
25/1/2016	AJ682913	LEASE	
25/1/2016	AJ682914	LEASE	
25/1/2016	AJ682915	LEASE	EDITION 4
5/10/2016	AK760967	LEASE	
5/10/2016	AK760968	LEASE	
5/10/2016	AK760969	LEASE	EDITION 5
18/11/2016	AK933756	TRANSFER OF LEASE	
18/11/2016	AK933757	LEASE	EDITION 6
29/3/2017	AM25754	LEASE	
29/3/2017	AM25755	LEASE	EDITION 7
23/5/2017	AM362500	LEASE	
23/5/2017	AM362501	LEASE	EDITION 8

*** END OF SEARCH ***

advlegs PRINTED ON 23/10/2017

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
23/10/2017 4:00PM

FOLIO: 11/531665

First Title(s): SEE PRIOR TITLE(S)
Prior Title(s): VOL 11573 FOL 117

Recorded	Number	Type of Instrument	C.T. Issue
28/3/1988		TITLE AUTOMATION PROJECT	LOT RECORDED FOLIO NOT CREATED
1/10/1991		CONVERTED TO AUTO CONSOL 11573-117	CONSOL CREATED CT NOT ISSUED
4/3/1992		EXCISED FROM AUTO CONSOL 11573-117	
5/3/1992	E301901	DEPARTMENTAL DEALING	
9/3/1992	E109153	TRANSFER	FOLIO CANCELLED
29/7/1996		AMENDMENT: LOCAL GOVT AREA	
8/2/2000	6546032	DEPARTMENTAL DEALING	

*** END OF SEARCH ***

advlegs PRINTED ON 23/10/2017

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
23/10/2017 4:00PM

FOLIO: 16/817507

First Title(s): OLD SYSTEM
Prior Title(s): 7/804087

Recorded	Number	Type of Instrument	C.T. Issue
9/10/1992	DP817507	DEPOSITED PLAN	FOLIO CREATED EDITION 1
13/10/1992	DP646880	DEPOSITED PLAN	
14/5/1993	I163444	LEASE	
14/5/1993	I163445	SUB-LEASE	EDITION 2
25/3/1994	DP648897	DEPOSITED PLAN	
8/4/1994	U128489	TRANSFER GRANTING EASEMENT	EDITION 3
25/5/1995	DP265379	DEPOSITED PLAN	EDITION 4
6/6/1995	O285703	DEPARTMENTAL DEALING	
27/7/1995	O291562	TRANSFER GRANTING EASEMENT	EDITION 5
18/12/1995	O273273	REQUEST	
22/4/1998	3920688	TRANSFER RELEASING EASEMENT	EDITION 6
27/11/2000	7244999	LEASE	EDITION 7
4/4/2001	7522086	LEASE	EDITION 8
24/9/2001	7965651	LEASE	EDITION 9
23/9/2002	8973897	LEASE	EDITION 10
11/1/2003	9283553	VARIATION OF LEASE	
22/12/2005	AC6211	LEASE	EDITION 11
23/9/2006	AC616195	LEASE	EDITION 12
20/11/2006	AC751301	LEASE	EDITION 13
23/11/2006	AC761586	LEASE	EDITION 14

END OF PAGE 1 - CONTINUED OVER

advlegs

PRINTED ON 23/10/2017

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
23/10/2017 4:00PM

FOLIO: 16/817507 PAGE 2

Recorded	Number	Type of Instrument	C.T. Issue
16/4/2007	AD19657	LEASE	
16/4/2007	AD19658	LEASE	
16/4/2007	AD19659	LEASE	EDITION 15
16/7/2008	AD647092	WITHDRAWN - LEASE	
12/8/2008	AE9583	SURRENDER OF LEASE	
12/8/2008	AE9584	REQUEST	
12/8/2008	AD884573	LEASE	
12/8/2008	AE9585	SUB-LEASE	
12/8/2008	AE139168	LEASE	
29/9/2008	AE239764	SUB-LEASE	
29/9/2008	AE239765	SUB-LEASE	
29/9/2008	AE239766	SUB-LEASE	
29/9/2008	AE239767	SUB-LEASE	
16/10/2008	AD647091	REJECTED - LEASE	
17/10/2008	AE274870	DEPARTMENTAL DEALING	EDITION 16
21/10/2008	AD647091	RE-INSTATED - LEASE	
21/10/2008	AD647091	LEASE	EDITION 17
13/11/2008	AE320920	SUB-LEASE	
15/9/2009	AE910608	LEASE	EDITION 18
8/9/2010	AF683710	SURRENDER OF LEASE	
8/9/2010	AF683711	SURRENDER OF LEASE	
8/9/2010	AF683712	SURRENDER OF LEASE	
8/9/2010	AF683713	SURRENDER OF LEASE	
8/9/2010	AF683715	SUB-LEASE	
8/9/2010	AF683716	SUB-LEASE	
8/9/2010	AF683717	SUB-LEASE	
28/10/2010	AF831953	SUB-LEASE	
10/3/2011	AG110225	SUB-LEASE	
15/4/2011	AG163277	SUB-LEASE	
14/12/2011	AG678069	TRANSFER OF LEASE	

END OF PAGE 2 - CONTINUED OVER

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LAND AND PROPERTY INFORMATION NEW SOUTH WALES - HISTORICAL SEARCH

SEARCH DATE
23/10/2017 4:00PM

FOLIO: 16/817507 PAGE 3

Recorded	Number	Type of Instrument	C.T. Issue
5/3/2013	AH590438	LEASE	EDITION 19
18/3/2013	AH595192	SUB-LEASE	
15/8/2013	DP1188100	DEPOSITED PLAN	FOLIO CANCELLED

*** END OF SEARCH ***

advlegs PRINTED ON 23/10/2017

of payment of Registration or other fees.

43
43800

JU 11 10 1964

R. J. McKAY
Crown Solicitor
per

11-664

REAL PROPERTY ACT 1900

APPLICATION UNDER SECTION 31A OF THE REAL PROPERTY ACT 1900 IN RESPECT OF LAND AT SHORTLAND BY THE MINISTER FOR EDUCATION.

Now Crown Land

formerly part of C.T. Vol. 5052 Fol. 234 on which is endorsed Feh.r Surr. F274015 + 20th Schedule notification.

23-6-64.

The Registrar General,

SYDNEY.

The parcel of land containing 235 acres 39¾ perches or thereabouts situate in the City of Newcastle, Parish of Newcastle, County of Northumberland, more particularly described in the Schedule hereunder written was, excluding all such mines and deposits thereunder as are mentioned in Section 141 of the Public Works Act, 1912, as amended, resumed under the Public Works Act, 1912 as amended for the purpose of the University of New South Wales by Notification of Resumption (a copy of which appears hereafter) published in the Government Gazette of the 18th January 1963 and was vested in the Minister for Education as Constructing Authority on behalf of Her Majesty the Queen AND the said land not being under the provisions of the Real Property Act, 1900, the Minister for Education as Constructing Authority in pursuance of Section 31A of the Real Property Act, 1900 as amended HEREBY makes application for the issue to him of a Certificate of Title under the provisions of the lastmentioned Act in respect of the said land excluding mines and deposits.

THE SCHEDULE HEREINBEFORE REFERRED TO

ALL THAT piece or parcel of Crown land situate in the City of Newcastle Parish of Newcastle and County of Northumberland being Lots 2, 3 and 4 Deposited Plan No. 216,528 and having an area of 235 acres 39¾ perches or thereabouts.

Dated at Sydney this fourteenth day of May 1964.

THE OFFICIAL SEAL of THE MINISTER FOR EDUCATION the Constructing Authority under the Public Works Act, 1912 as amended was hereto affixed in the presence of:

E. Wetherell

Andrews J.P.

Cert. of T., issued Vol. 9812 Fol. 210
Dated 21 SEP 1964

PUBLISHED IN NEW SOUTH WALES GOVERNMENT GAZETTE No. 5

OF 18th January, 1963. Fol. 152.

AND

TECHNICAL EDUCATION/UNIVERSITY OF NEW SOUTH WALES

ACT, 1949-1958. - PUBLIC WORKS ACT, 1912, AS AMENDED.

ACQUISITION OF LAND FOR THE PURPOSE OF THE TECHNICAL EDUCATION AND UNIVERSITY OF NEW SOUTH WALES ACT, 1949-1958.

In pursuance of the provisions of Section 49 of the Technical Education and University of New South Wales Technology Act, 1949, it is hereby notified and declared by His Excellency the Governor, acting with the advice of the Executive Council, that so much of the land described in the Schedule hereto as is Crown land is hereby appropriated, and so much of the said land as is private property is hereby resumed under the Public Works Act, 1912, as amended, for the purpose of the University of New South Wales, and that the said land is vested in the Minister for Education as Constructing Authority on behalf of Her Majesty the Queen.

Dated at Sydney, this Ninth day of January One thousand nine hundred and sixty three.

K.W. STREET.

By deputation from His Excellency the Governor.

By His Excellency's Command,

Ernest Wetherell, Minister for Education.

THE SCHEDULE

ALL THAT piece or parcel of Crown land situate in the City of Newcastle Parish of Newcastle and County of Northumberland being lots 2, 3 and 4 deposited plan 216,528 and having an area of 235 acres 39¾ perches or thereabouts.

~~The value of the land in the Application at the date of Resumption was £~~

6 5/73.20 JWK

University of Adel 61/U107/12037

State Crown Sol

State Crown Solicitor

[illegible]

Plan signed 10.6.64

LAND AND PROPERTY INFORMATION NEW SOUTH WALES - TITLE SEARCH

FOLIO: 1/1188100

SEARCH DATE	TIME	EDITION NO	DATE
23/10/2017	8:38 AM	8	23/5/2017

LAND

LOT 1 IN DEPOSITED PLAN 1188100
AT CALLAGHAN & SHORTLAND
LOCAL GOVERNMENT AREA NEWCASTLE
PARISH OF NEWCASTLE COUNTY OF NORTHUMBERLAND
TITLE DIAGRAM DP1188100

FIRST SCHEDULE

THE UNIVERSITY OF NEWCASTLE

SECOND SCHEDULE (62 NOTIFICATIONS)

1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S) WITHIN THE PART(S) SHOWN SO INDICATED IN THE TITLE DIAGRAM
2 LAND EXCLUDES MINERALS (S.141 PUBLIC WORKS ACT, 1912) WITHIN THE PART(S) SHOWN SO INDICATED IN THE TITLE DIAGRAM
3 BK 1210 NO 936 LAND EXCLUDES MINERALS WITHIN THE PART(S) SHOWN SO INDICATED IN THE TITLE DIAGRAM
4 BK 1210 NO 935 LAND EXCLUDES MINERALS WITHIN THE PART(S) SHOWN SO INDICATED IN THE TITLE DIAGRAM
5 F702707 SUBJECT TO THE PROVISIONS OF CLAUSE 29 OF THE BROKEN HILL PROPRIETARY COMPANY LIMITED (RECLAMATION AND EXCHANGE) AGREEMENT RATIFICATION ACT, 1950 OF THE PART(S) FORMERLY IN 101/881682
6 E109153 COVENANT AFFECTING THE PART SHOWN SO BURDENED IN THE TITLE DIAGRAM.
7 M110023 COVENANT AFFECTING THE PART SHOWN SO BURDENED IN THE TITLE DIAGRAM.
8 Z207914 COVENANT AFFECTING THE PART SHOWN SO BURDENED IN THE TITLE DIAGRAM.
9 T435370 EASEMENT FOR WATER MAIN 10.06 METRE(S) WIDE AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
10 E544247 EASEMENT FOR PIPELINE 5 METRE(S) WIDE AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
11 DP637869 RIGHT OF CARRIAGEWAY 15 & 25 METRE(S) WIDE AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
12 DP637869 RIGHT OF CARRIAGEWAY 15.24 METRE(S) WIDE & VARIABLE WIDTH AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
13 DP637869 RIGHT OF CARRIAGEWAY APPURTENANT TO THE PART(S) OF

END OF PAGE 1 - CONTINUED OVER

FOLIO: 1/1188100 PAGE 2

SECOND SCHEDULE (62 NOTIFICATIONS) (CONTINUED)

		THE LAND SHOWN SO BENEFITED IN THE TITLE DIAGRAM
14	DP637869	RIGHT OF CARRIAGEWAY 15 & 25 METRE(S) WIDE APPURTENANT TO THE PART(S) OF THE LAND SHOWN SO BENEFITED IN THE TITLE DIAGRAM
15	DP772130	RIGHT OF WAY 5.5 METRE(S) WIDE AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
16	DP772130	RIGHT OF WAY 6 METRE(S) WIDE AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
17	DP772130	RIGHT OF WAY 9 METRE(S) WIDE AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
18	DP817507	RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES 17 METRE(S) WIDE & VARIABLE WIDTH AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
19	DP817507	RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES 17 METRE(S) WIDE REFERRED TO AND NUMBERED (1) IN THE S.88B INSTRUMENT APPURTENANT TO THE PART(S) OF THE LAND SHOWN SO BENEFITED IN THE TITLE DIAGRAM
20	DP817507	RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES 17 METRE(S) WIDE & VARIABLE WIDTH APPURTENANT TO THE PART(S) OF THE LAND SHOWN SO BENEFITED IN THE TITLE DIAGRAM
21	DP817507	RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES VARIABLE WIDTH REFERRED TO AND NUMBERED (4) IN THE S.88B INSTRUMENT APPURTENANT TO THE PART(S) OF THE LAND SHOWN SO BENEFITED IN THE TITLE DIAGRAM
22	DP817507	RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES 16.8 & 18 METRE(S) WIDE APPURTENANT TO THE PART(S) OF THE LAND SHOWN SO BENEFITED IN THE TITLE DIAGRAM
23	DP817507	RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES 18 METRE(S) WIDE APPURTENANT TO THE PART(S) OF THE LAND SHOWN SO BENEFITED IN THE TITLE DIAGRAM
24	DP817507	RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES 20 METRE(S) WIDE REFERRED TO AND NUMBERED (7) IN THE S.88B INSTRUMENT APPURTENANT TO THE PART(S) OF THE LAND SHOWN SO BENEFITED IN THE TITLE DIAGRAM
25	DP817507	RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES 16.46 METRE(S) WIDE & VARIABLE WIDTH APPURTENANT TO THE PART(S) OF THE LAND SHOWN SO BENEFITED IN THE TITLE DIAGRAM
26	DP817507	RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES VARIABLE WIDTH REFERRED TO AND NUMBERED (9) IN THE S.88B INSTRUMENT APPURTENANT TO THE PART(S) OF THE LAND SHOWN SO BENEFITED IN THE TITLE DIAGRAM
27	DP817507	RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES 17 METRE(S) WIDE REFERRED TO AND NUMBERED (13) IN THE S.88B INSTRUMENT APPURTENANT TO THE PART(S) OF THE

END OF PAGE 2 - CONTINUED OVER

FOLIO: 1/1188100 PAGE 3

SECOND SCHEDULE (62 NOTIFICATIONS) (CONTINUED)

		LAND SHOWN SO BENEFITED IN THE TITLE DIAGRAM
28	DP817507	RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES 20 METRE(S) WIDE REFERRED TO AND NUMBERED (14) IN THE S.88B INSTRUMENT APPURTENANT TO THE PART(S) OF THE LAND SHOWN SO BENEFITED IN THE TITLE DIAGRAM
29	DP817507	RIGHT OF CARRIAGEWAY & EASEMENT FOR SERVICES 17 METRE(S) WIDE REFERRED TO AND NUMBERED (16) IN THE S.88B INSTRUMENT APPURTENANT TO THE PART(S) OF THE LAND SHOWN SO BENEFITED IN THE TITLE DIAGRAM
30	DP881682	RIGHT OF CARRIAGEWAY 8 METRE(S) WIDE AND VARIABLE WIDTH AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
31	U128489	EASEMENT FOR ROCK ANCHORS AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
32	DP881682	RIGHT OF CARRIAGEWAY 8 METRE(S) WIDE AND VARIABLE WIDTH APPURTENANT TO THE PART(S) OF THE LAND SHOWN SO BENEFITED IN THE TITLE DIAGRAM
33	DP881682	EASEMENT FOR PARKING VARIABLE WIDTH (B) AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
34	DP265379	EASEMENT FOR GAS PIPELINE 3 METRE(S) WIDE AND VARIABLE WIDTH AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
35	DP881682	EASEMENT FOR PARKING VARIABLE WIDTH APPURTENANT TO THE PART(S) OF THE LAND SHOWN SO BENEFITED IN THE TITLE DIAGRAM
36	DP265379	EASEMENT FOR UNDERGROUND ELECTRICITY CABLES 3 METRE(S) WIDE AND VARIABLE WIDTH AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
37	DP881682	EASEMENT FOR PARKING VARIABLE WIDTH (C) AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
38	O291562	EASEMENT FOR TRANSMISSION LINE AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
39	DP881682	EASEMENT FOR DRAINAGE OF WATER OVER EXISTING LINE OF PIPES AND PIT AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
40	DP881682	EASEMENT FOR DRAINAGE OF WATER OVER EXISTING LINE OF PIPES APPURTENANT TO THE PART(S) OF THE LAND SHOWN SO BENEFITED IN THE TITLE DIAGRAM
41	DP881682	EASEMENT FOR ELECTRICITY PURPOSES 3 METRE(S) WIDE AND VARIABLE WIDTH AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
42	DP881682	EASEMENT FOR ELECTRICITY SUBSTATION 3.5 METRE(S) WIDE AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
43	AD19658	LEASE TO JIREH INTERNATIONAL PTY LIMITED OF SHOP 2, LEVEL 2, SHORTLAND UNION BUILDING, UNIVERSITY OF

END OF PAGE 3 - CONTINUED OVER

FOLIO: 1/1188100 PAGE 4

SECOND SCHEDULE (62 NOTIFICATIONS) (CONTINUED)

NEWCASTLE, UNIVERSITY DRIVE, CALLAGHAN. EXPIRES: 26/5/2012. OPTION OF RENEWAL: 5 YEARS.

44 AF683715 LEASE TO UNIFOOD GROUP PTY LTD (SEE AG678069) OF PREMISES KNOWN AS RAFTERS, LEVEL 2, SHORTLAND BUILDING, UNIVERSITY OF NEWCASTLE, CALLAGHAN. EXPIRES: 31/12/2014. OPTION OF RENEWAL: 5 YEARS WITH A FURTHER 5 YEARS AND A FURTHER 2 YEARS 3 MONTHS AND 1 DAY.

45 AF683716 LEASE TO UNIFOOD GROUP PTY LTD (SEE AG678069) OF PREMISES KNOWN AS MCLARTY DINING, LEVEL 2, SHORTLAND BUILDING, UNIVERSITY OF NEWCASTLE, CALLAGHAN. EXPIRES: 31/12/2014. OPTION OF RENEWAL: 5 YEARS WITH A FURTHER 5 YEARS AND A FURTHER 2 YEARS 3 MONTHS AND 1 DAY.

46 AF683717 LEASE TO UNIFOOD GROUP PTY LTD (SEE AG678069) OF PREMISES KNOWN AS HUB CAFE, LEVEL 3, SHORTLAND BUILDING, UNIVERSITY OF NEWCASTLE, CALLAGHAN. EXPIRES: 31/12/2014. OPTION OF RENEWAL: 5 YEARS WITH A FURTHER 5 YEARS AND A FURTHER 2 YEARS 3 MONTHS AND 1 DAY.

47 AF831953 LEASE TO FRESH FOOD EXPRESS PTY LIMITED OF SHOP 1, LEVEL ONE ,SHORTLAND BUILDING , UNIVERSITY OF NEWCASTLE, CALLAGHAN. EXPIRES: 31/7/2014. OPTION OF RENEWAL: 4 YEARS.

48 AG110225 LEASE TO S & L EDWARDS INVESTMENTS PTY LTD OF SHOPS 205, 209, 210, 211, 212, 213 LEVEL 2, SHORTLAND BUILDING - UNIVERSITY OF NEWCASTLE, CALLAGHAN. EXPIRES: 30/1/2016. OPTION OF RENEWAL: 5 YEARS.

49 AG163277 LEASE TO FUJI XEROX AUSTRALIA PTY LIMITED OF SHOPS 201, 203 & 204, LEVEL 2, SHORTLAND BUILDING, CALLAGHAN. EXPIRES: 31/1/2016. OPTION OF RENEWAL: 5 YEARS.

50 AH595192 LEASE TO GAVIN LEIGH SMITH & STUART JAMES SHORTLAND OF SHOP 110B, LEVEL 1, SHORTLAND BUILDING, THE UNIVERSITY OF NEWCASTLE, UNIVERSITY DRIVE, CALLAGHAN. EXPIRES: 30/6/2018. OPTION OF RENEWAL: 5 YEARS.

AK933756 TRANSFER OF LEASE AH595192 LESSEE NOW SHORTLAND MEDICAL CENTRE PTY LIMITED

51 AJ682912 LEASE TO TELSTRA CORPORATION LIMITED OF THE PART SHOWN HATCHED IN PLAN WITH AJ682912. EXPIRES: 31/3/2019.

52 AJ682913 LEASE TO TELSTRA CORPORATION LIMITED OF THE PART SHOWN HATCHED IN PLAN WITH AJ682913. COMMENCES: 1/4/2019. EXPIRES: 31/3/2024.

53 AJ682914 LEASE TO TELSTRA CORPORATION LIMITED OF THE PART SHOWN HATCHED IN PLAN WITH AJ682914. COMMENCES: 1/4/2024. EXPIRES: 31/3/2029.

54 AJ682915 LEASE TO TELSTRA CORPORATION LIMITED OF THE PART SHOWN HATCHED IN PLAN WITH AJ682915. COMMENCES:

END OF PAGE 4 - CONTINUED OVER

FOLIO: 1/1188100 PAGE 5

SECOND SCHEDULE (62 NOTIFICATIONS) (CONTINUED)

1/4/2029. EXPIRES: 31/3/2034.

55 AK760967 LEASE TO HELIOS FOOD PTY LIMITED OF THE AREA KNOWN AS ROOMS 236, 236A, 238, 238A, 239, 240, 241, 242, 243, 243A, 244, 245, 246, 247, 248, 249, 250, 253, 254 AND 265 ON LEVEL 2, SHORTLAND BUILDING, UNIVERSITY OF NEWCASTLE, CALLAGHAN. EXPIRES: 31/12/2019. OPTION OF RENEWAL: 5 YEARS AND A FURTHER OPTION OF 2 YEARS, 3 MONTHS AND 1 DAY.

56 AK760968 LEASE TO HELIOS FOOD PTY LIMITED OF THE AREA KNOWN AS ROOMS 231 AND 237 ON LEVEL 2, SHORTLAND BUILDING, UNIVERSITY OF NEWCASTLE, CALLAGHAN. EXPIRES: 31/12/2019. OPTION OF RENEWAL: 5 YEARS AND A FURTHER OPTION OF 2 YEARS 3 MONTHS AND 1 DAY.

57 AK760969 LEASE TO HELIOS FOOD PTY LIMITED OF THE AREA KNOWN AS ROOMS 304, 305 AND 306 ON LEVEL 3, SHORTLAND BUILDING, UNIVERSITY OF NEWCASTLE, CALLAGHAN. EXPIRES: 31/12/2019. OPTION OF RENEWAL: 5 YEARS AND A FURTHER OPTION OF 2 YEARS 3 MONTHS AND 1 DAY.

58 AK933757 LEASE TO UNIVERSITY CO-OPERATIVE BOOKSHOP LIMITED OF ROOMS 130, 132, 132A, 132B AND 133, LEVEL 1, SHORTLAND UNION BUILDING, UNIVERSITY DRIVE, CALLAGHAN. EXPIRES: 2/10/2020.

59 AM25754 LEASE TO FRESH FOOD EXPRESS PTY LIMITED OF SHOP 1, LEVEL 1, BUILDING KNOWN AS SHORTLAND BUILDING, UNIVERSITY OF NEWCASTLE, CALLAGHAN. EXPIRES: 31/7/2018.

60 AM25755 LEASE TO RESTECH PTY LTD OF ROOMS 105, 109, 111 AND 112, BUILDING EB, UNIVERSITY OF NEWCASTLE, CALLAGHAN. EXPIRES: 13/8/2018. OPTION OF RENEWAL: 2 YEARS.

61 AM362500 LEASE TO FUJI XEROX AUSTRALIA PTY LIMITED OF ROOMS 204, 205 & 205A, LEVEL 2, SHORTLAND UNION BLDG, UNIVERSITY DR, CALLAGHAN. EXPIRES: 31/1/2021.

62 AM362501 LEASE TO NEWCASTLE PERMANENT BUILDING SOCIETY LIMITED OF ROOMS 221, 221A, 221B, 221C, 221D, 221E & 221F, LEVEL 2, SHORTLAND BUILDING, UNIVERSITY DR, CALLAGHAN. EXPIRES: 31/10/2018.

NOTATIONS

DP648897 NOTE: DP648897 PROPOSED EASEMENT PLAN

UNREGISTERED DEALINGS: DP1233389.

*** END OF SEARCH ***

advlegs PRINTED ON 23/10/2017

University of Newcastle Proposed Bio-Resources Facility

APPENDIX F

SECTION 149 CERTIFICATE

PLANNING CERTIFICATE

Section 149, Environmental Planning and Assessment Act 1979

To: Lotsearch Pty Ltd
Level 3, 68 Alfred Street
MILSONS POINT NSW 2061

Certificate No: PL2017/05204
Fees: $133.00
Receipt No(s): D000662739

Your Reference: LS002009

Date of Issue: 24/10/2017

The Land: Lot 1 DP 1188100
8 University Drive Callaghan NSW 2308

Advice provided on this Certificate:

Advice under section 149(2): see items 1 – 20
Additional advice under section 149 (5): see Items 21 – 29

IMPORTANT: Please read this certificate carefully

This certificate contains important information about the land.

Please check for any item which could be inconsistent with the proposed use or development of the land. If there is anything you do not understand, phone Council's **Customer Enquiry Centre** on (02) 4974 2000, or come in and see us.

The information provided in this certificate relates only to the land described above. If you need information about adjoining or nearby land, or about the Council's development policies for the general area, contact Council's **Customer Enquiry Centre**.

All information provided is correct as at 24/10/2017. However, it's possible for changes to occur within a short time. We recommend that you only rely upon a very recent certificate.

Newcastle City Council

PO Box 489
NEWCASTLE 2300

Phone: (02) 4974 2000
Facsimile: (02) 4974 2222

Customer Enquiry Centre
Ground floor,
282 King Street
Newcastle NSW 2300

Office hours:
Mondays to Fridays 8.30 am to 5.00 pm

PART 1:

ADVICE PROVIDED UNDER SECTION 149(2)

ATTENTION: The explanatory notes appearing in italic print within Part 1 are provided to assist understanding, but do not form part of the advice provided under section 149(2). These notes shall be taken as being advice provided under section 149(5).

1. Names of relevant planning instruments and DCPs

The following environmental planning instruments, proposed environmental planning instruments and development control plans apply to the land, either in full or in part.

State Environmental Planning Policy No. 44 - Koala Habitat Protection

State Environmental Planning Policy No. 50 - Canal Estate Development

State Environmental Planning Policy No. 55 - Remediation of Land

State Environmental Planning Policy No. 62 - Sustainable Aquaculture

State Environmental Planning Policy No. 64 - Advertising and Signage

State Environmental Planning Policy (Housing For Seniors or People with a Disability) 2004

State Environmental Planning Policy (State Significant Precincts) 2005

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

State Environmental Planning Policy (Temporary Structures) 2007

State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Exempt and Complying Development Codes) 2008

State Environmental Planning Policy (State and Regional Development) 2011

Newcastle Local Environmental Plan 2012

Newcastle Development Control Plan 2012

2. Zoning and land use under relevant LEPs

Newcastle Local Environmental Plan 2012

Zoning: The Newcastle Local Environmental Plan 2012 identifies the land as being within the following zone(s):

Zone SP2 Infrastructure -Educational Establishment

Note: Refer to www.newcastle.nsw.gov.au or www.legislation.nsw.gov.au web site for LEP instrument and zoning maps.

The following is an extract from the zoning provisions contained in Newcastle Local Environmental Plan 2012:

Zone SP2 Infrastructure

- **Objectives of zone**
    - To provide for infrastructure and related uses.
    - To prevent development that is not compatible with or that may detract from the provision of infrastructure.
- **Permitted without consent**

    Roads

- **Permitted with consent**

  The purpose shown on the Land Zoning Map, including any development that is ordinarily incidental or ancillary to development for that purpose

- **Prohibited**

  Any development not specified in, permitted without consent or permitted with consent

Minimum land dimensions for erection of a dwelling-house: The Newcastle Local Environmental Plan 2012 contains development standards relating to minimum land dimensions for the erection of a dwelling house. Refer to clause 4.1 Minimum subdivision lot size and Part 4 Principle development standards of the Newcastle LEP 2012 for provisions relating to minimum lot sizes for residential development.

Critical habitat: The Newcastle Local Environmental Plan 2012 does not identify the land as including or comprising critical habitat.

Heritage conservation area: The land is not within a heritage conservation area under the Newcastle Local Environmental Plan 2012.

Heritage items: There are no heritage items listed in the Newcastle Local Environmental Plan 2012 situated on the land.

3. Complying development

Note Other requirements: *The advice below for all Complying Development Codes, is limited to identifying whether or not the* ***land****, the subject of the certificate, is land on which complying development may be carried out because of Clauses 1.17A(1)(c) to (e), (2), (3) & (4), 1.18 (1)(c3) and 1.19 of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 (the Codes SEPP).*

General Housing Code

Complying development under the General Housing Code MAY be carried out on this land.

Rural Housing Code

Complying development under the Rural Housing Code MAY be carried out on this land.

Housing Alterations Code

Complying development under the Housing Alterations Code MAY be carried out on this land.

General Development Code

Complying development under the General Development Code MAY be carried out on this land.

Commercial and Industrial Alterations Code

Complying development under the Commercial and Industrial Alterations Code MAY be carried out on this land.

Commercial and Industrial (New Buildings and Additions) Code

Complying development under the Commercial and Industrial (New Buildings and Additions) Code MAY be carried out on this land.

Subdivision Code

Complying development under the Subdivision Code MAY be carried out on this land.

Demolition Code

Complying development under the Demolition Code MAY be carried out on this land.

Fire Safety Code

Complying development under the Fire Safety Code MAY be carried out on this land.

4. Coastal Protection Act 1979

The land IS NOT AFFECTED by the operation of sections 38 or 39 of the Coastal Protection Act 1979.

4A. Certain information relating to beaches and coasts

The land IS NOT AFFECTED by an order under Part 4D of the Coastal Protection Act 1979 in relation to temporary coastal protection works (within the meaning of that Act) on the land (or on public land adjacent to that land), except where the council is satisfied that such an order has been fully complied with.

The Council HAS NOT been notified under section 55X of the Coastal Protection Act 1979 that temporary coastal protection works (within the meaning of that Act) have been placed on the land (or on public land adjacent to that land).

4B. Annual charges under Local Government Act 1993 for coastal protection services that relate to existing coastal protection works

The land IS NOT subject to an agreement for annual charges under section 496B of the Local Government Act 1993 for coastal protection services (within the meaning of section 553B of that Act).

5. Mine Subsidence Compensation Act 1961

The land IS NOT within a proclaimed Mine Subsidence District under the Mine Subsidence Compensation Act 1961.

NOTE: The above advice is provided to the extent that Council has been notified by the Mine Subsidence Board. For up-to-date details, contact the Mine Subsidence Board, 117 Bull Street, Newcastle West. Ph (02) 49084300.

6. Road widening or realignment

NOTE: The Roads and Maritime Services (RMS) may have proposals that are not referred to in this item. For advice about affectation by RMS proposals, contact the Roads and Maritime Services, Locked Mail Bag 30 Newcastle 2300. Ph: 131 782.

The land IS NOT AFFECTED by any road widening or road realignment under Division 2 of Part 3 of the Roads Act 1993.

The land IS NOT AFFECTED by any road widening or road realignment under an environmental planning instrument.

The land IS NOT AFFECTED by road widening or road realignment under a resolution of the Council.

7. Policies on hazard risk restrictions

Except as stated below, the land is not affected by a policy referred to in Item 7 of Schedule 4 of the Environmental Planning and Assessment Regulation 2000 that restricts the development of the land because of the likelihood of land slip, bushfire, tidal inundation, subsidence, acid sulphate soils or any other risk (other than flooding).

Potential acid sulfate soils: Works carried out on the land must be undertaken in accordance with Clause 6.1 Acid sulfate soils of the Newcastle Local Environmental Plan 2012.

Land Contamination: Council has land contamination information/records in relation to this property. Council has adopted a policy of restricting development or imposing conditions on properties affected by land contamination. Refer to Section 5.02 Land Contamination of Newcastle Development Control Plan 2012, which may be inspected or purchased at Council's Customer Enquiry Centre.

Bush fire: Under clause 5.11 Bush fire hazard reduction of the Newcastle LEP 2012, bush fire hazard reduction work authorised by the Rural Fires Act 1997 may be carried out on any land without development consent.
NOTE: The Rural Fires Act 1997 also makes provision relating to the carrying out of development on bush fire prone land.

NOTE: The absence of a policy to restrict development of the land because of the likelihood of a particular risk does not imply that the land is free from that risk. The Council considers the likelihood of natural and man-made risks when determining development applications under section 79C of the Environmental Planning and Assessment Act 1979. Detailed investigation carried out in conjunction with the preparation or assessment of a development application may result in the Council either refusing development consent or imposing conditions of consent on the basis of risks that are not identified above.

7A. Flood related development controls information

Council's information currently indicates that the property is, or contains, flood prone land as defined in the Floodplain Development Manual: the management of flood liable land, April 2005 published by the NSW Government.

Development of flood prone land is controlled by Section 4.01 Flood Management of Newcastle DCP 2012. The Newcastle DCP 2012 provides restrictions or imposes conditions with respect to all development of flood prone land. This includes development for the purpose of dwelling houses, dual occupancies, multi dwelling housing or residential flat buildings.

NOTE: More detailed flood information specific to the property is available on separate flooding certificate application through Council's Customer Contact Centre on (02) 4974 2000

8. Land reserved for acquisition

The land is not identified for acquisition by a public authority (as referred to in section 27 of the Act) by any environmental planning instrument or proposed environmental planning instrument applying to the land.

9. Contributions plans

The following contribution plan/s apply to the land.

Section 94A Development Contributions Plan 2009 - August 2017:

The Plan specifies section 94A contributions that may be imposed as a condition of development consent.

NOTE: Contributions plans are available on Council's website or may be inspected or purchased at Council's Customer Enquiry Centre.

9A. Biodiversity certified land

The land IS NOT biodiversity certified land within the meaning of Part 7AA of the Threatened Species Conservation Act 1995.

10. Biobanking agreements

The land IS NOT land to which a biobanking agreement under Part 7A of the Threatened Species Conservation Act 1995 relates.

11. Bush fire prone land

The land, either in whole or in part IS bush fire prone land for the purposes of the Environmental Planning and Assessment Act 1979.

12. Property vegetation plans

Not applicable. The Native Vegetation Act 2003 does not apply to the Newcastle local government area.

13. Orders under Trees (Disputes Between Neighbours) Act 2006

Council HAS NOT been notified that an order has been made under the Trees (Disputes between Neighbours) Act 2006 to carry out work in relation to a tree on the land.

14. Directions under Part 3A

The land IS NOT AFFECTED by a direction by the Minister in force under section 75P (2) (c1) of the Act.

15. Site compatibility certificates and conditions for seniors housing

(a) The land IS NOT AFFECTED by a current site compatibility certificate (of which the Council is aware) issued under the State Environmental Planning Policy (Housing for Seniors and People with a Disability) 2004.

(b) The land IS NOT AFFECTED by any terms of kind referred to in clause 18(2) of the State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004, that have been imposed as a condition of consent to a development application granted after 11 October, 2007 in respect of the land.

16. Site compatibility certificates for infrastructure

The land IS NOT AFFECTED by a valid site compatibility certificate (of which the Council is aware) issued under the State Environmental Planning Policy (Infrastructure) 2007.

17. Site compatibility certificates and conditions for affordable rental housing

The land IS NOT AFFECTED by a valid site compatibility certificate (of which the Council is aware) issued under the State Environmental Planning Policy (Affordable Rental Housing) 2009.

18. Paper subdivision information

The land IS NOT AFFECTED by any development plan that applies to the land or that is proposed to be subject to a consent ballot.

19. Site verification certificates

The land IS NOT AFFECTED by a current site verification certificate (of which the Council is aware) issued under the State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007.

20. Loose-fill asbestos insulation

The Council HAS NOT been notified that the land includes any residential premises (within the meaning of Division 1A of Part 8 of the Home Building Act 1989) that are listed on the register of loose-fill asbestos insulation, that is required to be maintained under that Division.

Note: The following matters are prescribed by section 59(2) of the Contaminated Land Management Act 1997.

The land to which the certificate relates is the subject of the following site audit statement(s) within the meaning of the Contaminated Land Management Act 1997.

1. Site Audit Statement No. GN467 (30/7/2013) Produced by Environ Australia Pty Ltd.

You can contact Council's Compliance Services Unit on (02) 49742525 to obtain further information. NOTE: Contamination information that relates to the land that is not required to be disclosed under section 59(2) Contaminated Land Management Act 1997, may be provided under a section 149(5) certificate.

PART 2:

ADVICE PROVIDED UNDER SECTION 149(5)

ATTENTION: Section 149(6) of the Act states that a Council shall not incur any liability in respect of advice provided in good faith pursuant to sub-section 149(5).

21. Outstanding Notices and Orders issued by Council.

Council records indicate that this premise IS NOT AFFECTED by a current notice or order (excluding the notices or orders mentioned in the note below).

NOTE: The Council has not inspected the premises immediately prior to the issue of this certificate. It is possible that the premises are affected by matters of which the Council is unaware.

NOTE: This Certificate does not include any advice regarding outstanding notices or orders issued under the Environmental Planning and Assessment Act 1979 or the Local Government Act 1993. To obtain advice regarding these matters, you should lodge an application for a Certificate as to Outstanding Notices and Orders (accompanied by the appropriate fee). For further information, please contact the Customer Enquiry Centre on (02) 4974 2000.

22. Further consent requirements under the Newcastle Local Environmental Plan 2012.

The following provisions of the Newcastle Local Environmental Plan 2012 affect the carrying out of development on the land. These provisions are in addition to those required to be disclosed at Item 2 of this Certificate.

Refer to clause 3.1 Exempt Development of the Newcastle Local Environmental Plan 2012

Refer to clause 3.2 Complying Development of the Newcastle Local Environmental Plan 2012

Note: The Newcastle Local Environmental 2012 may have additional provisions that affect the carry out of development. Refer to the Newcastle Local Environmental 2012 for the full affect it may have on the land or obtain profession advice for more information.

23. Suspension of covenants.

Refer to 1.9A Suspension of covenants, agreements and instruments of the Newcastle Local Environmental Plan 2012.

24. Draft development control plans.

The following draft development control plans APPLY to the land. The draft plans are exhibited pursuant to Part 3 of the Environmental Planning and Assessment Regulation 2000.

Draft Newcastle Development Control Plan 2012 - Section 4.04 Safety & Security

Draft Newcastle Development Control Plan 2012 - Section 5.03 Tree Management

Draft Newcastle Development Control Plan 2012 - Section 9.00 Glossary

25. Heritage Act 1977.

The land IS NOT AFFECTED by a listing on the State Heritage Register or an Interim Heritage Order that is in force under the Heritage Act 1977.

NOTE: The above advice is provided to the extent that Council has been notified by the Heritage Council of NSW. For up-to-date details, contact the Office of Environment and Heritage, PO Box A290, South Sydney NSW 1232 Ph: (02) 9995 5000.

26. Listing by National Trust of Australia.

The land IS NOT AFFECTED by a listing of the National Trust of Australia (NSW).

NOTE: The above advice is provided to the extent that Council has been notified by the National Trust of Australia (NSW). For up-to-date details, contact the National Trust Ph 02 9258 0123.

27. Australian Heritage Database.

The land IS NOT AFFECTED by a listing on the Australian Heritage Database.

NOTE: The above advice is provided to the extent that Council has been notified by the Department of the Environment. For up-to-date details, contact the Department of the Environment, Heritage, King Edward Terrace, Parkes ACT 2600. Ph (02) 6274 1111.

28. Environment Protection & Biodiversity Conservation Act 1999 (Cth)

Under the (Commonwealth) Environment Protection and Biodiversity Conservation Act 1999, actions which have, may have or are likely to have, a significant impact on a matter of national environmental significance may be taken only with the approval of the Commonwealth Minister for the Environment.

Approval is also required for actions that have a significant effect on the environment of Commonwealth land. These actions may be on Commonwealth land or other land.

This approval is in addition to any approvals under the (NSW) Environmental Planning and Assessment Act 1979 or other NSW legislation.

Matters of national environmental significance are:

- declared World Heritage areas
- declared Ramsar wetlands
- listed threatened species and ecological communities
- listed migratory species
- nuclear actions
- the environment of Commonwealth marine areas.

Locations within the City of Newcastle that are a declared Ramsar wetland include Kooragang Nature Reserve and Shortland Wetlands. Listed threatened species and listed migratory species are known to occur within the City of Newcastle.

29. Other matters

The land is affected by the following:

Newcastle earthquake

Earthquakes occurred in the vicinity of Newcastle on 28th December 1989 and 6 August 1994. Buildings on the land may have suffered damage as a consequence of the earthquakes. Prospective purchasers are advised to make their own enquiries as to whether the property is affected by any damage.

Local Planning Strategy

The Local Planning Strategy is the principal land use strategy for Newcastle. It was adopted by the Council on 28 July 2015. The Strategy is taken into account when the Council assesses development applications and amendments to the Newcastle Local Environmental Plan 2012.

Note: Refer to Council's website to view the document. www.newcastle.nsw.gov.au

Lower Hunter Regional Strategy (2006 - 2031)

The Lower Hunter Regional Strategy has been prepared by the Department of Planning and Infrastructure. The contents of the strategy will be taken into account when Council assesses development applications and amendments to the Newcastle Local Environmental Plan 2012.

Note: Refer to Council's website to view the document. www.newcastle.nsw.gov.au

Newcastle City-Wide Floodplain Risk Management Study and Plan (2012)

The Newcastle City-wide Floodplain Risk Management Study and Plan addresses flood management for the City of Newcastle. The Study and Plan will be taken into account when Council assesses development applications and amendments to the Newcastle Local Environmental Plan 2012.

Note: Refer to Council's website to view the document. www.newcastle.nsw.gov.au

Stormwater drain

The Council's records indicate that a stormwater drain passes through the land. A registered easement to drain water has not been created for this drain.

Contaminated land information

Council records indicate that this land has been identified as being affected by soil or groundwater contamination. Recommendations have been made regarding restrictions or special conditions over the use or development of the land. Council is in possession of the following management plan(s) which apply to the land:

1. Report: Douglas Partners Pty Ltd (December 2011) Interim Environmental Management Plan - Soil and Water Management NIER Site, prepared for The University of Management - Project 49538.02.
2. Report: Douglas Partners Pty Ltd (June 2014) Long Term Environmental management Plan

Council is in possession of the following contaminated land document(s) which relate to the land. Persons relying on the certificate are advised to examine and consider the contents of each document:

1. Report: Robert Carr & Associates Pty Ltd (November 2004) Environmental Assessment Proposed Demolition Area C & D Blocks Newcastle Technology Centre Off Vale St Shortland Prepared for BHP Billiton RCA Ref: 4403-002/0.
2. Report: Robert Carr & Associates Pty Ltd (December 2004) Phase 2 Environmental Site Assessment Proposed Demolition Area Newcastle Technology Centre Off Vale St Shortland Prepared for Kate Noble on behalf of BHP Billiton RCA Ref: 4549-002/0.
3. Report: RCA Australia Pty Ltd (March 2005) Contamination Delineation and Groundwater Investigation Proposed Demolition Area Newcastle Technology Centre Off Vale St Shortland RCA Ref: 4549-003/1
4. Report: RCA Australia Pty Ltd (May 2005) Remedial Action Plan Proposed Demolition Area Newcastle Technology Centre Off Vale St Shortland RCA Ref: 4549-005/1
5. Letter: RCA Australia Pty Ltd (30 May 2005) Notice of Category 2 Site Remediation Proposed Demolition Area, Newcastle Technology Centre Off Vale Street, Shortland.
6. Report: Robert Carr & Associates Pty Ltd (November 2005) Site Remediation and Validation Demolition Area Newcastle Technology Centre. RCA Ref: 4911-002/1.
7. Report: Douglas Partners Pty Ltd (May 2011) Baseline Soil and Groundwater Testing
8. Report: RCA Australia (May 2013) Detailed Site Investigation
9. Site Audit Report No. GN 467 (July 2013) Produced by Environ Australia Pty Ltd.

Council records indicate the following potentially contaminating landuse(s) may have been carried out on the land:

1. waste storage activities

Persons relying on the certificate are advised to make their own investigations as to whether the land is affected by elevated concentrations of soil or groundwater contaminants in relation to proposed purchase or use of land.

Issued without alterations or additions, 24/10/17
Authorised by
JEREMY BATH
INTERIM CHIEF EXECUTIVE OFFICER

University of Newcastle Proposed Bio-Resources Facility

APPENDIX G

QA/QC REPORT

Cardno Geotech Solutions
Shaping the Future

Cardno (NSW/ACT) Pty Ltd
ABN 95 001 145 035

Unit 1
10 Denney Street
Broadmeadow 2292
Australia

Phone **+61 2 4965 4555**
Fax +61 2 4965 4666

File Reference: 82218015 QAQC Report

Date: 17 October 2017

University of Newcastle
University Drive
Callaghan, NSW, 2308

QA/QC Report
Preliminary Site Investigation
Bio-Resource Facility, University of Newcastle

This Quality Assurance and Quality Control (QA/QC) report assesses the reliability of field procedures adopted and the analytical results produced as part of the Preliminary Site Investigation for the proposed redevelopment of the Bio-Resource Facility at the University of Newcastle, NSW ('the site'). The following data quality indicators have been adopted with reference to the National Environment Protection Council, National Environment Protection (Assessment of Site Contamination) Measure, 1999 (amended, April 2013) (NEPM, 2013):

> Precision – The quantitative measure of variability of reproducibility of the data. Is a measure of the reproducibility of on measurements under a given set of conditions the Relative Percent Difference ('RPD') has been adopted to assess the precision of data between duplicate sample pairs;

> Accuracy – The quantitative measure of the closeness of the reported data to the true value. It is a measure of the bias in the analytical results and can often be attributed to: field contamination; insufficient preservation or sample preparation; or inappropriate analytical techniques. Accuracy of the analytical data is assessed by consideration of laboratory control samples, laboratory spikes and analytical techniques in accordance with appropriate standards. Accuracy of the fieldwork is assessed against an assessment of field blank, field trip and rinsate results;

> Representativeness – The confidence that the data is representative of each medium present on the site. Data representativeness is achieved by the collection of samples at an appropriate pattern and density as well as consistent and repeatable sampling techniques and procedures;

> Completeness – A measure of the amount of usable data (expressed as a %) from a data collection activity. Sufficient data is required to enable an assessment of the Decision Rules; and,

> Comparability – The confidence that data may be considered to be equivalent for each sampling and analytical event. This is achieved through consistent sampling and analytical testing and reporting techniques.

The data quality objectives, requirements and indicators for the assessment are presented in Table 1 below.

Table 1 Data Quality Objectives, Requirements and Indicators

Data Quality Objective	Requirement	Data Quality Indicator
Precision		
Intra-laboratory Duplicates	1 per 20 samples	RPDs < 50%
Inter-laboratory Duplicates	1 per 20 samples	RPDs < 50%
Laboratory Duplicates	Minimum of 1 per batch per analyte.	RPDs < 50%
Accuracy		
Laboratory Matrix Spikes	1 per batch per volatile/semi-volatile analyte	Recoveries 50% to 150%
Laboratory Surrogate Spikes	1 per volatile/semi-volatile analyte sample (as appropriate)	Recoveries 70% to 130%
Laboratory Method Blanks	At least 1 per batch per analyte tested	Result < Limit of reporting
Laboratory Control Samples	At least 1 per batch per analyte tested	Result < Limit of reporting
Rinsate samples	1 per sampling day	Result < Limit of reporting
Representativeness		
Sampling methodology	Appropriate for the sample type and analytes	Meet Requirement
Samples extracted and analysed within holding times	Specific to each analyte	Meet Requirement
Comparability		
Sampling approach	Consistent for each sample	Meet Requirement
Analysis methodology	Consistent methodology for each sample	Meet Requirement
Handling conditions and sampler	Consistent for each sample	Meet Requirement
Field observations and analytical results	Field observations to support analytical results	Meet Requirement
Consistent laboratory Limit of Reporting (LOR)	Consistent between primary and secondary laboratories	Meet Requirement
Completeness		
Chain of Custody Documentation	Appropriately completed	Meet Requirement
Field Sampling Documentation	Appropriately completed	Meet Requirement
Satisfactory quality assurance/ quality control procedures	In accordance with relevant guidance	Meet Requirement

1 Field QA/QC Results

1.1 Duplicate Sampling Techniques

1.1.1 Soil Sampling

Duplicate samples were collected by splitting soil samples in the field. This comprised collecting a sample of soil from the borehole and splitting it equally (per volume) into three laboratory supplied jars (primary, duplicate and triplicate). This process was repeated until all jars were full and zero headspace remained. Care was taken to collect a representative sample in each jar, that is, from the same strata, location and depth within the bore hole.

Field splitting was employed rather than sample homogenisation (blending of a sample in a bowl) and splitting to minimise VOC loss.

1.2 Decontamination Procedures

Decontamination of non-disposable equipment was conducted between sampling events and comprised:

> The scrubbing of field equipment in contact with potentially contaminated materials with a scrubbing brush and a container of 1% Decon 90 solution; and,

> Rinsing of equipment with deionised water following scrubbing to remove the detergent.

1.3 Relative Percentage Difference

The precision or repeatability of laboratory results obtained between field split primary and replicate samples (ie. duplicate and triplicate samples) is derived by the calculation of the relative percentage differences (RPDs). The calculation of the RPD is conducted using the following equation:

$$\text{RPD (\%)} = \frac{\text{Original - Duplicate}}{\text{(Original + Duplicate) / 2}} \times 100$$

A RPD of +/- 50% is generally considered acceptable.

The comparative analysis between the primary and replicate samples for the sampling event is summarised below in Table 2. Note that when the laboratory result for one or both samples is below the PQL the RPD has been given as NA. Complete laboratory reports are provided in Appendix C.

Table 2 Replicate RDP results for HA2 0.05 – 0.15 / DUP/ TRIP

Contaminant Species		Units	PQL [1]	PQL [2]	Primary Sample ID	Duplicate ID	Triplicate ID	MAX RPD
					HA2 0.05-0.15	DUP	TRIP	
					29/09/2017	29/09/2017	29/09/2017	
Heavy Metals	As	mg/kg	3	2	3	3	3.6	18%
	Cd	mg/kg	0.3	0.4	<0.3	<0.3	< 0.4	NA
	Cr	mg/kg	0.3	5	40	26	39	42%
	Cu	mg/kg	0.5	5	11	11	17	43%
	Pb	mg/kg	1	5	20	20	28	33%
	Hg	mg/kg	0.05	0.1	<0.05	<0.05	< 0.1	NA
	Ni	mg/kg	0.5	5	6.8	6.5	9.8	40%
	Zn	mg/kg	0.5	5	200	210	260	26%
TRH	C_6 - C_9	mg/kg	20	20	<20	<20	<20	NA
	C_{10} - C_{36}	mg/kg	110	50	<110	<110	119	NA
	F1 C_6 - C_9	mg/kg	20	20	<20	<20	<20	NA
	F2 > C_{10} - C_{16}	mg/kg	25	50	<25	<25	<50	NA
	F3 > C_{16} - C_{34}	mg/kg	90	100	<90	<90	<100	NA
	F4 > C_{34} - C_{40}	mg/kg	120	100	<120	<120	<100	NA
Naphthalene		mg/kg	0.1	0.1	<0.1	<0.1	<0.1	NA
BTEX	Benzene	mg/kg	0.1	0.1	<0.1	<0.1	<0.1	NA
	Toluene	mg/kg	0.1	0.1	<0.1	<0.1	<0.1	NA
	Ethyl Benzene	mg/kg	0.1	0.1	<0.1	<0.1	<0.1	NA
	Total Xylenes	mg/kg	0.3	0.3	0.4	0.4	<0.3	NA
PAH	Total	mg/kg	0.8	0.5	5.8	3	1.2	**131%**
	B(a)P	mg/kg	0.1	0.5	0.5	0.2	<0.5	NA
	B(a)P TEQ (Upper)	mg/kg	0.3	0.5	0.8	0.4	1.2	**100%**
OCP	Total	mg/kg	1.7	2	<1.7	<1.7	<2.0	NA
	DDT+DDE+DDD	mg/kg	0.3	0.05	<0.3	<0.3	<0.05	NA
	DDT	mg/kg	0.1	0.05	<0.1	<0.1	<0.05	NA
	Aldrin + Dieldrin	mg/kg	0.3	0.1	<0.3	<0.3	<0.1	NA
	Chlordane	mg/kg	0.2	0.1	<0.2	<0.2	<0.1	NA
	Endosulfan	mg/kg	0.2	0.15	<0.2	<0.2	<0.15	NA
	Endrin	mg/kg	0.2	0.05	<0.2	<0.2	<0.05	NA
	Hepta-chlor	mg/kg	0.2	0.05	<0.1	<0.1	<0.05	NA
	HCB	mg/kg	0.1	0.05	<0.1	<0.1	<0.05	NA
	Methoxychlor	mg/kg	0.1	0.05	<0.1	<0.1	<0.05	NA
OPP	Total	mg/kg	1	1.2	<1	<1	<1.2	NA
	Chlorpyrifos	mg/kg	0.2	0.2	<0.2	<0.2	<0.2	NA
Total PCB		mg/kg	1	0.5	<1	<1	0.5	NA

Notes to Table:

Bold - indicates exceedance of the acceptable RPD range of +/- 50%

1. SGS LOR Values
2. Eurofins LOR Values

The replicate RPD results summarised in Table 2 indicate that the samples analysed were generally within the acceptable RPD range of +/- 50% with the following exception:

> Total Polycyclic Aromatic Hydrocarbons (PAH); and

> Benzene (a) Pyrene, TEQ (Upper).

Elevated RPD values were considered tolerable due to:

> Concentrations of some analytes being less than 5 times the PQL, which can produce elevated RPD values, despite the low magnitude differences in the concentrations of the replicate pairs; and,

> The splitting of materials in the field to reduce volatile loss instead of homogenised blending.

The RPD results indicate the sampling methodology was acceptable and laboratory precision or repeatability was achieved.

1.4 Rinsate Samples

Rinsate samples are samples of laboratory prepared water poured over or through decontaminated field sampling equipment prior to the collection of environmental samples. Following completion of decontamination procedures (refer Section 1.2) laboratory supplied de-ionised water was poured over sampling equipment (typically a stainless steel garden trowel) and collected into a clean sampling jar for contaminant analysis. Rinsate samples are recovered to determine the adequacy of decontamination procedures and the potential for cross contamination of samples through use of adulterated sampling equipment.

Laboratory results for the Total Heavy Metals analysis of rinsate samples for the investigation are summarised in Table 3. Complete laboratory reports sheets are provided in Appendix C.

Table 3 Summary of TRH/BTEX Rinsate laboratory results

Sample ID	Date Sampled	Total Heavy Metals							
		Arsenic	Cadmium	Chromium	Copper	Nickel	Lead	Zinc	Mercury
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
RIN	29/09/2017	<1	<0.1	<1	<1	<1	<1	<5	<0.001
SGS PQL		1	0	1	2	1	1	5	0.001

Notes to Table:

BOLD - Indicates laboratory result is greater than the laboratory PQL

PQL - Practical Quantification Limit

The rinsate laboratory results summarised in Table 3 were all less than the laboratory PQL, indicating that field decontamination procedures were generally adequate.

1.5 Trip Blanks

Trip blanks are a laboratory supplied analyte free matrix (laboratory certified clean sands for solid samples or de-ionised water for water samples). Trip blanks are taken from the laboratory to the sampling site, unopened and unexposed to sampling procedures and subjected to the same preservation methods as the field samples. The samples are then analysed to determine the potential for cross- contamination into the samples as a result of field handling, storage and shipping procedures. Laboratory results for the trip blank samples for the PSI are summarised in Table 4. Complete laboratory reports sheets are provided in Appendix C.

Table 4 Summary of Trip Blank Laboratory Results

Sample ID	Date Sampled	BTEX						
		Benzene	Toluene	Ethyl-benzene	m+p-Xylene	o-Xylene	Total Xylenes	Napthalene
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
TRIP BLANK	29/09/2017	<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.1
ENVIROLAB PQL		0.1	0.1	0.1	0.2	0.1	0.3	0

Notes to Table:

BOLD - Indicates laboratory result is greater than the laboratory PQL

PQL - Practical Quantification Limit

The trip blank laboratory results summarised in Table 4 were all less than the laboratory PQL, indicating that field handling, storage and shipping procedures were generally adequate.

1.6 Trip Spikes

Trip spikes are a laboratory prepared sample injected or spiked with a known concentration of contaminants, in this case BTEX. The trip spikes were taken from the laboratory to the sampling site, unopened and unexposed to sampling procedures and subjected to the same preservation methods as the field samples. The samples are then analysed to determine the loss of VOCs as a result of field handling, storage and shipping procedures. Laboratory results for the trip spike samples for the PSI are summarised in Table 5 below. Complete laboratory reports sheets are provided in Appendix C.

Table 5 Summary of Trip Spike Laboratory Results

Sample ID	Date Sampled	BTEX				
		Benzene	Toluene	Ethyl-benxene	o-Xylene	m+p-Xylene
TRIP SPIKE	29/09/2017	89%	96%	97%	100%	100%

Notes to Table:

BOLD - Indicates the contaminant recovery is less than the specified DQI of 60 - 100%

The trip spike laboratory results summarised in Table 5 were within the acceptable contaminant recovery limits of 60-100%, indicate that field handling, storage and shipping procedures were generally adequate.

2 Laboratory QA/QC Results

2.1 Laboratory Replicates

Laboratory replicates are generated by subjecting a separate aliquot of sample through the same preparation and analysis procedures as the primary sample. Comparison of the primary sample to the duplicate will yield a precision measurement (expressed as RPD) in a given matrix.

The laboratory acceptance criteria for duplicate samples are as follows:

> If results are less than 5 times the PQL, any RPD is acceptable; and,

> If results are greater than 5 times the PQL, an RPD of 0-50% is acceptable.

Two samples returned RPD's outside of the acceptance criteria. Due to the low contaminant concentrations the RPD's are not considered to be a significant difference and are not indicative of inadequate field quality control. The RPD results are considered to be acceptable.

2.2 Method Blanks

A Method Blank is an analyte free matrix (laboratory certified clean sands for solid samples or de-ionised water for water samples) which is subjected to the complete preparation and analytical procedure to assess contamination introduced during laboratory procedures.

All laboratory results for method blank analysis were below the PQL indicating laboratory procedures were adequate to prevent cross contamination of samples.

2.3 Matrix Spikes

The Matrix Spike is a separate aliquot of the sample spiked with known concentrations of the analytes of interest. It is analyzed to determine, including the matrix interferences, if the procedure is working within established control limits. Analyte recoveries must lie between 70-130% for inorganics, 60-140% for organics and 10-140% for SVOC and Phenols.

Matrix spike recoveries were all within acceptable laboratory criteria.

3 Summary

It was considered that the field and laboratory QA/QC criteria were generally within acceptable limits indicating field sampling, storage, handling and decontamination procedures and laboratory preparation and analysis procedures were adequate for the purposes of the environmental investigation.