ENVIRONMENTAL INVESTIGATION SERVICES

REPORT

TO

CAPITAL INSIGHT PTY LTD

ON

PRELIMINARY STAGE 1 ENVIRONMENTAL SITE ASSESSMENT

FOR

PROPOSED REFURBISHMENT OF BUILDINGS W6A, AND W6B AND CONSTRUCTION OF AN ADDITIONAL NEW BUILDING AT MACQUARIE UNIVERSITY

AT

WESTERN ROAD, MACQUARIE UNIVERSITY, MACQUARIE PARK

6 JUNE 2017 **REF: E29807KRrpt rev1**

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ABBREVIATIONS

Ambient Background Concentrations	**ABC**
Added Contaminant Limits	**ACL**
Asbestos Containing Material	**ACM**
Australian Drinking Water Guidelines	**ADWG**
Area of Environmental Concern	**AEC**
Australian Height Datum	**AHD**
Asbestos Health Screening Levels	**ASL**
Acid Sulfate Soil	**ASS**
Above-Ground Storage Tank	**AST**
Below Ground Level	**BGL**
Bureau of Meteorology	**BOM**
Benzene, Toluene, Ethylbenzene, Xylene	**BTEX**
Benzene, Toluene, Ethylbenzene, Xylene, Naphthalene	**BTEXN**
Cation Exchange Capacity	**CEC**
Contaminated Land Management	**CLM**
Construction Management Plan	**CMP**
Contaminant(s) of Potential Concern	**CoPC**
Chain of Custody	**COC**
Conceptual Site Model	**CSM**
Data Quality Indicator	**DQI**
Data Quality Objective	**DQO**
Detailed Site Investigation	**DSI**
Ecological Assessment Criteria	**EAC**
Ecological Investigation Levels	**EILs**
Ecological Screening Level	**ESL**
Environmental Management Plan	**EMP**
Excavated Natural Material	**ENM**
Environmental Protection Agency	**EPA**
Environmental Site Assessment	**ESA**
Ecological Screening Level	**ESL**
Fibre Cement Fragments	**FCF**
General Approvals of Immobilisation	**GAI**
General Solid Waste	**GSW**
Health Investigation Level	**HILs**
Hardness Modified Trigger Values	**HMTV**
Health Screening Level	**HSLs**
International Organisation of Standardisation	**ISO**
Lab Control Spike	**LCS**
Light Non-Aqueous Phase Liquid	**LNAPL**
Local Government Authority	**LGA**
Map Grid of Australia	**MGA**
National Association of Testing Authorities	**NATA**
National Environmental Protection Measure	**NEPM**
Organochlorine Pesticides	**OCP**
Organophosphate Pesticides	**OPP**
Polycyclic Aromatic Hydrocarbons	**PAH**

ABBREVIATIONS

Photo-ionisation Detector	**PID**
Practical Quantitation Limit	**PQL**
Preliminary Site Investigation	**PSI**
Quality Assurance	**QA**
Quality Control	**QC**
Remediation Action Plan	**RAP**
Relative Percentage Difference	**RPD**
Restricted Solid Waste	**RSW**
Site Assessment Criteria	**SAC**
Sampling, Analysis and Quality Plan	**SAQP**
Site Audit Statement	**SAS**
Site Audit Report	**SAR**
Specific Contamination Concentration	**SCC**
Standard Penetration Test	**SPT**
Semi-Volatile Organic Compounds	**sVOC**
Standard Sampling Procedure	**SSP**
Standard Water Level	**SWL**
Standard Sampling Procedure	**SSP**
Trip Blank	**TB**
Toxicity Characteristic Leaching Procedure	**TCLP**
Total Recoverable Hydrocarbons	**TRH**
Trip Spike	**TS**
Upper Confidence Limit	**UCL**
United States Environmental Protection Agency	**USEPA**
Underground Storage Tank	**UST**
Virgin Excavated Natural Material	**VENM**
Volatile Organic Compounds	**VOC**
Work Health and Safety	**WHS**

1 INTRODUCTION

Woolacotts Consulting Engineers (Woolacotts), on behalf of Capital Insight Pty Limited ('the client') commissioned Environmental Investigation Services (EIS)[1] to undertake a Preliminary Stage 1 Environmental Site Assessment (ESA) for the proposed refurbishment of Buildings W6A and W6B and construction of an additional new building at Western Road, Macquarie University, Macquarie Park. The site location is shown on Figure 1 and the assessment was confined to the site boundaries/proposed development area as shown on Figure 2. The proposed development area is referred to as 'the site' in this report.

This report has been prepared to support the lodgement of a Development Application (DA) for the proposed refurbishment of Buildings W6A and W6B and construction of additional new building, at the Macquarie University campus.

A geotechnical investigation was undertaken in conjunction with this assessment by JK Geotechnics[2]. The results of the investigation are presented in a separate report (Ref. 29807ZRrpt, dated 4 November 2016[3]). This report should be read in conjunction with the JK report.

1.1 Proposed Development Details

We have been provided with the following information:

- Architectural plans (Drawing Numbers SSDA-01 to 16 Issue 1, dated 18 May 2017) prepared by Budden Nangle Micheal & Hudson Architects.
- Architectural plans (SK-MU3 and SK-MU4, dated 1 September 2016) annotated by Woolacotts Consulting Engineers Pty Ltd (Woolacotts) and attached to their 'Geotechnical and Environmental Investigation Brief (Ref. 16-058).
- Survey plan (Project No. 30431, Job Ref. 34174, dated 13 July 2011) prepared by Lockley Land Title Solutions.
- Original structural drawings for the Arts and Social Sciences Building, now Buildings W6A & W6B (Drawing Numbers 1E, dated 10/8/66, 2E, dated 15/8/66, 3E, dated 25/7/66, 4E & 5E, dated 20/7/66, 6E, dated 29/7/66, 7E, dated 9/6/66, 8E, dated 16/6/66, 9E, dated 3/8/66, 10E, dated 29/9/66 and 21E/A, dated 21/2/67) prepared by Woolacott, Hale, Bond & Corlett.
- Structural drawings for stair access to Building W6A (Drawing Numbers S1 and S2, dated 5/8/87) prepared by Randall Jones & Associates Pty Ltd.
- Rail Corridor Impact Study drawing (Drawing Number SK0010 Rev. A, dated 28 April 2017) attached to a letter dated 28 April 2017, both prepared by Taylor Lauder Bersten Pty Ltd (TLB).

[1] Environmental consulting division of Jeffery & Katauskas Pty Ltd (J&K)

[2] Geotechnical consulting division of J&K

[3] Referred to as JK 2016 Report

Based on a review of the provided information, we understand that the proposed works will include:

- Reconfiguration of Building W6A, including nine storey plant room extensions to the eastern and western ends of the building and a new nine storey central core that will accommodate the relocation of the lifts and stairs. Maximum vertical loads are expected to be 2,500kN (in compression) with tension loads of between 200kN and 700kN over the eastern and western ends of the building and the new lift core. New pile footings will be required, together with additional loads transferred to existing footings. Rock bolts are envisaged to be required to support tension loads acting on selected walls.
- Reconfiguration of Building W6B (comprising three buildings, each of three levels) and relocation of selected columns. Maximum vertical loads are expected to be 1,100kN (in compression) with tension loads of 150kN below new walls. New pile footings will be required. Rock bolts are envisaged to be required to support tension loads acting on selected walls.
- A new museum building to the south of W6A. The floor level of the new building will be at the same level as Building W6A (RL64.878m). Excavations to a maximum depth of about 5m will therefore be required to achieve design subgrade levels. A bridge link will be provided to connect the new Building to Building W6A. No structural loads have been provided for the new building and typical loads for this type of development have been assumed.

1.2 Aim and Objectives

The primary aims of the assessment were to identify any past or present potentially contaminating activities at the site, identify the potential for site contamination, and make a preliminary assessment of the soil contamination conditions. The assessment objectives were to:

- Provide an appraisal of the past site use(s) based on a review of historical records;
- Assess the current site conditions and use via a site walkover inspection;
- Identify potential contamination sources/areas of environmental concern (AEC) and contaminants of potential concern (CoPC);
- Assess the soil contamination conditions via implementation of a preliminary sampling and analysis program;
- Prepare a conceptual site model (CSM);
- Assess the potential risks posed by contamination to the receptors identified in the CSM (Tier 1 assessment);
- Provide a preliminary waste classification for off-site disposal of soil;
- Assess whether further intrusive investigation and/or remediation is required; and
- Assess whether the site is suitable or can be made suitable for the proposed development (from a contamination viewpoint).

1.3 Scope of Work

The assessment was undertaken generally in accordance with an EIS proposal (Ref: EP43348KR) of 19 September 2016 and written acceptance from the client of 4 October 2016. The scope of work included the following:

- Review of site information, including background and site history information from a Lotsearch Pty Ltd *Environmental Risk and Planning Report* and other sources;
- A walkover site inspection;
- Design and implementation of a sampling, analysis and quality plan (SAQP);
- Interpretation of the analytical results against the adopted site assessment criteria (SAC);
- Assessment of data quality; and
- Preparation of an ESA report presenting the results of the assessment, including a CSM and Tier 1 risk assessment.

The report was prepared with reference to regulations/guidelines outlined in the table below. Individual guidelines are also referenced within the text of the report.

Table 1-1: Guidelines

Guidelines/Regulations/Documents
Contaminated Land Management Act (1997)[4]
State Environmental Planning Policy No.55 – Remediation of Land (1998)[5]
Managing Land Contamination, Planning Guidelines SEPP55 – Remediation of Land (1998)[6]
Guidelines for Consultants Reporting on Contaminated Sites (2011)[7]
Guidelines for the NSW Site Auditor Scheme, 2nd Edition (2006)[8]
National Environmental Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)[9]

[4] NSW Government Legislation, (1997). *Contaminated Land Management Act 1997.* (referred to as CLM Act 1997)

[5] NSW Government, (1998). *State Environmental Planning Policy No. 55 – Remediation of Land.* (referred to as SEPP55)

[6] Department of Urban Affairs and Planning, and Environment Protection Authority, (1998). *Managing Land Contamination, Planning Guidelines SEPP55 – Remediation of Land*. (SEPP55 Planning Guidelines)

[7] NSW Office of Environment and Heritage (OEH), (2011). *Guidelines for Consultants Reporting on Contaminated Sites.* (referred to as Reporting Guidelines 2011)

[8] NSW DEC, (2006). *Guidelines for the NSW Site Auditor Scheme, 2nd ed.* (referred to as Site Auditor Guidelines 2006)

[9] National Environment Protection Council, (2013). *National Environmental Protection (Assessment of Site Contamination) Amendment Measure 1999* (as amended 2013). (referred to as NEPM 2013)

2 SITE INFORMATION

2.1 Site Identification

Table 2-1: Site Identification

Site Address:	Buildings W6A and W6B, Western Road, Macquarie University, Macquarie Park
Lot & Deposited Plan:	Lot 191 in DP1157041
Current Land Use:	Tertiary Institution Premises
Proposed Land Use:	Tertiary Institution Premises
Local Government Authority (LGA):	City of Ryde Council
Current Zoning:	B4 – Mixed Use
Site Area (ha):	Approximately 1.3
RL (AHD in m) (approx.):	62
Geographical Location (decimal degrees) (approx.):	Latitude: - 33.774900^0 Longitude: 151.110936^0

2.2 Site Location and Regional Setting

The site is located over the central western section of the Macquarie University campus, at Macquarie Park. The site is bounded by park and walkways to the north, other university buildings to the east and west and a carpark to the south, within the campus. The site is located approximately 60m to the south of Mars Creek.

2.3 Topography

The site was located within gently undulating topography on a hillside that sloped down to the north-west at about 6°.

2.4 Site Inspection

A walkover inspection of the site was undertaken by EIS on 6 October 2016. The inspection was limited to accessible areas of the site and immediate surrounds. An internal inspection of buildings was not undertaken and the upper floors of the buildings were not inspected. Selected site photographs obtained during the inspection are attached in the appendices. A summary of the findings are outlined in the following subsections:

2.4.1 Buildings, Structures and Roads

At the time of fieldwork the site was occupied by Buildings W6A and W6B, with respective northern and eastern frontages onto the concrete paved, tree lined Wally's Walk and the asphaltic concrete (AC) paved Western Road (see Figures 1 and 2). The roads sloped down to the north at between about 2^{o} and 6^{o}. To the north of the western end of Wally's Walk a grass surfaced area sloped down to the north-west at between about 3° and 5°

Building W6A comprised a nine storey building and W6B comprised three buildings (each three storey) arranged in a 'horseshoe' shape in plan. The buildings were of concrete frame and brick masonry construction with gravel surfaced courtyard surrounds containing stepped concrete paved walkways.

A concrete pedestrian walkway bridged over Western Road from the north eastern corner of W6B eastwards to the nearby multi-level concrete frame and brick masonry Building W5A.

To the west of Building W6B and to the north of the western end of Building W6A, was a single level framed building with synthetic walls and roof.

An AC paved walkway lined the southern side of Building W6A and sloped down to the west at about 2°. Two grass surfaced fill mounds, orientated east-west and bisected by a concrete paved walkway (orientated north-south) were located immediately to the south of the walkway. The toe of the northern side of the western fill mound was supported by a timber retaining wall about 0.5m high with a bicycle shed immediately to the north.

An AC surfaced car park was situated to the south of the fill mounds and sloped down to the north-west at about 6°. The car park extended west to a two level concrete framed car park and extended south to Macquarie Drive (see Figure 1).

Based on a cursory inspection from within the site, the buildings, structures and paved surfaces within and adjoining the site generally appeared to be in good condition.

2.4.2 Boundary Conditions, Soil Stability and Erosion

There was no fencing located on the site boundaries for this assessment and the site area was easily accessible. There was minimal exposed soils as the area around the buildings was landscaped.

No signs of erosion was observed.

2.4.3 Visible or Olfactory Indicators of Contamination

No staining was observed on the ground surface or the paved surfaces. No odours were noted. Suspected ACM may potentially be present within the buildings, however a hazardous building material survey was outside the scope of the investigation

There were no above ground storage tanks (ASTs) or indications of underground storage tanks (USTs) observed on site.

2.4.4 Presence of Drums/Chemicals, Waste and Fill Material

No drums were observed to be stored on site. A closed room, with a notice on the door, stating Chemical Storage Area, was located at the ground floor of Building W6B.

Two grass surfaced fill mounds, orientated east-west and bisected by a concrete paved walkway (orientated north-south) were located immediately to the south of the walkway, which lined the southern side of Building W6A. The fill mounds were a maximum of about 5m high (western mound) and 4.3m high (eastern mound), and had side slopes between about 14° and 18°.

Small waste bins were located at the site, for general refuse and waste from the buildings. Some cleaning agents and graffiti removing solutions etc. were noted to be present on site.

No other waste material was observed on site.

2.4.5 Drainage and Services

Surface water flows and run off from the soil mounds are likely to flow into drainage pits observed at the northern toe of the mounds. Water taps were observed at the top of the soil mounds. Site surface run off is likely to flow into drainage pits and/or sewer pits, observed at the perimeters of building W6A and building W6B. Other services were also noted in these areas.

2.4.6 Sensitive Environments

Sensitive environments such as wetlands, ponds, creeks or extensive areas of natural vegetation were not identified on site. However, Mars Creek was located approximately 60m to the north of the site.

2.4.7 Landscaped Areas and Visible Signs of Plant Stress

A number of garden beds were also located around Buildings W6A and W6B and were supported by timber, brick and concrete retaining walls ranging in height from approximately 0.3m to 1.2m. Numerous medium to large sized trees were present within the landscaped surrounds.

No visible signs of plant and vegetation stress were observed on site.

2.5 Surrounding Land Use

During the site inspection, EIS observed the following land uses in the immediate surrounds:

- North – Park and pathways/walkways (including Wally's Walk) and Mars Creek, with Sports and Aquatic Centre (Building W10A beyond)
- South – the West 3 (X3 and W4) carpark, with part of Macquarie Walk, Balaclava Road, Australian Hearing Hub (Building S2.6) and University Avenue beyond
- East – Buildings W5A, W5C and W2.4A (Macquarie Theatre), with other university buildings beyond

- West – Building W6D (Lotus Theatre), Building X5B (Mia Mia) and Building X5A, with part of Mars Creek and West 5 (X8) carpark beyond

EIS did not observe any land uses in the immediate surrounds that were identified as potential contamination sources for the site.

2.6 Underground Services

The 'Dial Before You Dig' (DBYD) plans were reviewed for the assessment in order to establish whether any major underground services exist at the site or in the immediate vicinity that could act as a preferential pathway for contamination migration. No major services were identified that would be expected to act as preferential pathway for contamination migration.

However, it should be noted that the Chatswood to Epping Rail Link Tunnel is located directly beneath Building W6B, in the northern section of the site.

2.7 Section 149 Planning Certificate

The s149 (2 and 5) planning certificates were reviewed for the assessment. Copies of the certificates are attached in the appendices. EIS note that the s149 certificate applies to the entire Macquarie University campus and some sections may not be relevant for this specific area being investigated. A summary of the relevant information is outlined below:

- The site is not located in an area of ecological significance;
- The site is not deemed to be: significantly contaminated; subject to a management order; subject of an approved voluntary management proposal; or subject to an on-going management order under the provisions of the CLM Act 1997;
- The site is not subject to a Site Audit Statement (SAS);
- The site is not located within an ASS risk area;
- The site is not located in a heritage conservation area. However, an item of environmental heritage is located on the land of the university;
- The university campus is within bushfire prone land. However, the Lotsearch report indicates that Bushfire Prone Areas are located approximately 300m to the north-east, north and north-west of the investigation site; and

3 GEOLOGY AND HYDROGEOLOGY

3.1 Regional Geology

Regional geological information presented in the Lotsearch report (attached in the appendices) indicated that the site is underlain by Ashfield Shale of the Wianamatta Group, which typically consists of black to dark grey shale and laminite. Medium to coarse grained quartz sandstone, very minor shale and laminate lenses were also located to the north and east of the site.

3.2 JK / EIS Jobs Database

EIS/JK have previously drilled at one location within 100m of the site. The drilling identified imported fill to depths of 3.0m, underlain by clayey soil and sandstone bedrock. However, the majority of EIS/JK investigations across the university have encountered shallow fill.

3.3 Acid Sulfate Soil Risk and Planning

The site is not located in an acid sulfate soil (ASS) risk area according to the risk maps prepared by the Department of Land and Water Conservation.

3.4 Hydrogeology

Hydrogeological information presented in the Lotsearch report (attached in the appendices) indicated that the regional aquifer on-site and in the areas immediately surrounding the site includes porous, extensive aquifers of low to moderate productivity. There were a total of 19 registered bores within the report buffer of 2,000m. In summary:

- The nearest registered bore was located approximately 337m from the site. This was utilised for irrigation purposes;
- The majority of the bores were registered for monitoring purposes;
- There were two nearby bores (i.e. within 400m) registered for irrigation use; and
- The drillers log information from the closest registered bores typically identified fill and/or sand or clay to depths of 0.0-6.0m, underlain by sandstone and/or shale bedrock.

The information reviewed for this assessment indicated that the subsurface conditions at the site are likely to consist of erosional soils overlying relatively shallow bedrock. The potential for viable groundwater abstraction and use of groundwater under these conditions is considered to be low.

3.5 Receiving Water Bodies

Surface water body was identified in the immediate vicinity of the site. The closest surface water body is Mars Creek located approximately 60m to the north of the site. This is down-gradient from site and is considered to be a potential receptor.

4 SITE HISTORY INFORMATION

4.1 Review of Historical Aerial Photographs

Historical aerial photographs were included in the Lotsearch report (attached in the appendices). EIS has reviewed the photographs and summarised relevant information in the following table:

Table 4-1: Summary of Historical Aerial Photographs

Year	Details
1943	The site appeared to be used for farming purposes. Ploughing furrows were visible in this area. A residential building was located in the central-western section of the site. A number of small sheds were located in the north-eastern section and the south-eastern corner of the site. The surrounds appeared similar to the site and were most likely used for farming, grazing and/or market garden purposes. A lot of buildings and sheds were located to the south-east and south-west of the site. A few buildings and sheds were also located to the north, north-east and south of the site. A few shed-type structures were located to the north-west of the site, surrounded by ploughed land. Mars Creek was located to the north of the site.
1956	The sheds that had been located in the south-eastern corner appeared to have been demolished. The sheds and some of the buildings located to the south-east and south of the site appeared to have been demolished.
1961	A number of sheds in the north-eastern section of the site appeared to have been demolished. A number of sheds located to the immediate north-east of the site appeared to have been demolished. Additional buildings appeared to have been constructed to the south-east and south of the site, with some new sheds also noted to the south of the site. A number of long buildings had been constructed to the south-west of the site. An area of disturbed ground was noted to the south of the site.
1965	No apparent changes were noted on the site. One of the sheds located to the immediate north-east of the site appeared to have been demolished. Additional buildings appeared to have been built to the south-east and south (within the area of disturbed ground seen in the 1961 photograph) of the site.
1970	The residential building located in the central-western section of the site had been demolished. The Macquarie University buildings, the current W6A and W6B, including the landscaped soil mounds to the south of the current building W6A had been built within the site. Much of the land surrounding the site appeared to be no longer used for farming purposes and almost all the former buildings and structures located in the surrounding land had been demolished. This could be the period when Macquarie University campus began to be established. A large carpark was built to the immediate south and south-west of the site and

Year	Details
	a part of the car park was located within the south-western corner of the site. A building (potentially the current building W5A) had been constructed to the immediate north-east of the site, and other buildings erected further north-east. Areas of disturbed ground were observed to the immediate north-west, south-east and further south-west of the site. A pathway and some roadways had been formed to the north of the site. The pathway appeared to extend from the site, cut across Mars Creek and lead up to a small building (located at the current large Sport and Aquatic Centre (Building W10A) location). A cleared rectangular area was located to the immediate south-west of this building. A circular feature was observed on the ground, further north-east of the site, at the current Amphitheatre location. The land further to the south-east of the site appeared to have been developed.
1982	Part of the carpark located in the south-western corner of the site appeared to have been further developed. The large carpark located to the immediate south and south-west of the site appeared to have been further developed and also extended further to the west. An area further to the south-east of the site appeared to have been developed into a large carpark as well. Some roadways had been formed and/or further developed to the north-east and south-east of the site. The configuration of the current Balaclava Road appeared to have been changed slightly, to the south of the site. A structure was noted on the current Balaclava Road, to the south of the site. Other buildings i.e. the current Building X5A (to the immediate west of the site), current Building W5C (to the immediate east of the site and adjacent to the south of current Building W5A), current Macquarie Theatre Building (W2.4A) (further east of the site), current buildings Muse (C7A), C9A and Campus Hub (C10A) (to the north-east of the site) and current buildings W3A, C3A, C3B, C5A and C5B (to the south-east of the site) had been built. Some small buildings and a small carpark were located to the north-west of the current Buildings C9A and Campus Hub (C10A). The current Sport and Aquatic Centre (W10A), located to the north of the site, appeared to have been further developed and extended, and a carparking area was noted to the north and north west of it. The current Lighthouse Theatre (W11A) appeared to have been built to the further north-east of the site.
1991	A building structure was noted in the north-western section of the site, immediately adjacent to the west of current Building W6B and north of W6A. The current Building C5C (further east of the site) and Building Y3A (further south-west of the site) had been built. Additional roadways and associated landscaping had been developed to the south-west of the site. The current Sport and Aquatic Centre (W10A), located to the north of the site, appeared to have been further developed and extended, including the carparking areas to the north and west of it.
2003	The current Mia Mia Building (X5B) had been built to the immediate north-west of the site, part of which was within the north-western end of the site. Wally's Walk was noted within the northern boundary of the site. The current Banksia Cottage (Building X6A) had been built to the south-west of the site. Further extensions appeared to have occurred to the current Muse Building (C7A) to the

Year	Details
	north-east and the current Sport and Aquatic Centre (W10A) to the north of the site. Another building was noted to the north of the current C9A and Campus Hub (C10A) building. The pathway located to the north of the site appeared to have been further developed and appeared to now extend further north-west of the site. A multi-storey carpark appeared to have been built in place of the on-grade carpark located to the south-east of the site. The roads/roadways to the south and south-west of the site appeared to have been further developed. Some building development appeared to have occurred further south-west of the site.
2009	Some trees and vegetation appeared to be growing on the soil mounds located to the south of the current Building W6A. The open 'courtyard' type of area at the central section of the current Building W6B appeared to have been developed, with two structures noted within the north-eastern section. Further infrastructural developments appeared to have occurred further east and south-east of the site. An area of disturbed ground was located to the south of the current Building W3A, south-east of the site. A large building with auxiliary units, located further south of the site had been demolished and the area redeveloped with new building and landscaping in place. The current Sport and Aquatic Centre (W10A) to the north of the site, appeared to have been further developed and extended, with a swimming pool built in the location of a rectangular area (as seen in the previous photographs) to the immediate south-west of the building. A rectangular green area was built to the south-east of the current Sport and Aquatic Centre (W10A). The roads and roadways appeared to have been further developed in the site surrounds.
2014	Further landscaping appeared to have taken place in the area to the immediate south of the current Building W6A, and the current bike hub had been built. The current Lotus Theatre (Building W6D) had been built to the immediate west of the current Building W6B, in place of the former building that had been located at this spot (initially seen in the 1991 photograph). Further infrastructural developments had occurred: • to the east (Macquarie Theatre (W2.4A)); • to the south-east (new buildings and a circular structure in the area of disturbed ground as seen in the 2009 photograph), construction of the Library (C3C) building, and construction of the Australian Hearing Hub (S2.6) building in place of the former multi-storey carpark in this location); • to the north-west (establishment of a new large carpark (West 5, X8) with a new roadway extending to it from the north-east); and • to the north (further extension of the current Sport and Aquatic Centre (W10A). New pathways had been built and some of the existing pathways had been further developed to the south-west, north-west and north-east of the site.

4.2 NSW EPA Records

The Lotsearch report (attached in the appendices) included information from the NSW EPA databases for the following:

- Records maintained in relation to contaminated land under Section 58 of the CLM Act 1997;
- Records of notified sites under Section 60 of the CLM Act 1997 (Duty to Report Contamination); and
- Licensed activities under the Protection of the Environment Operations Act (1997[10]).

The search included the site area and surrounding areas in the report buffer of 1000m. The search indicated the following:

- There were no records for the site or any properties in the report buffer under Section 58 of the CLM Act 1997;
- The site has not been notified under Section 60 of the CLM Act 1997. There was one notified property in the report buffer. This was for the Coles Express Marsfield service station located approximately 425m to the west of the site, at Epping Road;
- There was one record (EPL 12208) for licenced activity at the site under the POEO Act 1997. This was for the Railway Systems Activities pertaining to the underground Chatswood to Epping Rail Link tunnel at the site. Historical licenses were identified for the site and several properties within the report buffer, however these activities are considered unlikely to pose a contamination risk to the site.

4.3 Historical Business Directory and Additional Lotsearch Information

Historical business records for the site and surrounding areas in the report buffer were included in the Lotsearch report (attached in the appendices). The records indicated the following:

- There was one motor garage and/or engineer's business registered within the report buffer during the 1950s. This was located over 900m up-gradient of the site; and
- There was one motor service stations-petrol, oil etc. business registered within the report buffer during the 1970s. This business was located approximately 460m up-gradient of the site.

EIS are of the opinion that the historical businesses in the report buffer could potentially represent potential off-site sources of site contamination.

In addition to the above, EIS have reviewed additional information contained within the Lotsearch report and note the following:

- There were no state heritage items at the site or in the immediate surrounds. However, a local heritage item (Macquarie University ruins) was located on Macquarie University campus;
- The presence of native vegetation is noted to be present on the university campus. An ecologist should be contacted to assess any ecological constraints to the site;

[10] NSW Government Legislation, (1997). *Protection of the Environment Operations Act 1997.* (referred to as POEO Act 1997)

- There was no natural occurring asbestos potential at the site or in the immediate surrounds;
- There were no State Environmental Planning Policy Protected Areas at the site or in the immediate surrounds;
- The site was under the State Environmental Policy Major Developments (2005); and
- There was no dryland salinity data available for the site or for the immediate surrounds.

4.4 Summary of Site History Information

A summary of the historical land uses and activities is presented in the table below. The information presented in the table is based on a weight of evidence assessment of the site history documentation and observations made by EIS.

Table 4-2: Summary of Historical Land Uses

Year(s)	Potential Land Use / Activities	Supporting Evidence
Pre-1970	Agricultural (grazing)/Market Gardens	The aerial photographs dated prior to 1970 indicated the site and surrounds were used for farming or market garden purposes.
1970-Present	Macquarie University Campus	The aerial photographs from 1970 onwards identified the site being progressively developed with buildings, infrastructure and landscaping of the present day Macquarie University campus.

4.5 Integrity of Site History Information

The majority of the site history information has been obtained from government organisations as outlined and the relevant sections of this report. The veracity of the information from these sources is considered to be relatively high. A certain degree of information loss can be expected given the lack of specific land use details over time. EIS has relied upon the Lotsearch report and has not independently verified any information contained within. However, it is noted that the Lotsearch report is generated based on databases maintained by various government agencies and is expected to be reliable.

5 CONCEPTUAL SITE MODEL

NEPM (2013) defines a CSM as a representation of site related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM for the site is presented in the following sub-sections and is based on the site information (including the site inspection information) and the review of site history information. Reference should also be made to the figures attached in the appendices.

5.1 Potential Contamination Sources/AEC and CoPC

The potential contamination sources/AEC and CoPC are presented in the following table:

Table 5-1: Potential Contamination Sources/AEC and Contaminants of Potential Concern

Source / AEC	CoPC
Fill material - The site appears to have been historically filled to achieve the existing levels. The fill may have been imported from various sources and could be contaminated.	Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), petroleum hydrocarbons (referred to as total recoverable hydrocarbons – TRHs), benzene, toluene, ethylbenzene and xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs), organophosphate pesticides (OPPs), polychlorinated biphenyls (PCBs) and asbestos.
Historical agricultural use – The site appears to have been used for grazing and/or market garden purposes historically. This could have resulted in contamination across the site via use of machinery, application of pesticides and building/demolition of various structures. The remains of asbestos cement irrigation pipes may be present.	Heavy metals, TRH, PAHs, OCPs, PCBs and asbestos
Use of pesticides – Pesticides may have been used beneath the buildings and/or around the site.	Heavy metals, OCPs and OPPs
Hazardous Building Material – Hazardous building materials may be present as a result of former building and demolition activities. These materials may also be present in the existing buildings/ structures on site.	Asbestos, lead and PCBs
Soil Mounds – Landscaped soil mounds were located to the south of Building W6A. These	Heavy metals, TRH, BTEXN, PAHs, OCPs, OPPs, PCBs and asbestos

Source / AEC	CoPC
could contain potential contaminated fill material within them.	
Off-site area – A service station is located up-gradient of the site Historical service station/garage businesses were also located up-gradient of the site However, the distance of these facilities from the site (greater than 500m) suggests that the potential risk of migration is very low	Heavy metals (lead), TRH and BTEXN

5.2 Mechanism for Contamination, Affected Media, Receptors and Exposure Pathways

The mechanisms for contamination, affected media, receptors and exposure pathways relevant to the potential contamination sources/AEC are outlined in the following CSM table:

Table 5-2: CSM

Potential mechanism for contamination	Potential mechanisms for contamination include: • Fill material – importation of impacted material, 'top-down' impacts (e.g. leaching from surficial material), or sub-surface release (e.g. impacts from buried material); • Historical agricultural use – 'top-down' and spills (e.g. application of pesticides, refuelling or repairing machinery, and other activities at the ground surface level); • Use of pesticides – 'top-down' and spills (e.g. during normal use, application and/or improper storage); • Hazardous building materials – 'top-down' (e.g. demolition resulting in surficial impacts in unpaved areas); • Soil Mounds - importation of impacted material, 'top-down' impacts (e.g. leaching from surficial material), or sub-surface release (e.g. impacts from buried material); and • Off-site land uses – 'top-down', spill or sub-surface release. Impacts to the site could occur via migration of contaminated groundwater.
Affected media	Soil/soil vapour, surface water and groundwater have been identified as potentially affected media.
Receptor identification	Human receptors include site occupants/users, construction workers and intrusive maintenance workers. Off-site human receptors include adjacent land users, groundwater users and recreational water users within Mars Creek. Ecological receptors include terrestrial organisms and plants within unpaved areas (including the current and proposed landscaped areas), and freshwater/marine ecology in Mars Creek.

Potential Exposure pathways	Potential exposure pathways relevant to the human receptors include ingestion, dermal absorption and inhalation of dust (all contaminants) and vapours (volatile TRH, naphthalene and BTEX). The potential for exposure would typically be associated with the construction and excavation works, and use of unpaved areas (i.e. the gardens) and basement (i.e. vapour inhalation or incidental contact with groundwater seepage and groundwater at Mars Creek). Potential exposure pathways for ecological receptors include primary contact and ingestion. Exposure to groundwater is unlikely to occur in the Mars Creek through direct migration, however groundwater has the potential to enter the creek via the stormwater system (which is expected to discharge into the creek) in a drained basement scenario.
Presence of preferential pathways for contaminant movement	The underground railway tunnel and the associated trench(es) and backfill is a potential preferential pathway for contaminant migration. This could occur via groundwater/seepage if present, or via soil/vapour migration through the cavities and/or backfill.

5.3 Assessment of Data Gaps

EIS has undertaken a preliminary data gap analysis based on the findings of assessment. The data gaps and our comments are outlined in the following table:

Table 5-3: Data Gap Assessment

Data Gap	EIS Comments
Historical land titles search	Historical land titles records were not obtained for the site and aerial photographs and other information from the Lotsearch document was relied upon. EIS are of the opinion that the aerial photographs within the Lotsearch document are likely to be representative of the site.
Council Records	The review of council records was limited to planning-related information within the section 149 certificate and/or within the Local Environmental Plan (as outlined in the Lotsearch report attached in the appendices). EIS are of the opinion that further review of council records such as building approval and development application records is unlikely to identify any information that would alter the outcome of the assessment at this stage.
SafeWork NSW	SafeWork NSW records were not obtained for this assessment. Dangerous goods licences are most likely to be associated with

Data Gap	EIS Comments
	small scale storage and use of chemicals in the various University laboratories.
Groundwater Sampling	Groundwater sampling and analysis was outside the scope of this assessment.

6 SAMPLING, ANALYSIS AND QUALITY PLAN

6.1 Data Quality Objectives (DQO)

The NEPM 2013 defines the DQO process as a seven step iterative planning tool used to define the type, quantity and quality of data needed to inform decisions relating to the environmental condition of the site. The DQO process is detailed in the Site Auditor Guidelines 2006 and the USEPA documents Data Quality Objectives Processes for Hazardous Waste Site Investigations (2000) and Guidance on Systematic Planning Using the Data Quality Objectives Process (2006). These seven steps are applicable to this assessment as summarised in the table below:

Table 6-1: DQOs – Seven Steps

Step	Input
State the Problem	The CSM has identified AEC at the site which may pose a risk to the site receptors. A preliminary intrusive investigation was required to assess the risk and comment on the suitability of the site for the proposed development or intended landuse. The assessment also aims to meet the requirements of SEPP55 in order to address the council DA process.
Identify the Decisions/ Goal of the Study	The data collection is project specific and has been designed based on the following information: • Review of site information including site history; • AEC, CoPC, receptors, pathways and medium identified in the CSM; • Development of SAC for each media; and • The use of decision statements outlined below: a) Are there elevated concentrations of contaminants above the SAC present in the soil samples? b) Was asbestos containing material identified in sub-surface samples? c) Is further investigation required? d) Is the site suitable for the proposed use? The data will be assessed in the following way: 1) Statistical analysis will be used to assess the laboratory data against the SAC. The following criteria will be adopted: ➢ The 95%/99% Upper Confidence Limit (UCL) value of the arithmetic mean concentration of each contaminant should be less than the SAC; ➢ The standard deviation (SD) of the results must be less than 50% of the SAC; and ➢ No single value exceeds 250% of the relevant SAC. 2) Statistical calculations will not be undertaken if all results are below the SAC; and 3) Statistical calculations will not be undertaken on the following: ➢ Health Screening Levels (HSLs) – elevated point source contamination associated with petroleum hydrocarbons can pose a vapour risk to receptors;

Step	Input
	➢ Ecological Investigation Levels (EILs) – elevated EILs can pose a potential point source ecological risk; and ➢ Groundwater Investigation Levels (GILs) – elevated GILs can indicate a wider groundwater contamination risk.
Identify Information Inputs	The following information will be collected: • Soil samples based on subsurface conditions; • The SAC will be designed based on the criteria outlined in NEPM 2013. Other criteria will be used as required and detailed in this report; • The samples will be analysed in accordance with the analytical methods outlined in NEPM 2013; • Field screening information (i.e. PID data, presence of hydrocarbons etc.) will be taken into consideration in selecting the analytical schedule; and • Any additional information that may arise during the field work will also be used as data inputs.
Define the Study Boundary	The sampling will be confined to the site boundaries as shown in Figure 1. Fill has been identified as an AEC. The source of fill has not been established. Fill is considered to be heterogeneous material with PCC occurring in random pockets or layers. The presence of PCC in between sampling points cannot be measured. The areas excluded from the investigation are outlined in the data gaps.
Develop the analytical approach (or decision rule)	The following acceptable limits will be adopted for the data quality assessment: • The following acceptance criteria will be used to assess the RPD results: ➢ results > 10 times the practical quantitation limit (PQL), RPDs < 50% are acceptable; ➢ results between 5 and 10 times PQL, RPDs < 75% are acceptable; ➢ results < 5 times PQL, RPDs < 100% are acceptable; and ➢ An explanation is provided if RPD results are outside the acceptance criteria. • Acceptable concentrations in Trip Spike (TS), Trip Blank (TB) and Field Rinsate (FR) samples. Non-compliance to be documented in the report; • The following acceptance criteria will be used to assess the primary laboratory QA/QC results. Non-compliance to be documented: ➢ <u>RPDs</u>: - Results that are < 5 times the PQL, any RPD is acceptable; and - Results > 5 times the PQL, RPDs between 0-50% are acceptable; ➢ <u>LCS recovery and matrix spikes</u>: - 70-130% recovery acceptable for metals and inorganics; - 60-140% recovery acceptable for organics; and - 10-140% recovery acceptable for VOCs; ➢ <u>Surrogate spike recovery</u>: - 60-140% recovery acceptable for general organics; and - 10-140% recovery acceptable for VOCs;

Step	Input
	➢ Blanks: All less than PQL.
Specify the performance or acceptance criteria	NEPM 2013 defines decision errors as '*incorrect decisions caused by using data which is not representative of site conditions'*. This can arise from errors during sampling or analytical testing. A combination of these errors is referred to as '*total study error*'. The study error can be managed through the correct choice of sample design and measurement. Decision errors can be controlled through the use of hypothesis testing. The test can be used to show either that the baseline condition is false or that there is insufficient evidence to indicate that the baseline condition is false. The null hypothesis is an assumption that is assumed to be true in the absence of contrary evidence. In this case, for example, the PCC identified in the PCSM is considered to pose a risk to receptors unless proven not to. The null hypothesis has been adopted for this assessment.
Optimise the design for obtaining data	The most resource-effective design will be used in an optimum manner to achieve the assessment objectives.

6.2 Soil Sampling Plan and Methodology

The soil sampling plan and methodology adopted for this assessment is outlined in the table below:

Table 6-2: Soil Sampling Plan and Methodology

Aspect	Input
Sampling Density	The NSW EPA Contaminated Sites Sampling Design Guidelines (1995[11]) recommend a sampling density for an environmental assessment based on the size of the investigation area. The guideline provides a minimum number of sampling points required for the investigation on a systematic sampling pattern. The guidelines recommend sampling from a minimum of 25 evenly spaced sampling points for this site with an area of approximately 1.3 ha. Samples for this investigation were obtained from 11 sampling points (excluding the 2 sampling points on the soil mounds) as shown on the attached Figure 2. This density (is approximately 44% of) the minimum sampling density recommended by the EPA. The soil mounds at the southern boundary of the site (south of Building W6A) were estimated to be approximately 9,000m^3. Three samples were obtained from two sample locations from the soil mounds. This meets the density recommended in the NEPM 2013.

[11] NSW EPA, (1995), *Contaminated Sites Sampling Design Guidelines.* (referred to as EPA Sampling Design Guidelines 1995)

Aspect	Input
Sampling Plan	The sampling locations were placed on a systematic plan with a grid spacing of approximately 20m between sampling locations. A systematic plan was considered suitable to address potential contaminants associated with the fill material. Two fill mounds are located at the southern boundary of the site. Distribution of contamination in the soil mounds is considered to be random. One sample location each had been chosen for the soil mounds, as a preliminary assessment.
Exclusion Areas (Data Gaps)	Sampling was not undertaken in inaccessible areas of the site such as beneath existing buildings. These areas have been excluded from the investigation.
Sampling Equipment	Soil samples were obtained on 27 September 2016, 28 September 2016, 30 September 2016 and 6 October 2016 in accordance with the standard sampling procedure (SSP) attached in the appendices. In-situ sampling locations were cleared for underground services by an external contractor prior to sampling as outlined in the SSP. The sample locations were drilled using the following equipment as shown on the borehole logs attached in the appendices: • Hydraulically operated drill rig equipped with spiral flight augers. Soil samples were obtained from a Standard Penetration Test (SPT) sampler or directly from the auger when conditions did not allow use of the SPT sampler; and • Hand equipment in hard to access areas i.e. the soil mounds.
Sampling Collection and Field QA/QC	Soil samples were collected from the fill and natural profiles based on field observations. The sampling depths are shown on the logs attached in the appendices. Additional samples were obtained when relatively deep fill (>0.5m) was encountered. Samples were also obtained when there was a distinct change in lithology or based on the observations made during the investigation. During sampling, soil at selected depths was split into primary and duplicate samples for field QA/QC analysis. Samples were placed in glass jars with plastic caps and teflon seals with minimal headspace. Samples for asbestos analysis were placed in zip-lock plastic bags. Sampling personnel used disposable nitrile gloves during sampling activities. The samples were labelled with the job number, sampling location, sampling depth and date in accordance with the SSP.
Field PID Screening for VOCs	A portable Photoionisation Detector (PID) was used to screen the samples for the presence of VOCs and to assist with selection of samples for hydrocarbon analysis.

Aspect	Input
	The sensitivity of the PID is dependent on the organic compound and varies for different mixtures of hydrocarbons. Some compounds give relatively high readings and some can be undetectable even though present in identical concentrations. The portable PID is best used semi-quantitatively to compare samples contaminated by the same hydrocarbon source. The PID is calibrated before use by measurement of an isobutylene standard gas. All the PID measurements are quoted as parts per million (ppm) isobutylene equivalents. PID calibration records are attached in the appendices. PID screening for VOCs was undertaken on soil samples using the soil sample headspace method. VOC data was obtained from partly filled zip-lock plastic bags following equilibration of the headspace gases.
Decontami-nation and Sample Preservation	The decontamination procedure adopted during sampling is outlined in the SSP. Where applicable, the sampling equipment was decontaminated using a scrubbing brush and potable water and Decon 90 solution (phosphate free detergent) followed by rinsing with potable water. Rinsate sample was obtained during the decontamination process as part of the field QA/QC. Soil samples were preserved by immediate storage in an insulated sample container with ice in accordance with the SSP. On completion of the fieldwork, the samples were delivered in the insulated sample container to a NATA registered laboratory for analysis under standard COC procedures.

6.3 Analytical Schedule

The analytical schedule is outlined in the following table:

Table 6-3: Analytical Schedule

PCC/CoPC	Fill Samples	Natural Soil Samples
Heavy Metals	12	6
TRH/BTEXN	12	6
PAHs	12	6
OCPs/OPPs	11	2
PCBs	11	2

PCC/CoPC	Fill Samples	Natural Soil Samples
Asbestos	11	2
TCLP Metals	3	-

6.3.1 Laboratory Analysis

The samples were analysed by the NATA Accredited laboratory/s using the analytical methods detailed in Schedule B(3) of NEPM 2013. Reference should be made to the laboratory reports attached in the appendices for further details.

Table 6-4: Laboratory Details

Samples	Laboratory	Report Reference
All primary samples and field QA/QC samples including (intra-laboratory duplicates, trip blank, trip spike and field rinsate samples)	Envirolab Services Pty Ltd NSW, NATA Accreditation Number – 2901 (ISO/IEC 17025 compliance)	154919 & 154919-A
Inter-laboratory duplicates	SGS Alexandria Environmental NSW NATA Accreditation Number – 2562(4354) (ISO/IEC 17025 compliance)	SE158009

7 SITE ASSESSMENT CRITERIA (SAC)

The SAC adopted for the assessment is outlined in the table below. The SAC has been derived from the NEPM 2013 and other guidelines as applicable. The guideline values for individual contaminants are presented in the attached report tables.

Table 7-1: SAC Adopted for this Investigation

Guideline	Applicability
Health Investigation Levels (HILs) (NEPM 2013)	The HIL-D criteria for 'commercial/industrial' have been adopted for this assessment.
Health Screening Levels (HSLs) (NEPM 2013)	The HSL-D criteria for 'commercial/industrial' have been adopted for this assessment.
Asbestos in Soil	The 'presence/absence' of asbestos in soil has been adopted as the assessment criterion for the Preliminary Site Investigation (PSI).
Waste Classification (WC) Criteria	The criteria outlined in the NSW EPA Waste Classification Guidelines - Part 1: Classifying Waste (2014[12]) has been adopted to classify the material for off-site disposal.

[12] NSW EPA, (2014), *Waste Classification Guidelines, Part 1: Classifying Waste.* (referred to as Waste Classification Guidelines 2014)

8 INVESTIGATION RESULTS

8.1 Subsurface Conditions

A summary of the subsurface conditions encountered during the investigation is presented in the table below. Reference should be made to the borehole logs attached in the appendices for further details.

Table 8-1: Summary of Subsurface Conditions

Profile	Description (m in bgl)
Pavement	Asphaltic Concrete (AC)/Concrete pavement was encountered in BH4, BH5, BH6, BH7, BH8, BH9, BH10 and BH11.
Fill	Fill material was encountered at the surface or beneath the pavement in all boreholes, except in BH11, and extended to depths of approximately 0.1 to 0.6 mBGL in the ground and more than 1 mBGL in the soil mounds. BH12 and BH13 were terminated in the fill in the soil mounds at a maximum depth of approximately 1 mBGL. The fill typically comprised of: silty clay; sandy gravel; clayey gravel; and gravelly sand. The fill contained inclusions of: ironstone gravel (BH1 and BH11); sandstone gravel (BH1); trace of root fibres (BH2); trace silt and brick fragments (BH9); and plastic fragments (BH13). No hydrocarbon odours were encountered in the fill in the boreholes drilled. No asbestos containing material (ACM) was observed in the fill in the boreholes drilled.
Natural Soil	Natural soil was encountered at the surface or beneath the fill in all boreholes, except in BH12 and BH13 in the soil mounds, and extended to depths of approximately 0.8 to 4.3 mBGL. The natural soil typically comprised of: silty clay; and sandy clay (BH6, BH8, and BH9). The natural soils contained inclusions of: ironstone gravel (BH1, BH2, BH3, BH4, BH6, BH7, BH9, BH10 and BH11); sand (BH1 and BH2); trace of root fibres (BH2 and BH7); and trace roots and root fibres (BH10). Sandstone bands and iron indurated bands were observed in BH5. No hydrocarbon odours were encountered in the natural soils in the boreholes drilled. No ACM was observed in the natural soils in the boreholes drilled.
Bedrock	Bedrock was encountered beneath the natural soils in all boreholes (except for BH12 and BH13 in the soil mounds), and extended to depths of approximately 5.2 to 8.78 mBGL upon termination of the boreholes. The bedrock typically comprised of sandstone. The bedrock contained: grey laminae (BH1, BH2, BH4, BH6, and BH7); iron indurated bands (BH2, BH3, BH4, BH5, BH6, BH7, BH8, BH9, BH10 and BH11); and clay bands/seams (BH4, BH7, BH9 and BH11). Interbedded sandstone and shale was observed at BH9 at depths of 5.6 and 7.52 mBGL. No hydrocarbon odours were encountered in the bedrock in the boreholes drilled.

Profile	Description (m in bgl)
Groundwater	Groundwater seepage was not encountered in the boreholes during drilling, except in BH3, BH5, BH8 and BH11. All boreholes remained dry on completion of drilling and a short time after, except BH3, BH4, BH5, BH6, BH7, BH8 and BH11.

8.2 Field Screening

A summary of the field screening results are presented in the table below.

Table 8-2: Summary of Field Screening

Aspect	Details (m in bgl)
PID Screening of Soil Samples for VOCs	PID soil sample headspace readings are presented in attached report tables and the COC documents attached in the appendices. The results ranged from 0.0ppm to 0.5ppm equivalent isobutylene. These results indicate minor PID detectable VOCs.
Groundwater Depth & Flow	Groundwater seepage was encountered in boreholes BH3, BH5, BH8 and BH11 during drilling at depths of approximately 5.1 to 6.8 mBGL. A standing water level (SWL) was measured in boreholes BH3, BH4, BH5, BH6, BH7, BH8 and BH11 at depths ranging from 3.0 to 6.8 mBGL a short time after completion of drilling. The remaining boreholes were dry during and a short time after completion of drilling. SWL measured in the monitoring wells installed at the site (for the geotechnical investigation) ranged from 3.4 to 6.8 mBGL. Groundwater RLs calculated on these measurements ranged from 59.7 to 57.8. The groundwater RLs indicate that excavation for the proposed excavation for the new building may intercept groundwater.

8.3 Soil Laboratory Results

The soil laboratory results are compared to the relevant SAC in the attached report tables. A summary of the results assessed against the SAC is presented below.

Table 8-3: Summary of Soil Laboratory Results

Analyte	Results Compared to SAC
Heavy Metals	**HILs:** All heavy metal results were below the HIL-D criteria. **WC:** All heavy metal results were less than the CT1 criteria, except for nickel in samples BH4 0.05-0.15, BH6 0.1-0.2 and BH9 0.2-0.3. TCLP leachates were prepared from the three samples and analysed for nickel. The results were less than the TCLP1 criteria.

Analyte	Results Compared to SAC
TRH	**HSLs:** All TRH results were below the HSL-D criteria. **WC:** All TRH results were less than the relevant CT1 and SCC1 criteria.
BTEXN	**HSLs:** All BTEXN results were below the HSL-D criteria. **WC:** All BTEX results were less than the relevant CT1 and SCC1 criteria.
PAHs	**HILs:** All PAH results were below the HIL-D criteria. **HSLs:** All naphthalene results were below the HSL-D criteria. **WC:** All PAH results were less than the relevant CT1 and SCC1 criteria.
OCPs & OPPs	**HILs:** All OCP and OPP results were below the HIL-D criteria. **WC:** All OCP and OPP results were less than the relevant CT1 and SCC1 criteria.
PCBs	**HILs:** All PCB results were below the HIL-D criterion. **WC:** All PCB results were less than the SCC1 criterion.
Asbestos	Asbestos was not detected in the samples analysed for the investigation.

9 DATA QUALITY ASSESSMENT

As part of the data quality assessment the following data quality indicators (DQIs) were assessed: precision, accuracy, representativeness, completeness and comparability as outlined in the table below. Reference should be made to the appendices for an explanation of the individual DQI.

Table 9-1: Assessment of DQIs

Completeness

Field Considerations:

- The investigation was designed as a preliminary screening and sampling was confined to accessible areas of the site (see Figure 2);
- Samples were obtained from various depths based on the subsurface conditions encountered at the sampling locations. All samples were recorded on the borehole logs. All sampling points are shown on the attached Figure 2;
- The investigation was undertaken by trained staff in accordance with the SSP; and
- Documentation maintained during the field work is attached in the appendices where applicable.

Laboratory Considerations:

- Selected samples were analysed for a range of PCC/CoPC. For the preliminary screening samples were not analysed for VOCs;
- All samples were analysed by NATA registered laboratory/s in accordance with the analytical methods outlined in NEPM 2013;
- Appropriate analytical methods and PQLs were used by the laboratory/s; and
- Appropriate sample preservation, handling, holding time and COC procedures were adopted for the investigation;

Comparability

Field Considerations:

- The investigation was undertaken by trained staff in accordance with the SSP;
- The climate conditions encountered during the field work were noted on the site description record maintained in the job file; and
- Consistency was maintained during sampling in accordance with the SSP.

Laboratory Considerations:

- All samples were analysed in accordance with the analytical methods outlined in NEPM 2013;
- Appropriate PQLs were used by the laboratory/s for all analysis (other than those outlined above);
- All primary, intra-laboratory duplicate/s and other QA/QC samples were analysed by the same laboratory; and
- The same units were used by the laboratory/s for all of the analysis.

Representativeness

Field Considerations:

- The investigation was designed to obtain appropriate media encountered during the field work as outlined in the SAQP. Dust and/or vapour sampling was outside the scope of this assessment; and
- All media identified in the SAQP was sampled.

Laboratory Considerations:

- All samples were analysed in accordance with the SAQP.

Precision

Field Considerations:

- The investigation was undertaken in accordance with the SSP.

Laboratory Considerations:

- Analysis of field QA/QC samples including inter and intra-laboratory duplicates, trip blank (TB), field rinsate (FR) and trip spike (TS) as outlined below;
- The field QA/QC frequency adopted for the investigation is outlined below;
- Calculation of the Relative Percentage Difference (RPD) from the primary and duplicate results (the RPD calculation equation is outlined in the attached appendices);
- Assessment of RPD results against the acceptance criteria outlined in **Section 6.1.**

Intra-laboratory RPD Results:

Soil Samples at a frequency of 11% of the primary samples:

- Dup A is a soil duplicate of primary sample BH7 0.15-0.25
- Dup B is a soil duplicate of primary sample BH11 0.1-0.2

The intra-laboratory results are presented in the attached report tables. The results indicated that field precision was acceptable.

The RPD values for a range of individual heavy metals were outside the acceptance criteria. Values outside the acceptable limits have been attributed to sample heterogeneity and the difficulties associated with obtaining homogenous duplicate samples of heterogenous matrices.

As both the primary and duplicate sample results were less than the SAC, the exceedances are not considered to have had an adverse impact on the data set as a whole.

Inter-laboratory RPD Results:

Soil Samples at a frequency of 6% of the primary samples:

- Dup C is a soil duplicate of primary sample BH8 0.1-0.2

The inter-laboratory results are presented in the attached report tables. The results indicated that field precision was acceptable.

Trip Spike (TS):

One soil TS was analysed for BTEX at a frequency of one spike per batch of volatiles. The results are presented in the attached report tables.

The results ranged from 98% to 100% and indicated that field preservation methods were appropriate.

Field Rinsate (FR):
One FR samples obtained from the field equipment decontamination process was analysed for BTEXN. The results are presented in the attached report tables.

All results were below the PQL which indicates that cross-contamination artefacts associated with sampling equipment was not present.

Trip Blank (TB):
One soil TB was analysed for BTEX at a frequency of one blank per batch of volatiles. The results are presented in the attached report tables.

The results were all less than the PQLs.

Accuracy

Field Considerations:

- The investigation was undertaken in accordance with the SSP.

Laboratory Considerations:

- The analytical quality assessment adopted by the laboratory/s was in accordance with the NATA and NEPM 2013 requirements as outlined in the analytical report/s;
- A review of the report/s indicates the following comments noted by the laboratory/s:

Envirolab Report 154919 – The laboratory RPD acceptance criteria was exceeded in one sample for nickel. A triplicate result was issued to account for this. Excessive sample volume was provided for asbestos analysis. A portion of the supplied sample was sub-sampled according to the laboratory's internal procedures.

SGS Report SE158009 – The laboratory matrix spikes acceptance criteria failed in two samples for select TRH compounds. The report stated that the recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).

10 WASTE CLASSIFICATION OF SOIL FOR OFF-SITE DISPOSAL

The waste classification of soil for off-site disposal is summarised in the following table:

Table 10-1: Waste Classification

Site Extent / Material Type	Classification	Disposal Option
Fill material at the site	General Solid Waste (non-putrescible) (GSW) subject to further testing of the soil mounds. (The soil mounds were further assessed on 20 April 2017 as GSW (Ref: E29807KR2let-WC, dated 10 May 2017))	A NSW EPA landfill licensed to receive the waste stream. The landfill should be contacted to obtain the required approvals prior to commencement of excavation. Alternatively, the fill material is considered to be suitable for re-use on the subject site (only) provided it meets geotechnical and earthwork requirements.
Natural silty clay and sandy clay soil and sandstone/shale bedrock	Virgin excavated natural material (VENM)	VENM is considered suitable for re-use on-site, or alternatively, the information included in this report may be used to assess whether the material is suitable for beneficial reuse at another site as fill material. Alternatively, the natural material can be disposed of as VENM to a facility licensed by the NSW EPA to receive the waste stream.

11 TIER 1 RISK ASSESSMENT AND REVIEW OF PCSM

For a contaminant to represent a risk to a receptor, the following three conditions must be present:

1. Source – The presence of a contaminant;
2. Pathway – A mechanism or action by which a receptor can become exposed to the contaminant; and
3. Receptor – The human or ecological entity which may be adversely impacted following exposure to contamination.

If one of the above components is missing, the potential for adverse risks is relatively low.

The assessment identified the following:

- Elevated concentrations of contaminants were not encountered in the soil samples analysed for the investigation;
- All results were below the SAC adopted for this assessment; and
- EIS consider the risk posed by the AEC to the receptors to be relatively low.

11.1 Data Gaps

The assessment has identified the following data gaps:

- Areas beneath the existing buildings have not been included in the assessment;
- The presence of hazardous building materials in the existing buildings has not been assessed;
- The current investigation did not include groundwater assessment; and
- Limited sampling was undertaken of the soil mounds located at the site. The soil mounds were further assessed on 20 April 2017 for waste classification (Ref: E29807KR2let-WC, dated 10 May 2017).

12 CONCLUSION

EIS consider that the report objectives outlined in **Section 1.2** have been addressed.

The decision statements specified in section 6.1 are addressed below:

a) Are there elevated concentrations of contaminants above the SAC present in the soil samples? No.
b) Is there asbestos containing material in the soil samples? No.
c) Is further investigation required? Yes. Additional assessment of the soil mounds is required to better confirm the waste classification. This was done on 20 April 2017 (Ref: E29807KR2let-WC, dated 10 May 2017)
d) Is the site suitable for the proposed development? EIS are of the opinion that the site can be made suitable for the proposed development subject to the recommendations below:

1. After the soil mounds have been classified and removed from site, the footprint of the mounds should be inspected by an environmental consultant or licenced asbestos assessor, and a surface clearance provided prior to any excavation works beneath it**;**

2. Undertake a Hazardous Materials Assessment (Hazmat) for the existing buildings prior to the commencement of demolition work.

3. An unexpected finds protocol, that can be implemented during earthworks, should be prepared.

In the event unexpected conditions are encountered during development work or between sampling locations that may pose a contamination risk, all works should stop and an environmental consultant should be engaged to inspect the site and address the issue.

12.1 Regulatory Requirement

The regulatory requirements applicable for the site are outlined in the following table:

Table 12-1: Regulatory Requirement

Guideline	Applicability
Duty to Report Contamination 2015[13]	At this stage, EIS consider that there is no requirement to notify the NSW EPA of the site contamination.
POEO Act 1997	Section 143 of the POEO Act 1997 states that if waste is transported to a place that cannot lawfully be used as a waste facility for that waste, then the transporter and owner of the waste are each guilty of an offence. The transporter and owner of the waste have a duty to ensure that the waste is disposed of in an appropriate manner.

[13] NSW Environment Protection Agency, (2015), *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997.* (referred to as Duty to Report Contamination 2015)

Guideline	Applicability
Dewatering Consent	In the event groundwater is intercepted during excavation works, dewatering may be required. Council, NSW Office of Water (NOW) and other relevant approvals (from discharge authorities like Sydney Water etc.) should be obtained prior to the commencement of dewatering.

13 LIMITATIONS

The report limitations are outlined below:

- EIS accepts no responsibility for any unidentified contamination issues at the site. Any unexpected problems/subsurface features that may be encountered during development works should be inspected by an environmental consultant as soon as possible;
- Previous use of this site may have involved excavation for the foundations of buildings, services, and similar facilities. In addition, unrecorded excavation and burial of material may have occurred on the site. Backfilling of excavations could have been undertaken with potentially contaminated material that may be discovered in discrete, isolated locations across the site during construction work;
- This report has been prepared based on site conditions which existed at the time of the investigation; scope of work and limitation outlined in the EIS proposal; and terms of contract between EIS and the client (as applicable);
- The conclusions presented in this report are based on investigation of conditions at specific locations, chosen to be as representative as possible under the given circumstances, visual observations of the site and immediate surrounds and documents reviewed as described in the report;
- Subsurface soil and rock conditions encountered between investigation locations may be found to be different from those expected. Groundwater conditions may also vary, especially after climatic changes;
- The investigation and preparation of this report have been undertaken in accordance with accepted practice for environmental consultants, with reference to applicable environmental regulatory authority and industry standards, guidelines and the assessment criteria outlined in the report;
- Where information has been provided by third parties, EIS has not undertaken any verification process, except where specifically stated in the report;
- EIS has not undertaken any assessment of off-site areas that may be potential contamination sources or may have been impacted by site contamination, except where specifically stated in the report;
- EIS accept no responsibility for potentially asbestos containing materials that may exist at the site. These materials may be associated with demolition of pre-1990 constructed buildings or fill material at the site;
- EIS have not and will not make any determination regarding finances associated with the site;
- Additional investigation work may be required in the event of changes to the proposed development or landuse. EIS should be contacted immediately in such circumstances;
- Material considered to be suitable from a geotechnical point of view may be unsatisfactory from a soil contamination viewpoint, and vice versa; and
- This report has been prepared for the particular project described and no responsibility is accepted for the use of any part of this report in any other context or for any other purpose.

LIST OF IN-TEXT TABLES

IMPORTANT INFORMATION ABOUT THIS REPORT

These notes have been prepared by EIS to assist with the assessment and interpretation of this report.

The Report is based on a Unique Set of Project Specific Factors
This report has been prepared in response to specific project requirements as stated in the EIS proposal document which may have been limited by instructions from the client. This report should be reviewed, and if necessary, revised if any of the following occur:

- The proposed land use is altered;
- The defined subject site is increased or sub-divided;
- The proposed development details including size, configuration, location, orientation of the structures or landscaped areas are modified;
- The proposed development levels are altered, eg addition of basement levels; or
- Ownership of the site changes.

EIS/J&K will not accept any responsibility whatsoever for situations where one or more of the above factors have changed since completion of the assessment. If the subject site is sold, ownership of the assessment report should be transferred by EIS to the new site owners who will be informed of the conditions and limitations under which the assessment was undertaken. No person should apply an assessment for any purpose other than that originally intended without first conferring with the consultant.

Changes in Subsurface Conditions
Subsurface conditions are influenced by natural geological and hydrogeological process and human activities. Groundwater conditions are likely to vary over time with changes in climatic conditions and human activities within the catchment (e.g. water extraction for irrigation or industrial uses, subsurface waste water disposal, construction related dewatering). Soil and groundwater contaminant concentrations may also vary over time through contaminant migration, natural attenuation of organic contaminants, ongoing contaminating activities and placement or removal of fill material. The conclusions of an assessment report may have been affected by the above factors if a significant period of time has elapsed prior to commencement of the proposed development.

This Report is based on Professional Interpretations of Factual Data
Site assessments identify actual subsurface conditions at the actual sampling locations at the time of the investigation. Data obtained from the sampling and subsequent laboratory analyses, available site history information and published regional information is interpreted by geologists, engineers or environmental scientists and opinions are drawn about the overall subsurface conditions, the nature and extent of contamination, the likely impact on the proposed development and appropriate remediation measures.

Actual conditions may differ from those inferred, because no professional, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from predictions. Nothing can be done to prevent the unanticipated, but steps can be taken to help minimise the impact. For this reason, site owners should retain the services of their consultants throughout the development stage of the project, to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.

Assessment Limitations
Although information provided by a site assessment can reduce exposure to the risk of the presence of contamination, no environmental site assessment can eliminate the risk. Even a rigorous professional assessment may not detect all contamination on a site. Contaminants may be present in areas that were not surveyed or sampled, or may migrate to areas which showed no signs of contamination when sampled. Contaminant analysis cannot possibly cover every type of contaminant which may occur; only the most likely contaminants are screened.

Misinterpretation of Site Assessments by Design Professionals

Costly problems can occur when other design professionals develop plans based on misinterpretation of an assessment report. To minimise problems associated with misinterpretations, the environmental consultant should be retained to work with appropriate professionals to explain relevant findings and to review the adequacy of plans and specifications relevant to contamination issues.

Logs Should not be Separated from the Assessment Report

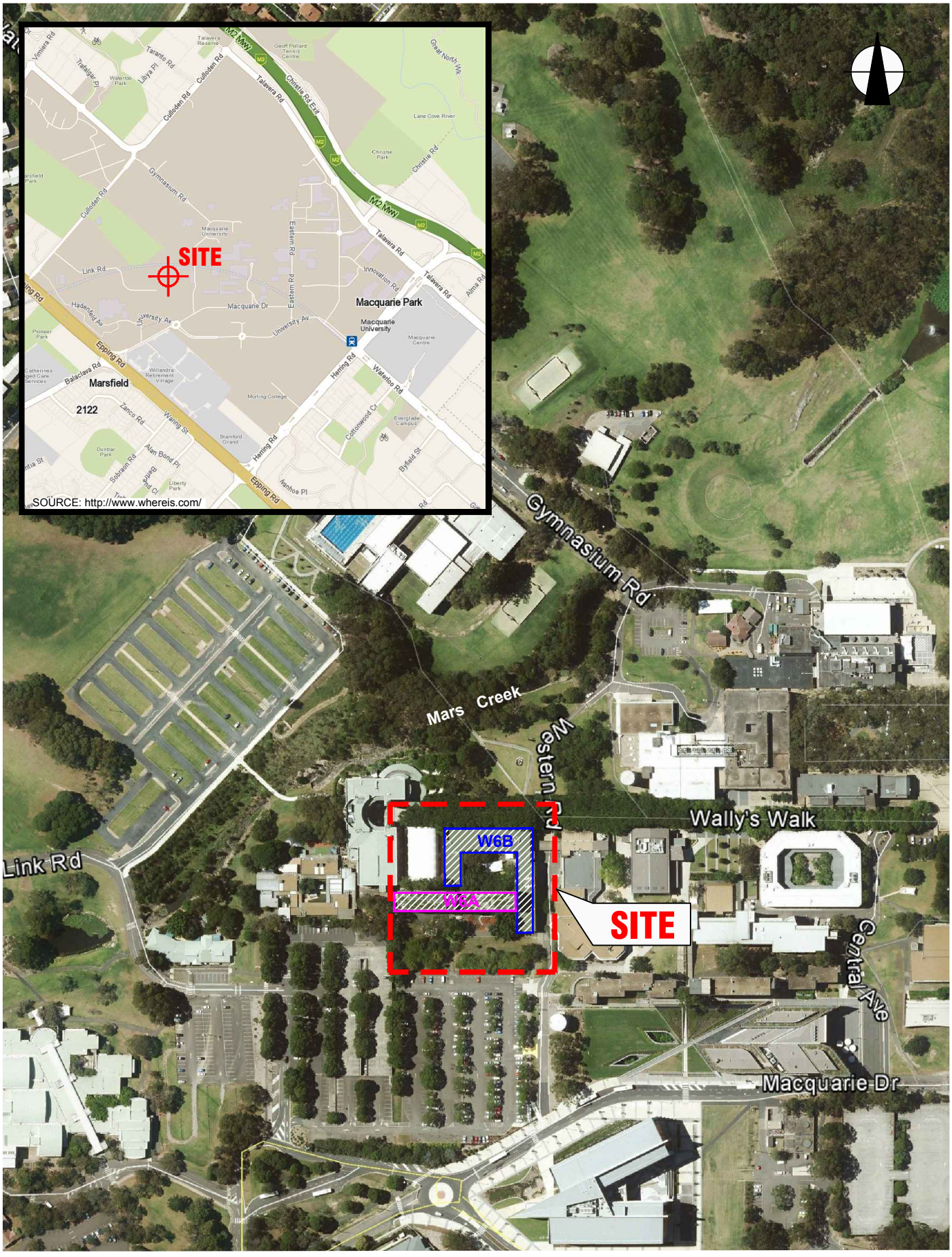
Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other design drawings, as subtle but significant drafting errors or omissions may occur in the transfer process. Photographic reproduction can eliminate this problem, however contractors can still misinterpret the logs during bid preparation if separated from the text of the assessment. If this occurs, delays, disputes and unanticipated costs may result. In all cases it is necessary to refer to the rest of the report to obtain a proper understanding of the assessment. Please note that logs with the 'Environmental Log' header are not suitable for geotechnical purposes as they have not been peer reviewed by a Senior Geotechnical Engineer.

To reduce the likelihood of borehole and test pit log misinterpretation, the complete assessment should be available to persons or organisations involved in the project, such as contractors, for their use. Denial of such access and disclaiming responsibility for the accuracy of subsurface information does not insulate an owner from the attendant liability. It is critical that the site owner provides all available site information to persons and organisations such as contractors.

Read Responsibility Clauses Closely

Because an environmental site assessment is based extensively on judgement and opinion, it is necessarily less exact than other disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, model clauses have been developed for use in written transmittals. These are definitive clauses designed to indicate consultant responsibility. Their use helps all parties involved recognise individual responsibilities and formulate appropriate action. Some of these definitive clauses are likely to appear in the environmental site assessment, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to any questions.

REPORT FIGURES



AERIAL IMAGE SOURCE: GOOGLE EARTH PRO 7.1.5.1557
AERIAL IMAGE ©: 2015 GOOGLE INC.

This plan should be read in conjunction with the EIS report.

Title: **SITE LOCATION PLAN**

Location: BUILDING W6A & 6B
MACQUARIE UNIVERSITY, MACQUARIE PARK, NSW

Report No: E29807KR

Figure No: 1

ENVIRONMENTAL INVESTIGATION SERVICES

EIS

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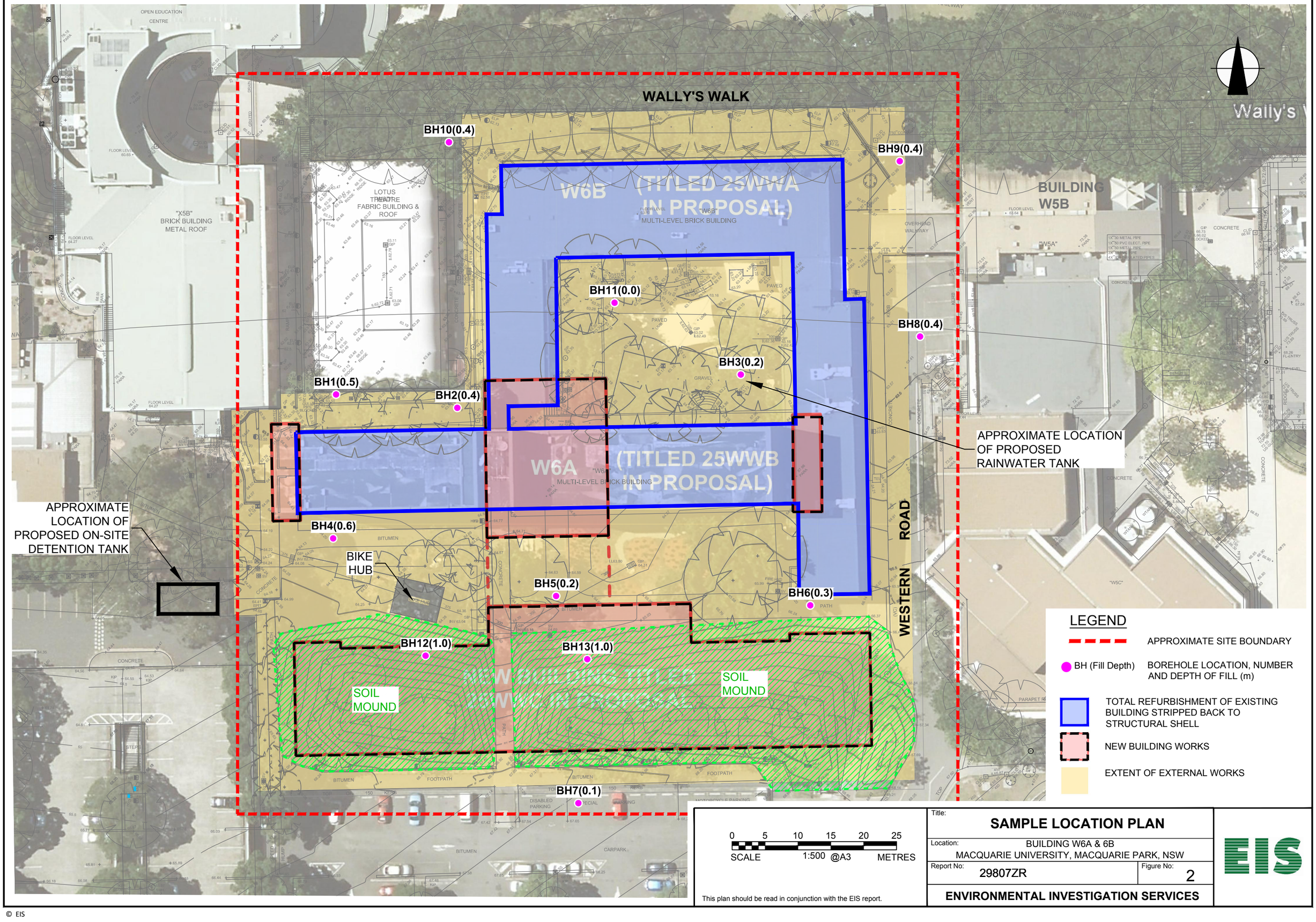
WALLY'S WALK
BH10(0.4)
BH9(0.4)
BH11(0.0)
BH8(0.4)
BH3(0.2)
BH1(0.5)
BH2(0.4)
BH4(0.6)
BH5(0.2)
BH6(0.3)
BH12(0.1.0)
BH13(1.0)
BH7(0.1)
W6B (TITLED 25WWA IN PROPOSAL)
W6A (TITLED 25WWB IN PROPOSAL)
"X5B" BRICK BUILDING METAL ROOF
LOTUS THEATRE FABRIC BUILDING & ROOF
BUILDING W5B
"W5A"
"W5C"
OPEN EDUCATION CENTRE
BIKE HUB
SOIL MOUND
SOIL MOUND
APPROXIMATE LOCATION OF PROPOSED ON-SITE DETENTION TANK
APPROXIMATE LOCATION OF PROPOSED RAINWATER TANK
WESTERN ROAD
Wally's W
LEGEND
APPROXIMATE SITE BOUNDARY
BH (Fill Depth) BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL (m)
TOTAL REFURBISHMENT OF EXISTING BUILDING STRIPPED BACK TO STRUCTURAL SHELL
NEW BUILDING WORKS
EXTENT OF EXTERNAL WORKS
0 5 10 15 20 25
SCALE 1:500 @A3 METRES
This plan should be read in conjunction with the EIS report.
Title: SAMPLE LOCATION PLAN
Location: BUILDING W6A & 6B MACQUARIE UNIVERSITY, MACQUARIE PARK, NSW
Report No: 29807ZR
Figure No: 2
ENVIRONMENTAL INVESTIGATION SERVICES
EIS
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LABORATORY SUMMARY TABLES

TABLE A
SOIL LABORATORY RESULTS COMPARED TO HILs D
All data in mg/kg unless stated otherwise

			HEAVY METALS								PAHs		ORGANOCHLORINE PESTICIDES (OCPs)							OP PESTICIDES (OPPs)	TOTAL PCBs	ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium VI [2]	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B(a)P TEQ [3]	HCB	Endosulfan	Methoxychlor	Aldrin & Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor	Chlorpyrifos		
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	100
Site Assessment Criteria (SAC) [1]			3000	900	3600	240000	1500	730	6000	400000	4000	40	80	2000	2500	45	530	3600	50	2000	7	Detected/Not Detected
Sample Reference	**Sample Depth**	**Sample Description**																				
BH1	0.0-0.1	Fill	11	LPQL	41	13	29	0.1	2	49	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH2	0.0-0.1	Fill	9	LPQL	35	16	40	0.1	3	57	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH2	0.4-0.5	Silty Clay	7	LPQL	21	9	18	LPQL	1	11	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH3	0.1-0.2	Fill	LPQL	LPQL	4	190	6	LPQL	13	36	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH4	0.05-0.15	Fill	6	LPQL	63	19	12	LPQL	54	43	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH5	0.05-0.15	Fill	LPQL	LPQL	19	36	2	LPQL	39	29	0.32	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH6	0.1-0.2	Fill	LPQL	LPQL	18	67	3	LPQL	49	32	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH7	0.15-0.25	Silty Clay	8	LPQL	30	4	22	LPQL	7	36	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH7	0.4-0.5	Silty Clay	10	LPQL	34	LPQL	22	LPQL	1	4	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH8	0.1-0.2	Fill	4	LPQL	12	81	10	LPQL	7	30	0.17	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH9	0.2-0.3	Fill	LPQL	LPQL	29	71	49	0.1	61	82	5.7	0.8	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH9	0.5-0.6	Sandy Clay	6	LPQL	28	LPQL	9	LPQL	1	1	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH10	0.15-0.25	Fill	10	LPQL	77	16	30	0.2	29	61	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH10	0.9-1.0	Silty Clay	8	LPQL	26	1	15	LPQL	LPQL	4	LPQL	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH11	0.1-0.2	Silty Clay	8	LPQL	21	7	19	LPQL	4	24	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH12	0.0-0.2	Fill	11	LPQL	38	11	34	0.1	2	69	0.4	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH12	0.9-1.0	Fill	9	LPQL	37	16	40	0.2	3	92	0.11	LPQL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH13	0.5-0.6	Fill	8	LPQL	29	9	28	LPQL	3	52	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
Total Number of Samples			18	18	18	18	18	18	18	18	18	18	13	13	13	13	13	13	13	13	13	13
Maximum Value			11	LPQL	77	190	49	0.2	61	92	5.7	0.8	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NC

Explanation:

1 - Site Assessment Criteria (SAC): NEPM 2013, HIL-D: 'Commercial/Industrial'

2 - The results are for Total Chromium which includes Chromium III and VI. For initial screening purposes, we have assumed that the samples contain only Chromium VI unless demonstrated otherwise by additional analysis.

3 - B(a)P TEQ - Benzo(a)pyrene Toxicity Equivalence Quotient has been calculated based on 8 carcinogenic PAHs and their Toxic Equivalence Factors (TEFs) outlined in NEPM 2013

Concentration above the SAC **VALUE**

Standard deviation exceeds data assessment criteria VALUE

Abbreviations:

PAHs: Polycyclic Aromatic Hydrocarbons
B(a)P: Benzo(a)pyrene
PQL: Practical Quantitation Limit
LPQL: Less than PQL
OPP: Organophosphorus Pesticides
OCP: Organochlorine Pesticides
PCBs: Polychlorinated Biphenyls
UCL: Upper Level Confidence Limit on Mean Value
HILs: Health Investigation Levels
NA: Not Analysed
NC: Not Calculated
NSL: No Set Limit
SAC: Site Assessment Criteria
NEPM: National Environmental Protection Measure

TABLE B
SOIL LABORATORY RESULTS COMPARED TO HSLs
All data in mg/kg unless stated otherwise

					C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	PID [2]
PQL - Envirolab Services					25	50	0.2	0.5	1	3	1	
HSL Land Use Category [1]					**COMMERCIAL/INDUSTRIAL**							
Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**								
BH1	0.0-0.1	Fill	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.1
BH2	0.0-0.1	Fill	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.3
BH2	0.4-0.5	Silty Clay	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.5
BH3	0.1-0.2	Fill	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.2
BH4	0.05-0.15	Fill	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.1
BH5	0.05-0.15	Fill	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH6	0.1-0.2	Fill	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.2
BH7	0.15-0.25	Silty Clay	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.3
BH7	0.4-0.5	Silty Clay	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.2
BH8	0.1-0.2	Fill	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.3
BH9	0.2-0.3	Fill	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.1
BH9	0.5-0.6	Sandy Clay	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.1
BH10	0.15-0.25	Fill	0m to < 1m	Sand	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH10	0.9-1.0	Silty Clay	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0
BH11	0.1-0.2	Silty Clay	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.2
BH12	0.0-0.2	Fill	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.3
BH12	0.9-1.0	Fill	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.2
BH13	0.5-0.6	Fill	0m to < 1m	Clay	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.1
Total Number of Samples					18	18	18	18	18	18	18	18
Maximum Value					LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0.5

Explanation:
1 - Site Assessment Criteria (SAC): NEPM 2013
2 - Field PID values obtained during the investigation

Concentration above the SAC **VALUE**
The guideline corresponding to the elevated value is highlighted in grey in the Site Assessment Criteria Table below

Abbreviations:

UCL: Upper Level Confidence Limit on Mean Value	NC: Not Calculated	PQL: Practical Quantitation Limit
HSLs: Health Screening Levels	NL: Not Limiting	LPQL: Less than PQL
NA: Not Analysed	SAC: Site Assessment Criteria	NEPM: National Environmental Protection Measure

SITE ASSESSMENT CRITERIA

					C_6-C_{10} (F1)	>C_{10}-C_{16} (F2)	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene
PQL - Envirolab Services					25	50	0.2	0.5	1	3	1
HSL Land Use Category [1]					**COMMERCIAL/INDUSTRIAL**						
Sample Reference	**Sample Depth**	**Sample Description**	**Depth Category**	**Soil Category**							
BH1	0.0-0.1	Fill	0m to < 1m	Clay	310	NL	4	NL	NL	NL	NL
BH2	0.0-0.1	Fill	0m to < 1m	Clay	310	NL	4	NL	NL	NL	NL
BH2	0.4-0.5	Silty Clay	0m to < 1m	Clay	310	NL	4	NL	NL	NL	NL
BH3	0.1-0.2	Fill	0m to < 1m	Sand	260	NL	3	NL	NL	230	NL
BH4	0.05-0.15	Fill	0m to < 1m	Clay	310	NL	4	NL	NL	NL	NL
BH5	0.05-0.15	Fill	0m to < 1m	Sand	260	NL	3	NL	NL	230	NL
BH6	0.1-0.2	Fill	0m to < 1m	Sand	260	NL	3	NL	NL	230	NL
BH7	0.15-0.25	Silty Clay	0m to < 1m	Clay	310	NL	4	NL	NL	NL	NL
BH7	0.4-0.5	Silty Clay	0m to < 1m	Clay	310	NL	4	NL	NL	NL	NL
BH8	0.1-0.2	Fill	0m to < 1m	Sand	260	NL	3	NL	NL	230	NL
BH9	0.2-0.3	Fill	0m to < 1m	Sand	260	NL	3	NL	NL	230	NL
BH9	0.5-0.6	Sandy Clay	0m to < 1m	Clay	310	NL	4	NL	NL	NL	NL
BH10	0.15-0.25	Fill	0m to < 1m	Sand	260	NL	3	NL	NL	230	NL
BH10	0.9-1.0	Silty Clay	0m to < 1m	Clay	310	NL	4	NL	NL	NL	NL
BH11	0.1-0.2	Silty Clay	0m to < 1m	Clay	310	NL	4	NL	NL	NL	NL
BH12	0.0-0.2	Fill	0m to < 1m	Clay	310	NL	4	NL	NL	NL	NL
BH12	0.9-1.0	Fill	0m to < 1m	Clay	310	NL	4	NL	NL	NL	NL
BH13	0.5-0.6	Fill	0m to < 1m	Clay	310	NL	4	NL	NL	NL	NL

TABLE C
SOIL LABORATORY RESULTS COMPARED TO WASTE CLASSIFICATION GUIDELINES (2014)
All data in mg/kg unless stated otherwise

			HEAVY METALS								PAHs		OC/OP PESTICIDES				Total	TRH					BTEX COMPOUNDS				ASBESTOS FIBRES
			Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B(a)P	Total Endosulfans	Chloropyrifos	Total Moderately Harmful [2]	Total Scheduled[3]	Total PCBs	C_6-C_9	C_{10}-C_{14}	C_{15}-C_{28}	C_{29}-C_{36}	Total C_{10}-C_{36}	Benzene	Toluene	Ethyl benzene	Total Xylenes	
PQL - Envirolab Services			4	0.4	1	1	1	0.1	1	1	-	0.05	0.1	0.1	0.1	0.1	0.1	25	50	100	100	250	0.2	0.5	1	3	100
General Solid Waste CT1 [1]			100	20	100	NSL	100	4	40	NSL	200	0.8	60	4	250	<50	<50	650		NSL		10,000	10	288	600	1,000	-
General Solid Waste SCC1 [1]			500	100	1900	NSL	1500	50	1050	NSL	200	10	108	7.5	250	<50	<50	650		NSL		10,000	18	518	1,080	1,800	-
Restricted Solid Waste CT2 [1]			400	80	400	NSL	400	16	160	NSL	800	3.2	240	16	1000	<50	<50	2600		NSL		40,000	40	1,152	2,400	4,000	-
Restricted Solid Waste SCC2 [1]			2000	400	7600	NSL	6000	200	4200	NSL	800	23	432	30	1000	<50	<50	2600		NSL		40,000	72	2,073	4,320	7,200	-
Sample Reference	**Sample Depth**	**Sample Description**																									
BH1	0.0-0.1	Fill	11	LPQL	41	13	29	0.1	2	49	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH2	0.0-0.1	Fill	9	LPQL	35	16	40	0.1	3	57	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH2	0.4-0.5	Silty Clay	7	LPQL	21	9	18	LPQL	1	11	LPQL	LPQL	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA
BH3	0.1-0.2	Fill	LPQL	LPQL	4	190	6	LPQL	13	36	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH4	0.05-0.15	Fill	6	LPQL	63	19	12	LPQL	**54**	43	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH5	0.05-0.15	Fill	LPQL	LPQL	19	36	2	LPQL	39	29	0.32	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	240	240	LPQL	LPQL	LPQL	LPQL	Not Detected
BH6	0.1-0.2	Fill	LPQL	LPQL	18	67	3	LPQL	**49**	32	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH7	0.15-0.25	Silty Clay	8	LPQL	30	4	22	LPQL	7	36	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH7	0.4-0.5	Silty Clay	10	LPQL	34	LPQL	22	LPQL	1	4	LPQL	LPQL	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA
BH8	0.1-0.2	Fill	4	LPQL	12	81	10	LPQL	7	30	0.17	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	200	710	910	LPQL	LPQL	LPQL	LPQL	Not Detected
BH9	0.2-0.3	Fill	LPQL	LPQL	29	71	49	0.1	**61**	82	5.7	0.5	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH9	0.5-0.6	Sandy Clay	6	LPQL	28	LPQL	9	LPQL	1	1	LPQL	LPQL	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA
BH10	0.15-0.25	Fill	10	LPQL	77	16	30	0.2	29	61	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH10	0.9-1.0	Silty Clay	8	LPQL	26	1	15	LPQL	LPQL	4	LPQL	LPQL	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA
BH11	0.1-0.2	Silty Clay	8	LPQL	21	7	19	LPQL	4	24	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH12	0.0-0.2	Fill	11	LPQL	38	11	34	0.1	2	69	0.4	0.07	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
BH12	0.9-1.0	Fill	9	LPQL	37	16	40	0.2	3	92	0.11	LPQL	NA	NA	NA	NA	NA	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	NA
BH13	0.5-0.6	Fill	8	LPQL	29	9	28	LPQL	3	52	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	Not Detected
Total Number of samples			18	18	18	18	18	18	18	18	18	18	13	13	13	13	13	18	18	18	18	18	18	18	18	18	13
Maximum Value			11	LPQL	77	190	49	0.2	61	92	5.7	0.5	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	200	710	910	LPQL	LPQL	LPQL	LPQL	NC

Explanation:

[1] - NSW EPA Waste Classification Guidelines (2014)

[2] - Assessment of Total Moderately Harmful pesticides includes: Dichlorovos, Dimethoate, Fenitrothion, Ethion, Malathion and Parathion

[3] - Assessment of Total Scheduled pesticides include: HBC, alpha-BHC, gamma-BHC, beta-BHC, Heptachlor, Aldrin, Heptachlor Epoxide, gamma-Chlordane, alpha-chlordane, pp-DDE, Dieldrin, Endrin, pp-DDD, pp-DDT, Endrin Aldehyde

Concentration above the CT1 — **VALUE**
Concentration above SCC1 — **VALUE**
Concentration above the SCC2 — **VALUE**

Abbreviations:

PAHs: Polycyclic Aromatic Hydrocarbons
B(a)P: Benzo(a)pyrene
PQL: Practical Quantitation Limit
LPQL: Less than PQL
PID: Photoionisation Detector
PCBs: Polychlorinated Biphenyls
UCL: Upper Level Confidence Limit on Mean Value
NA: Not Analysed
NC: Not Calculated
NSL: No Set Limit
SAC: Site Assessment Criteria
TRH: Total Recoverable Hydrocarbons
CT: Contaminant Threshold
SCC: Specific Contaminant Concentration
HILs: Health Investigation Levels
NEPM: National Environmental Protection Measure
BTEX: Monocyclic Aromatic Hydrocarbons

TABLE D

SOIL LABORATORY TCLP RESULTS

All data in mg/L unless stated otherwise

			Arsenic	Cadmium	Chromium	Lead	Mercury	Nickel	B(a)P
PQL - Envirolab Services			0.05	0.01	0.01	0.03	0.0005	0.02	0.001
TCLP1 - General Solid Waste [1]			5	1	5	5	0.2	2	0.04
TCLP2 - Restricted Solid Waste [1]			20	4	20	20	0.8	8	0.16
TCLP3 - Hazardous Waste [1]			>20	>4	>20	>20	>0.8	>8	>0.16
Sample Reference	**Sample Depth**	**Sample Description**							
BH4	0.05-0.15	Fill	NA	NA	NA	NA	NA	LPQL	NA
BH6	0.1-0.2	Fill	NA	NA	NA	NA	NA	0.06	NA
BH9	0.2-0.3	Fill	NA	NA	NA	NA	NA	0.04	NA
Total Number of samples			0	0	0	0	0	3	0
Maximum Value			LPQL	LPQL	LPQL	LPQL	LPQL	0.06	LPQL

Explanation:

1 - NSW EPA Waste Classification Guidelines (2014)

General Solid Waste	**VALUE**
Restricted Solid Waste	**VALUE**
Hazardous Waste	**VALUE**

Abbreviations:

PQL: Practical Quantitation Limit

LPQL: Less than PQL

B(a)P: Benzo(a)pyrene

NC: Not Calculated

NA: Not Analysed

TCLP: Toxicity Characteristics Leaching Procedure

TABLE E
SOIL INTRA-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS
All results in mg/kg unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = BH7 0.15-0.25	Arsenic	4	8	8	8.0	0
Dup Ref = DUP A	Cadmium	0.4	LPQL	LPQL	NC	NC
	Chromium	1	30	44	37.0	38
Envirolab Report: 154919	Copper	1	4	10	7.0	86
	Lead	1	22	19	20.5	15
	Mercury	0.1	LPQL	LPQL	NC	NC
	Nickel	1	7	23	15.0	107
	Zinc	1	36	26	31.0	32
	Naphthalene	0.1	LPQL	LPQL	NC	NC
	Acenaphthylene	0.1	LPQL	LPQL	NC	NC
	Acenaphthene	0.1	LPQL	LPQL	NC	NC
	Fluorene	0.1	LPQL	LPQL	NC	NC
	Phenanthrene	0.1	LPQL	LPQL	NC	NC
	Anthracene	0.1	LPQL	LPQL	NC	NC
	Fluoranthene	0.1	LPQL	LPQL	NC	NC
	Pyrene	0.1	LPQL	LPQL	NC	NC
	Benzo(a)anthracene	0.1	LPQL	LPQL	NC	NC
	Chrysene	0.1	LPQL	LPQL	NC	NC
	Benzo(b,j+k)fluoranthene	0.2	LPQL	LPQL	NC	NC
	Benzo(a)pyrene	0.05	LPQL	LPQL	NC	NC
	Indeno(123-cd)pyrene	0.1	LPQL	LPQL	NC	NC
	Dibenzo(ah)anthracene	0.1	LPQL	LPQL	NC	NC
	Benzo(ghi)perylene	0.1	LPQL	LPQL	NC	NC
	Total OCPs	0.1	LPQL	LPQL	NC	NC
	Total OPPs	0.1	LPQL	LPQL	NC	NC
	Total PCBs	0.1	LPQL	LPQL	NC	NC
	TRH C_6-C_{10} (F1)	25	LPQL	LPQL	NC	NC
	TRH >C_{10}-C_{16} (F2)	50	LPQL	LPQL	NC	NC
	TRH >C_{16}-C_{34} (F3)	100	LPQL	LPQL	NC	NC
	TRH >C_{34}-C_{40} (F4)	100	LPQL	LPQL	NC	NC
	Benzene	0.5	LPQL	LPQL	NC	NC
	Toluene	0.5	LPQL	LPQL	NC	NC
	Ethylbenzene	1	LPQL	LPQL	NC	NC
	m+p-xylene	2	LPQL	LPQL	NC	NC
	o-xylene	1	LPQL	LPQL	NC	NC

Explanation:

The RPD value is calculated as the absolute value of the difference between the initial and repeat results divided by the average value expressed as a percentage. The following acceptance criteria will be used to assess the RPD results:

Results > 10 times PQL = RPD value <= 50% are acceptable
Results between 5 & 10 times PQL = RPD value <= 75% are acceptable
Results < 5 times PQL = RPD value <= 100% are acceptable
If result is LPQL then 50% of the PQL is used for the calculation

RPD Results Above the Acceptance Criteria VALUE

Abbreviations:

PQL: Practical Quantitation Limit
LPQL: Less than PQL
NA: Not Analysed
NC: Not Calculated
OCP: Organochlorine Pesticides
OPP: Organophosphorus Pesticides
PCBs: Polychlorinated Biphenyls
TRH: Total Recoverable Hydrocarbons

TABLE F
SOIL INTRA-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS
All results in mg/kg unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = BH11 0.1-0.2	Arsenic	4	8	8	8.0	0
Dup Ref = DUP B	Cadmium	0.4	LPQL	LPQL	NC	NC
	Chromium	1	21	24	22.5	13
Envirolab Report: 154919	Copper	1	7	8	7.5	13
	Lead	1	19	24	21.5	23
	Mercury	0.1	LPQL	LPQL	NC	NC
	Nickel	1	4	3	3.5	29
	Zinc	1	24	32	28.0	29
	Naphthalene	0.1	LPQL	LPQL	NC	NC
	Acenaphthylene	0.1	LPQL	LPQL	NC	NC
	Acenaphthene	0.1	LPQL	LPQL	NC	NC
	Fluorene	0.1	LPQL	LPQL	NC	NC
	Phenanthrene	0.1	LPQL	LPQL	NC	NC
	Anthracene	0.1	LPQL	LPQL	NC	NC
	Fluoranthene	0.1	LPQL	LPQL	NC	NC
	Pyrene	0.1	LPQL	LPQL	NC	NC
	Benzo(a)anthracene	0.1	LPQL	LPQL	NC	NC
	Chrysene	0.1	LPQL	LPQL	NC	NC
	Benzo(b,j+k)fluoranthene	0.2	LPQL	LPQL	NC	NC
	Benzo(a)pyrene	0.05	LPQL	LPQL	NC	NC
	Indeno(123-cd)pyrene	0.1	LPQL	LPQL	NC	NC
	Dibenzo(ah)anthracene	0.1	LPQL	LPQL	NC	NC
	Benzo(ghi)perylene	0.1	LPQL	LPQL	NC	NC
	Total OCPs	0.1	LPQL	LPQL	NC	NC
	Total OPPs	0.1	LPQL	LPQL	NC	NC
	Total PCBs	0.1	LPQL	LPQL	NC	NC
	TRH C6-C10 (F1)	25	LPQL	LPQL	NC	NC
	TRH >C10-C16 (F2)	50	LPQL	LPQL	NC	NC
	TRH >C16-C34 (F3)	100	LPQL	LPQL	NC	NC
	TRH >C34-C40 (F4)	100	LPQL	LPQL	NC	NC
	Benzene	0.5	LPQL	LPQL	NC	NC
	Toluene	0.5	LPQL	LPQL	NC	NC
	Ethylbenzene	1	LPQL	LPQL	NC	NC
	m+p-xylene	2	LPQL	LPQL	NC	NC
	o-xylene	1	LPQL	LPQL	NC	NC

Explanation:

The RPD value is calculated as the absolute value of the difference between the initial and repeat results divided by the average value expressed as a percentage. The following acceptance criteria will be used to assess the RPD results:

Results > 10 times PQL = RPD value <= 50% are acceptable

Results between 5 & 10 times PQL = RPD value <= 75% are acceptable

Results < 5 times PQL = RPD value <= 100% are acceptable

If result is LPQL then 50% of the PQL is used for the calculation

RPD Results Above the Acceptance Criteria VALUE

Abbreviations:

PQL: Practical Quantitation Limit
LPQL: Less than PQL
NA: Not Analysed
NC: Not Calculated
OCP: Organochlorine Pesticides
OPP: Organophosphorus Pesticides
PCBs: Polychlorinated Biphenyls
TRH: Total Recoverable Hydrocarbons

TABLE G

SOIL INTER-LABORATORY DUPLICATE RESULTS & RPD CALCULATIONS

All results in mg/kg unless stated otherwise

SAMPLE	ANALYSIS	Envirolab PQL	SGS PQL	INITIAL	REPEAT	MEAN	RPD %
Sample Ref = BH8 0.1-0.2	Arsenic	4	3	4	LPQL	2.8	91
Dup Ref = DUP C	Cadmium	0.4	0.3	LPQL	LPQL	NC	NC
	Chromium	1	0.3	12	6.7	9.4	57
Envirolab Report: 154919	Copper	1	0.5	81	130	105.5	46
SGS Report: SE158009	Lead	1	1	10	9	9.5	11
	Mercury	0.1	0.05	LPQL	LPQL	NC	NC
	Nickel	1	0.5	7	6.6	6.8	6
	Zinc	1	0.5	30	36	33.0	18
	Naphthalene	0.1	0.1	LPQL	LPQL	NC	NC
	Acenaphthylene	0.1	0.1	LPQL	LPQL	NC	NC
	Acenaphthene	0.1	0.1	LPQL	LPQL	NC	NC
	Fluorene	0.1	0.1	LPQL	LPQL	NC	NC
	Phenanthrene	0.1	0.1	0.2	0.1	0.2	67
	Anthracene	0.1	0.1	LPQL	LPQL	NC	NC
	Fluoranthene	0.1	0.1	LPQL	LPQL	NC	NC
	Pyrene	0.1	0.1	LPQL	LPQL	NC	NC
	Benzo(a)anthracene	0.1	0.1	LPQL	LPQL	NC	NC
	Chrysene	0.1	0.1	LPQL	LPQL	NC	NC
	Benzo(b,j+k)fluoranthene	0.2	0.2	LPQL	LPQL	NC	NC
	Benzo(a)pyrene	0.05	0.05	LPQL	LPQL	NC	NC
	Indeno(123-cd)pyrene	0.1	0.1	LPQL	LPQL	NC	NC
	Dibenzo(ah)anthracene	0.1	0.1	LPQL	LPQL	NC	NC
	Benzo(ghi)perylene	0.1	0.1	LPQL	LPQL	NC	NC
	Benzo(a)pyrene TEQ	0.5	0.5	LPQL	LPQL	NC	NC
	Total OCPs	0.1	0.1	LPQL	LPQL	NC	NC
	Total OPPs	0.1	0.1	LPQL	LPQL	NC	NC
	Total PCBs	0.1	0.1	LPQL	LPQL	NC	NC
	TRH C6-C10 (F1)	25	25	LPQL	LPQL	NC	NC
	TRH >C10-C16 (F2)	50	50	LPQL	LPQL	NC	NC
	TRH >C16-C34 (F3)	100	100	670	530	600.0	23
	TRH >C34-C40 (F4)	100	100	870	430	650.0	68
	Benzene	0.5	0.5	LPQL	LPQL	NC	NC
	Toluene	0.5	0.5	LPQL	LPQL	NC	NC
	Ethylbenzene	1	1	LPQL	LPQL	NC	NC
	m+p-xylene	2	2	LPQL	LPQL	NC	NC
	o-xylene	1	1	LPQL	LPQL	NC	NC

Explanation:

The RPD value is calculated as the absolute value of the difference between the initial and repeat results divided by the average value expressed as a percentage. The following acceptance criteria will be used to assess the RPD results:

Results > 10 times PQL = RPD value <= 50% are acceptable

Results between 5 & 10 times PQL = RPD value <= 75% are acceptable

Results < 5 times PQL = RPD value <= 100% are acceptable

If result is LPQL then 50% of the PQL is used for the calculation

RPD Results Above the Acceptance Criteria VALUE

Abbreviations:

PQL: Practical Quantitation Limit

LPQL: Less than PQL

NA: Not Analysed

NC: Not Calculated

OCP: Organochlorine Pesticides

OPP: Organophosphorus Pesticides

PCBs: Polychlorinated Biphenyls

TRH: Total Recoverable Hydrocarbons

TABLE H

SUMMARY OF FIELD QA/QC RESULTS

ANALYSIS	Envirolab PQL		TB[S] 27/09/2016 154919	FR[W] 30/09/2016 154919	TS[S] 27/09/2016 154919
	mg/kg	µg/L	mg/kg	ug/L	% Recovery
Benzene	1	1	LPQL	LPQL	98
Toluene	1	1	LPQL	LPQL	98
Ethylbenzene	1	1	LPQL	LPQL	99
m+p-xylene	2	2	LPQL	LPQL	99
o-xylene	1	1	LPQL	LPQL	100

Explanation:

[W] Sample type (water)

[S] Sample type (sand)

BTEX concentrations in trip spikes are presented as % recovery

Values above PQLs/Acceptance criteria **VALUE**

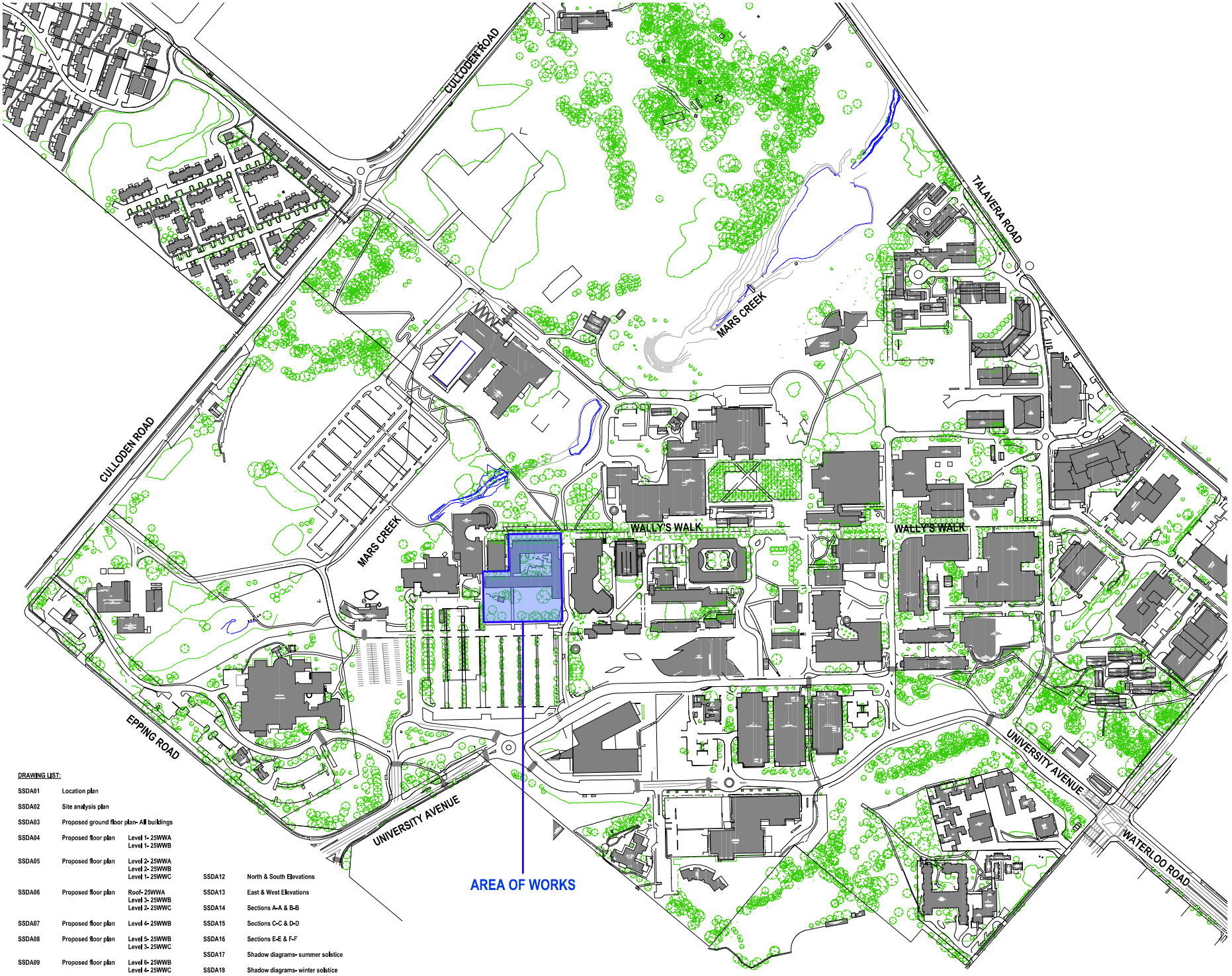
Abbreviations:

PQL: Practical Quantitation Limit
LPQL: Less than PQL
NA: Not Analysed
NC: Not Calculated
TB: Trip Blank
TS: Trip Spike
RS: Rinsate Sample
TRH: Total Recoverable Hydrocarbons

REPORT APPENDICES

Appendix A: Site Information including Site History

Proposed Development Plans



DRAWING LIST:

SSDA01	Location plan			
SSDA02	Site analysis plan			
SSDA03	Proposed ground floor plan- All buildings			
SSDA04	Proposed floor plan	Level 1- 25WWA Level 1- 25WWB		
SSDA05	Proposed floor plan	Level 2- 25WWA Level 2- 25WWB Level 1- 25WWC	SSDA12	North & South Elevations
SSDA06	Proposed floor plan	Roof- 25WWA Level 3- 25WWB Level 2- 25WWC	SSDA13	East & West Elevations
SSDA07	Proposed floor plan	Level 4- 25WWB	SSDA14	Sections A-A & B-B
SSDA08	Proposed floor plan	Level 5- 25WWB Level 3- 25WWC	SSDA15	Sections C-C & D-D
SSDA09	Proposed floor plan	Level 6- 25WWB Level 4- 25WWC	SSDA16	Sections E-E & F-F
SSDA10	Proposed floor plan	Level 7- 25WWB	SSDA17	Shadow diagrams- summer solstice
SSDA11	Proposed floor plan	Level 8- 25WWB	SSDA18	Shadow diagrams- winter solstice
			SSDA19	Shadow diagrams- equinox
			SSDA20	View analysis/photomontage

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Do not scale drawings. Verify all dimensions on site

issue	amendment	date
00	Progress Issue	17/05/2017
01	Draft SSDA Issue	18/05/2017

0 20 40 60 80 100m
Scale 1:2000 at A1 sheet

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project
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Arts Precinct Project

drawing
LOCATION PLAN

scale: 1 : 2000 @ A1 SHEET
drawing no.: SSDA-01
drawn: AdB
checked: AdB
issue: 01
project n.: APP

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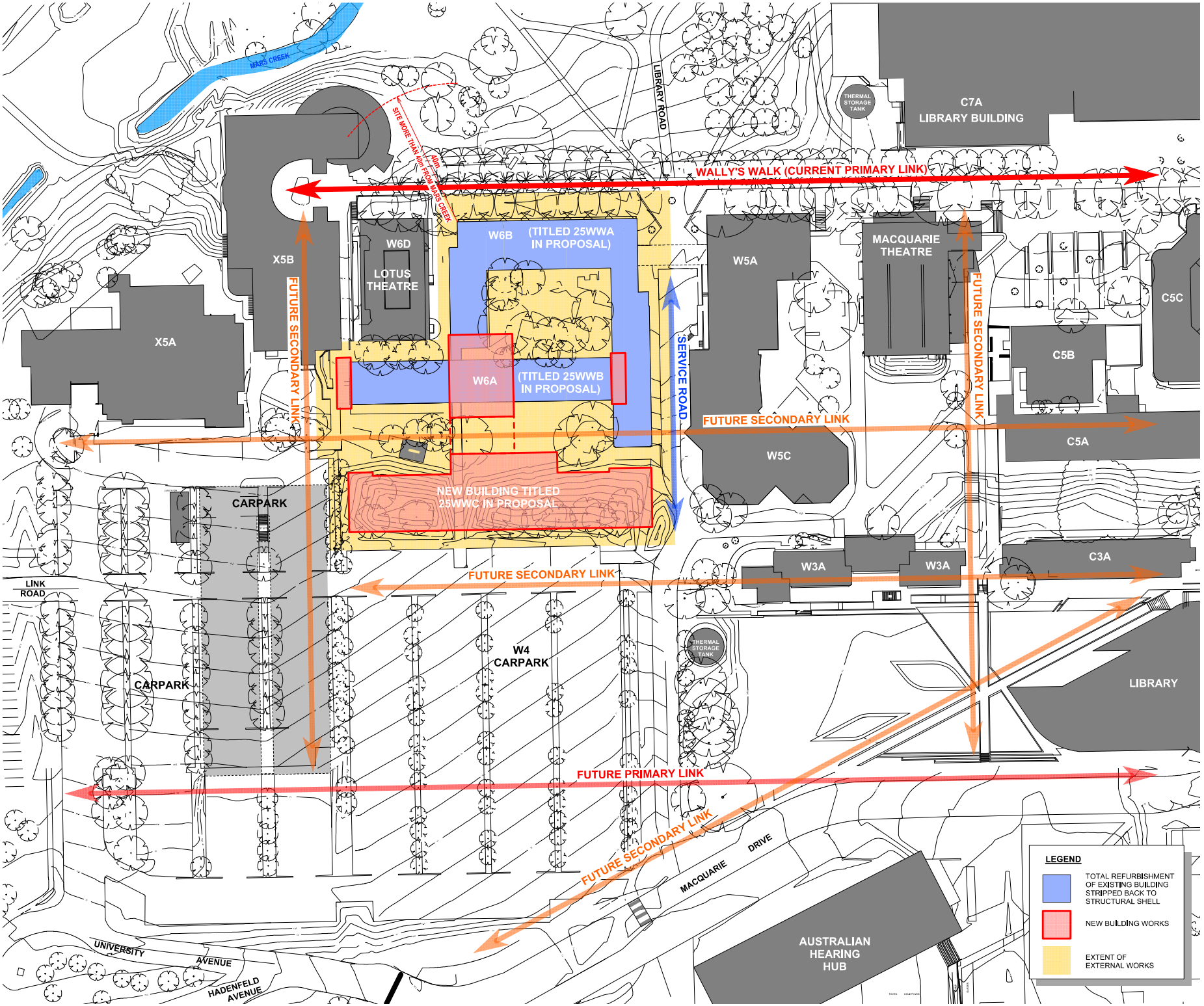

BNM&H ARCHITECTS + architectus

Do not scale drawings. Verify all dimensions on site

issue	amendment	date
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Scale 1:500 at A1 sheet

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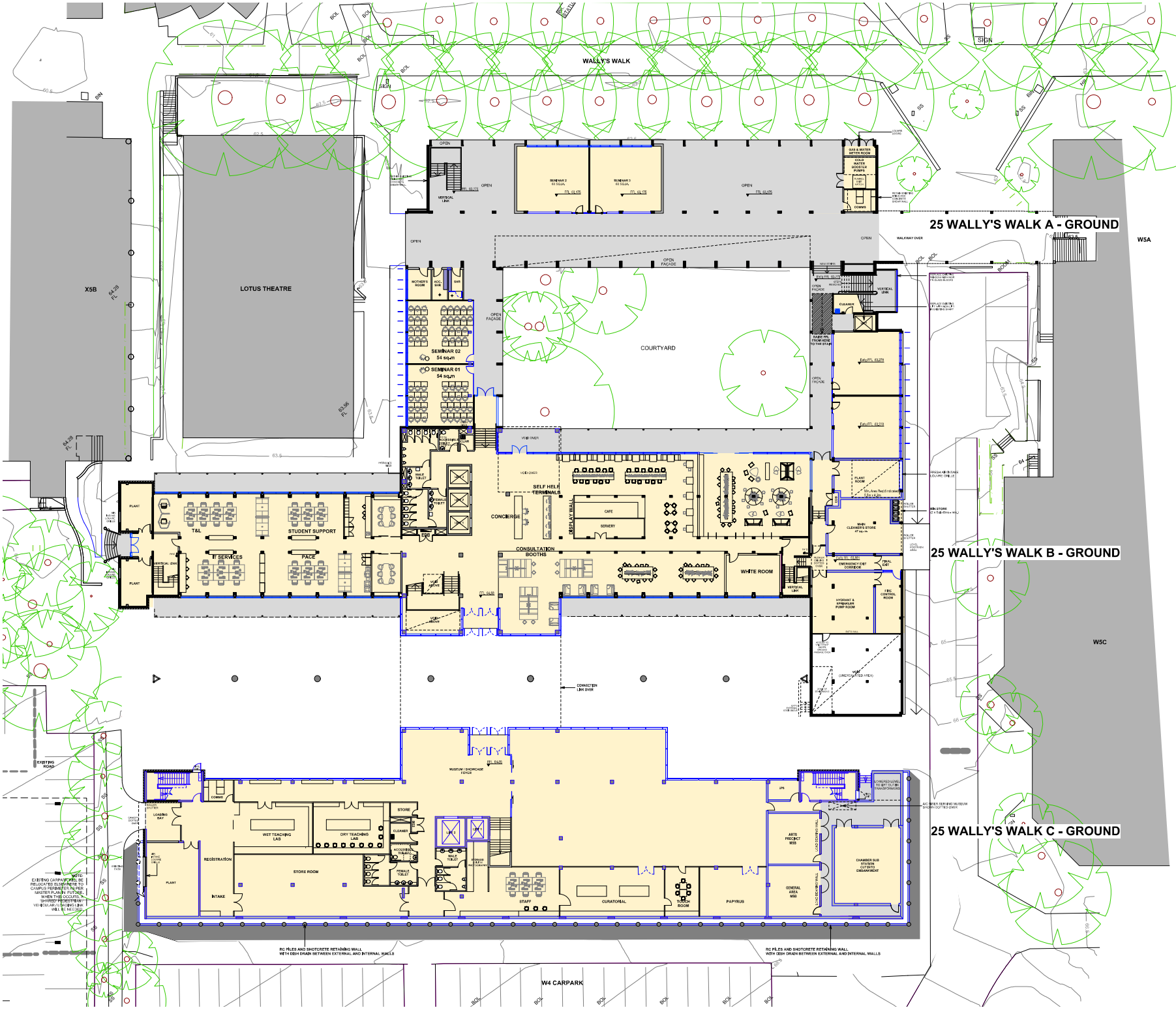
drawing
SITE ANALYSIS PLAN

scale	1 : 500 @ A1 SHEET
drawn	AdB
checked	AdB
project n.	APP
drawing no.	SSDA-02
issue	01

18/05/2017 7:00:00 PM



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project
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Arts Precinct Project

drawing
PROPOSED GROUND FLOOR PLAN - ALL BUILDINGS

scale: 1:200 @ A1
drawn: AdB / tw
checked: AdB
project no.: APP
drawing no.: **SSDA-03**
issue: **01**

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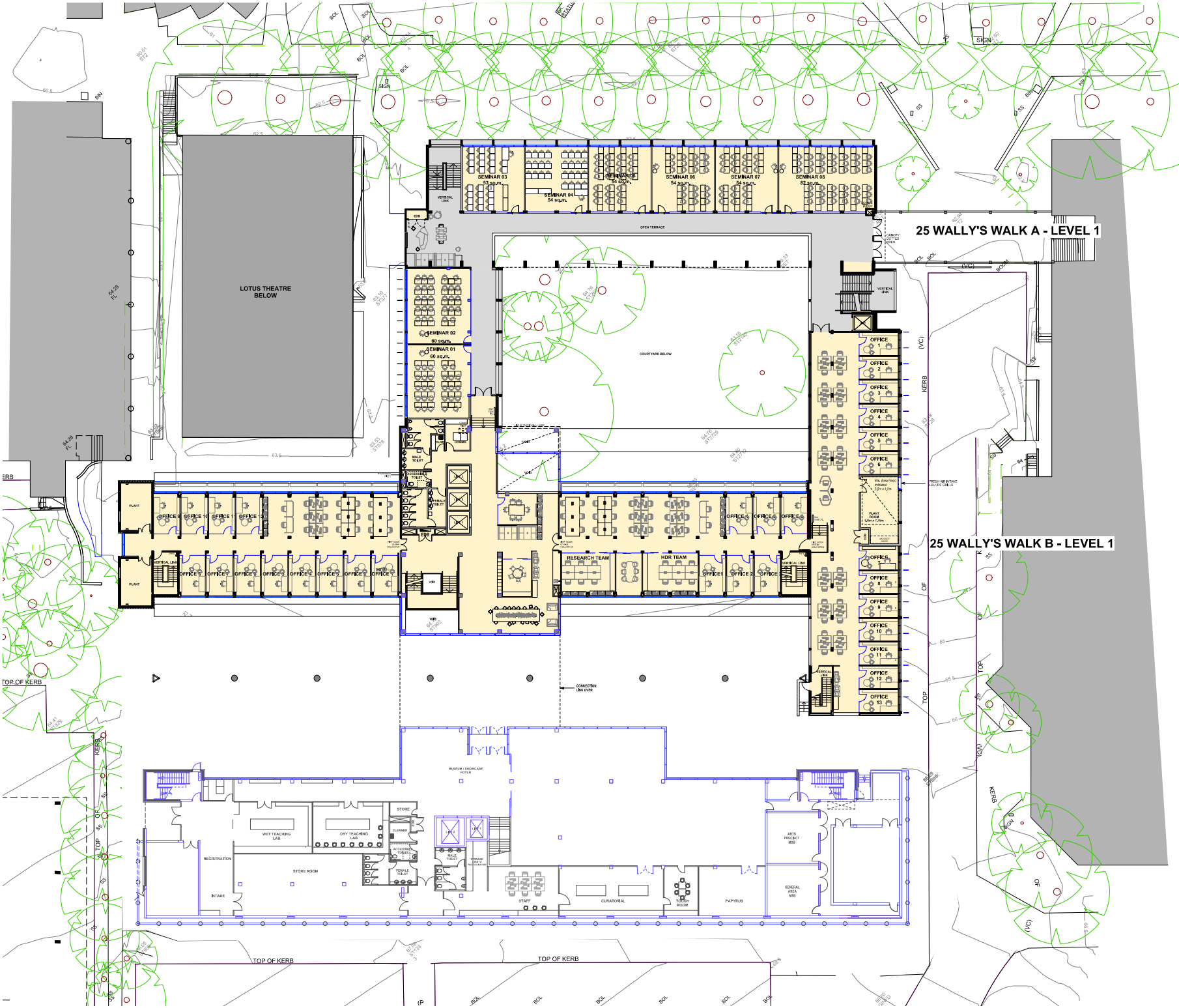

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00	PROGRESS ISSUE	16/05/2017
01	DRAFT ISSUE	18/05/2017

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Arts Precinct Project

drawing
PROPOSED FLOOR PLAN
LEVEL 1 - 25 WW A & 25 WW B

scale 1:200 @ A1
drawn AdB / tw
checked AdB
project no. APP
drawing no. **SSDA-04**
issue **01**

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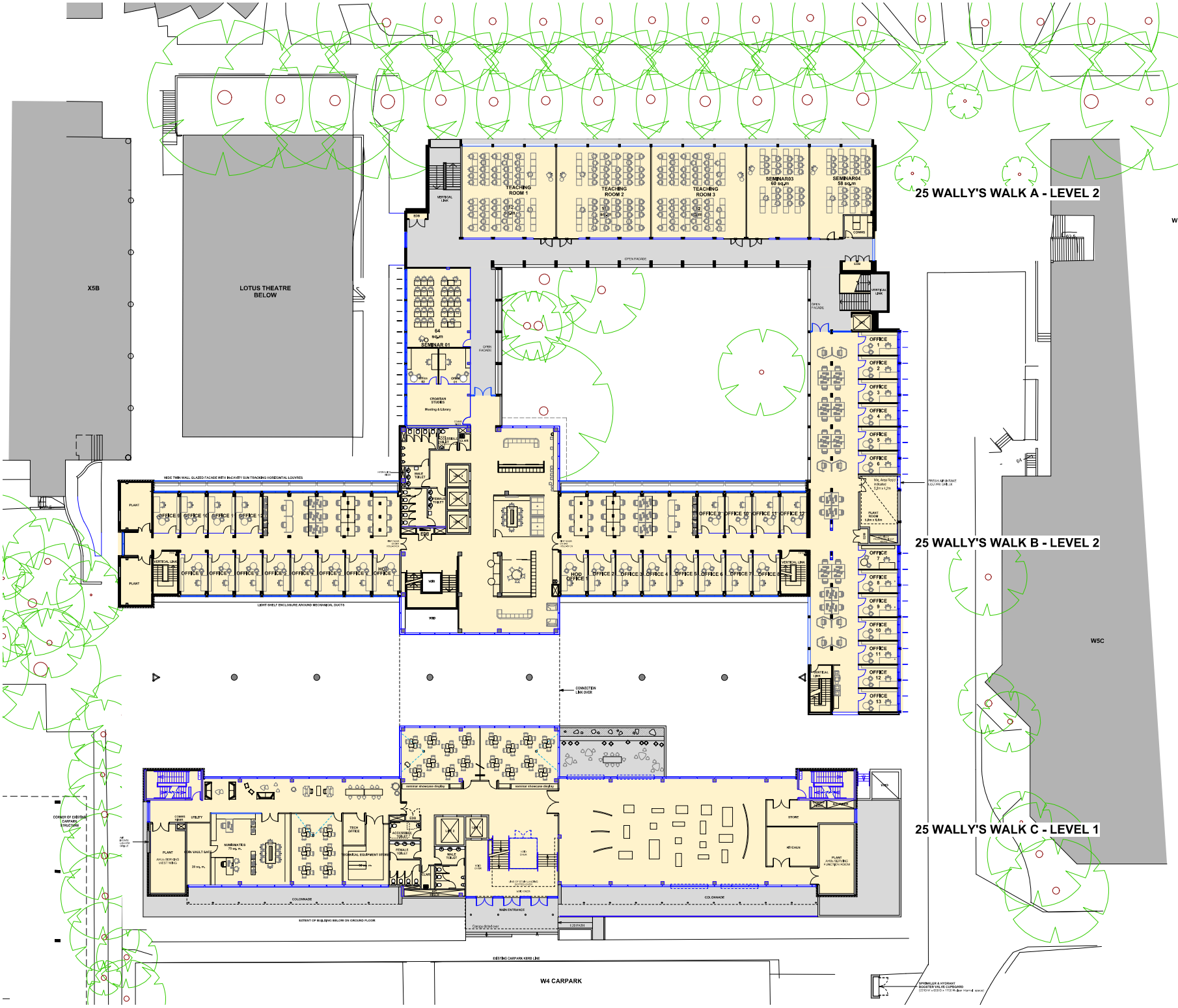

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01	DRAFT ISSUE	18/05/2017

Scale 1:200 at A1 sheet

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Arts Precinct Project

drawing
PROPOSED FLOOR PLAN
LEVEL 2 - 25 WW A & 25 WW B
LEVEL 1 - 25 WW C

scale	1:200 @ A1
drawn	AdB / tw
checked	AdB
project no.	APP
drawing no.	SSDA-05
issue	01

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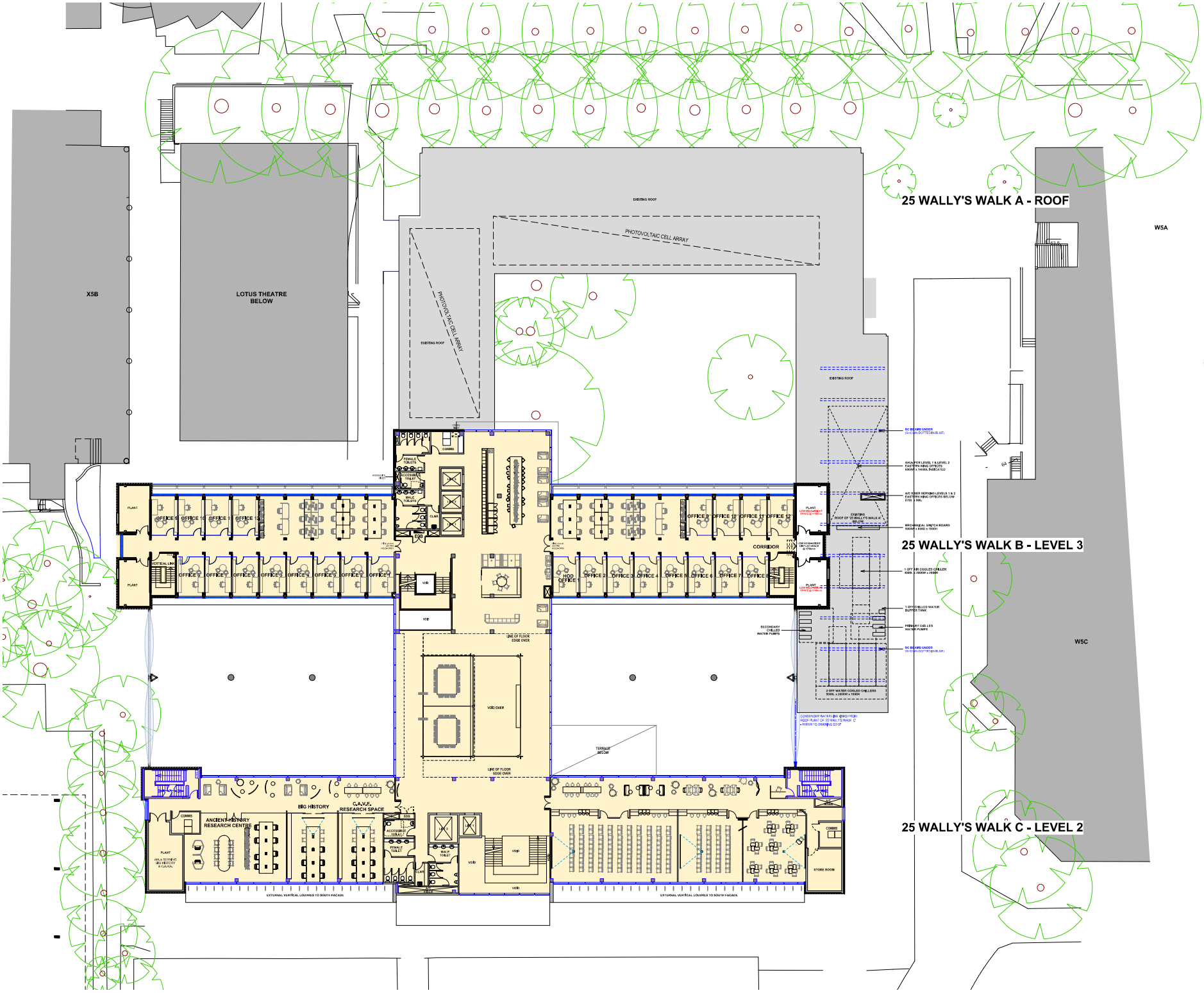

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project
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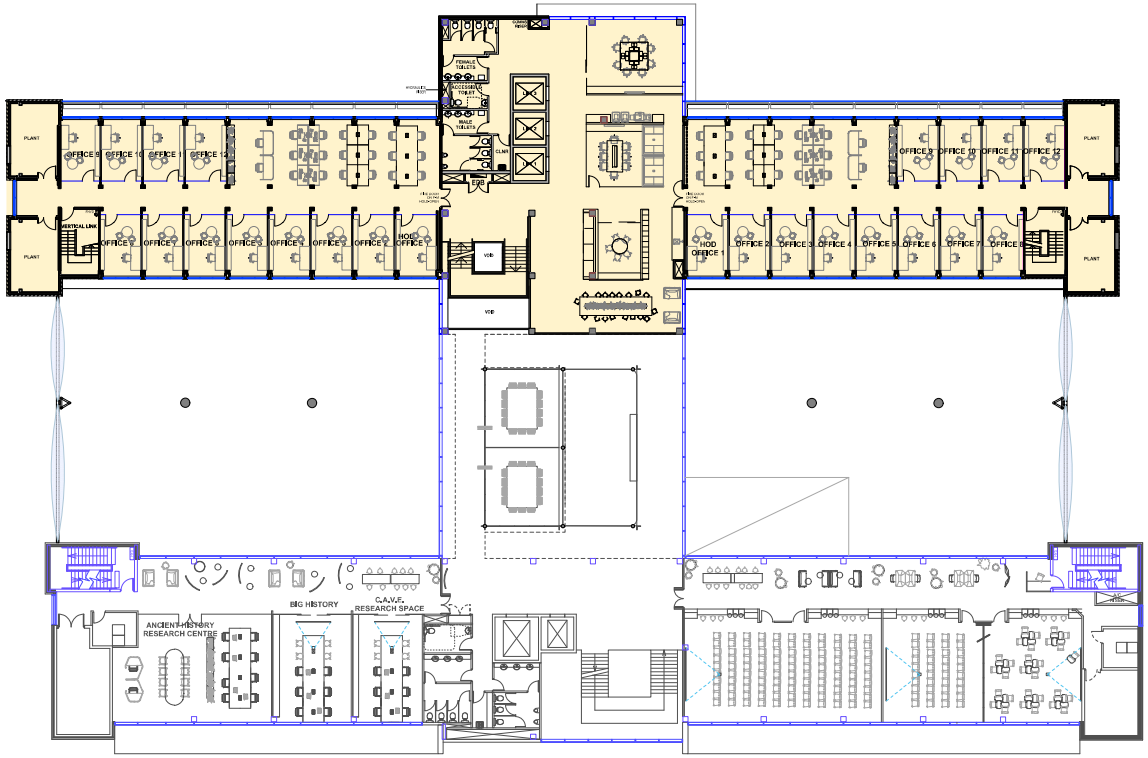
Arts Precinct Project

drawing
PROPOSED FLOOR PLAN
ROOF LEVEL - 25 WW A
LEVEL 3 - 25 WW B
LEVEL 2 - 25 WW C

scale: 1:200 @ A1
drawn: AdB / tw
checked: AdB
project no.: APP
drawing no.: SSDA-06
issue: 01

18/05/2017 5:00 PM



25 WALLY'S WALK B - LEVEL 4

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Arts Precinct Project

drawing
PROPOSED FLOOR PLAN
LEVEL 4 - 25 WW B

scale: 1:200 @ A1
drawing no.: SSDA-07
drawn: AdB / tw
checked: AdB
issue: 01
project no.: APP

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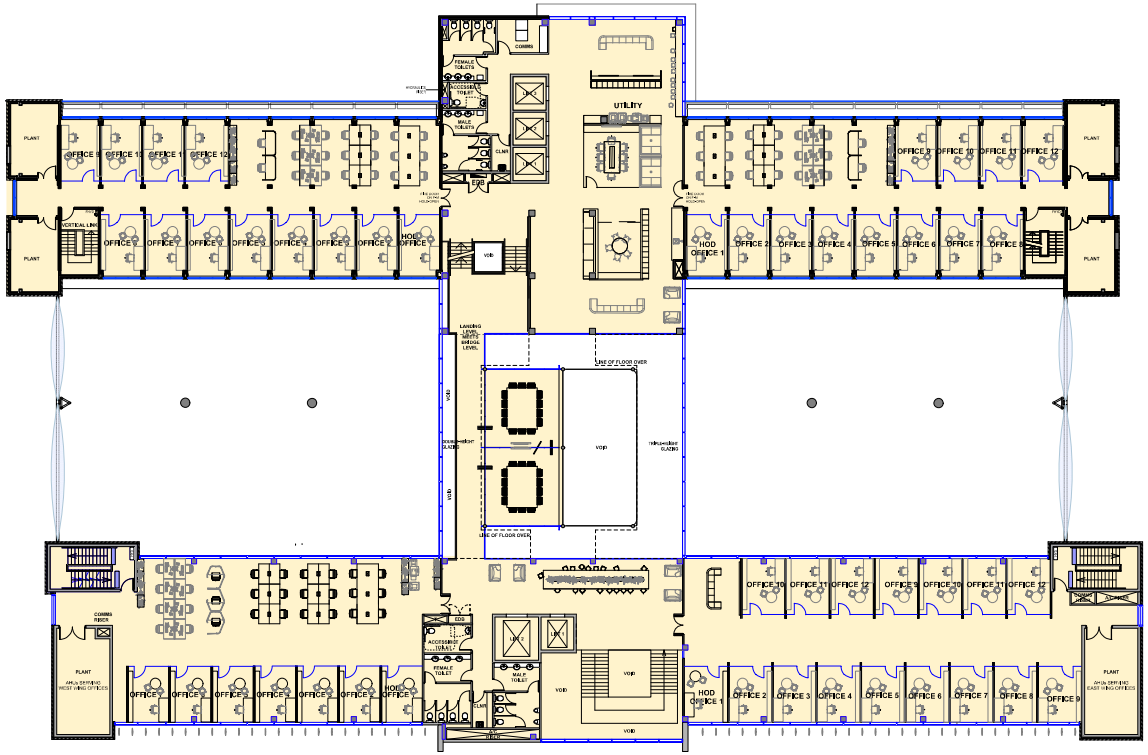

25 WALLY'S WALK B - LEVEL 5

25 WALLY'S WALK C - LEVEL 3

issue	amendment	date
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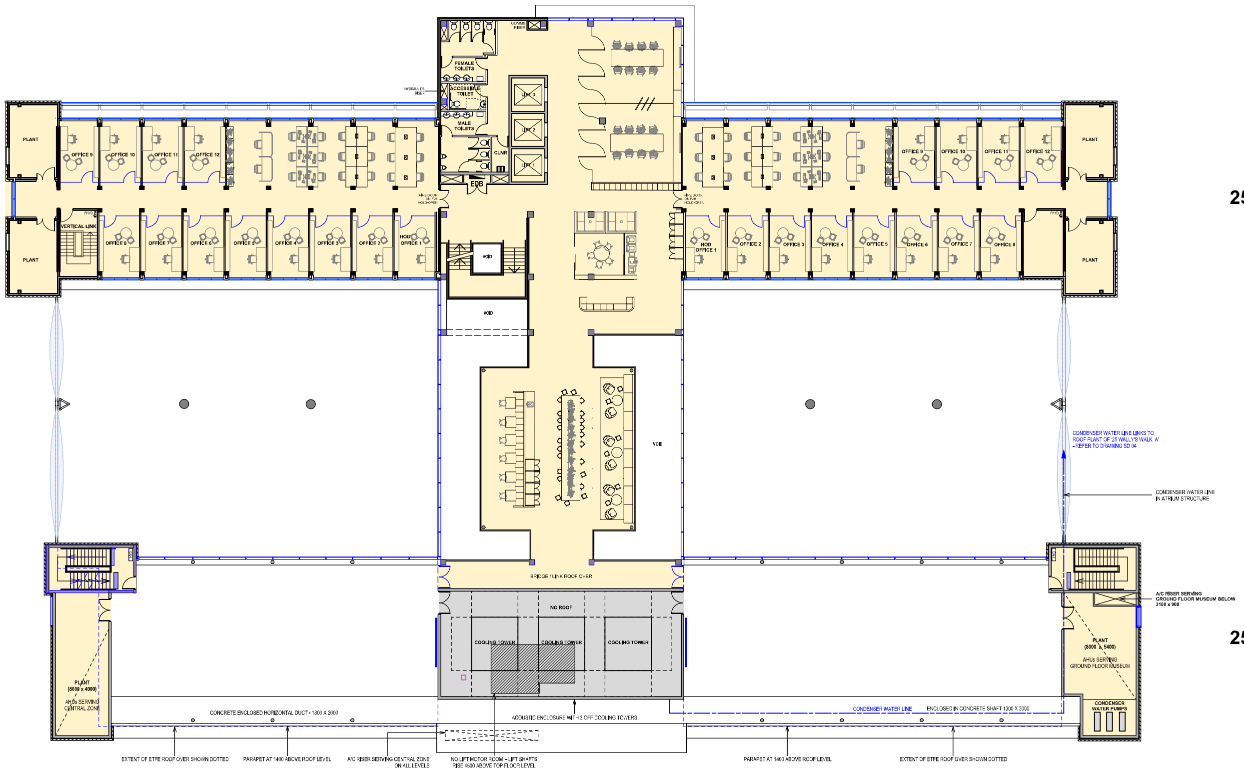
project
Macquarie University
Arts Precinct Project

drawing
PROPOSED FLOOR PLAN
LEVEL 5 - 25 WW B
LEVEL 3 - 25 WW C

scale: 1:200 @ A1
drawing no.: SSDA-08
drawn: AdB / tw
checked: AdB
issue: 01
project no.: APP

18/05/2017 5:00 PM



25 WALLY'S WALK B - LEVEL 6

25 WALLY'S WALK C - LEVEL 4

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project
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Arts Precinct Project

drawing
PROPOSED FLOOR PLAN
LEVEL 6 - 25 WW B
LEVEL 4 - 25 WW C

scale: 1:200 @ A1
drawn: AdB / tw
checked: AdB
project no.: APP
drawing no.: **SSDA-09**
issue: **01**

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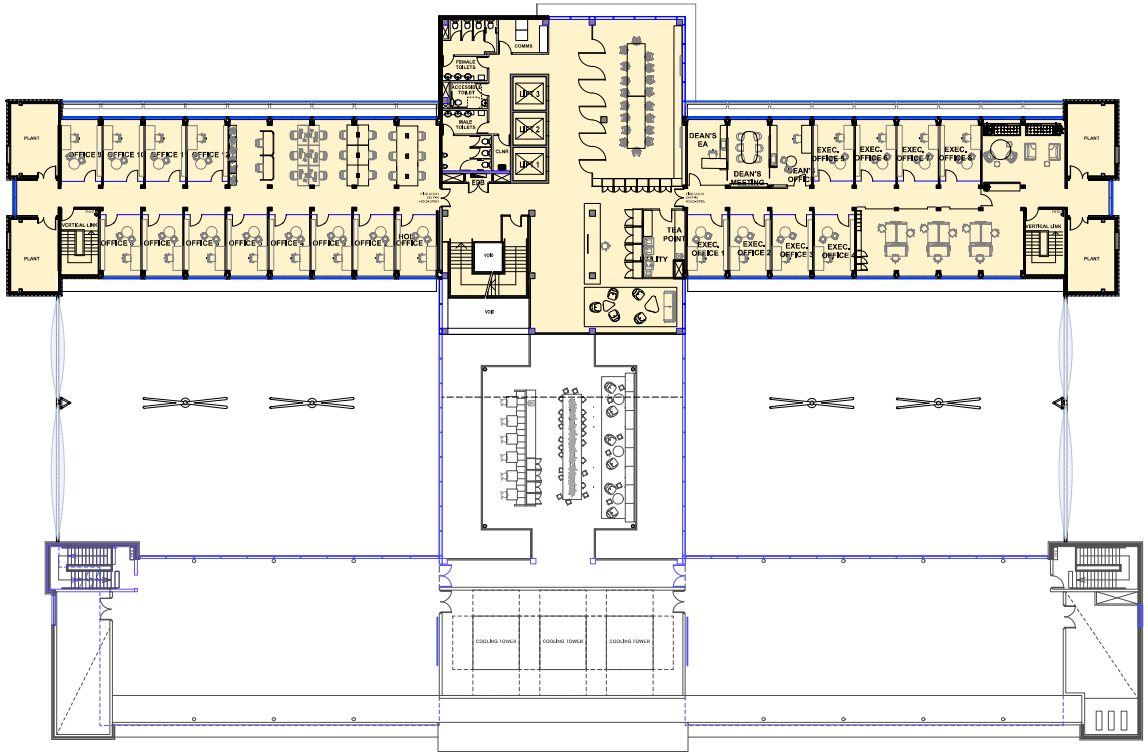

25 WALLY'S WALK B - LEVEL 7

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Arts Precinct Project

drawing
PROPOSED FLOOR PLAN
LEVEL 7 - 25 WW B

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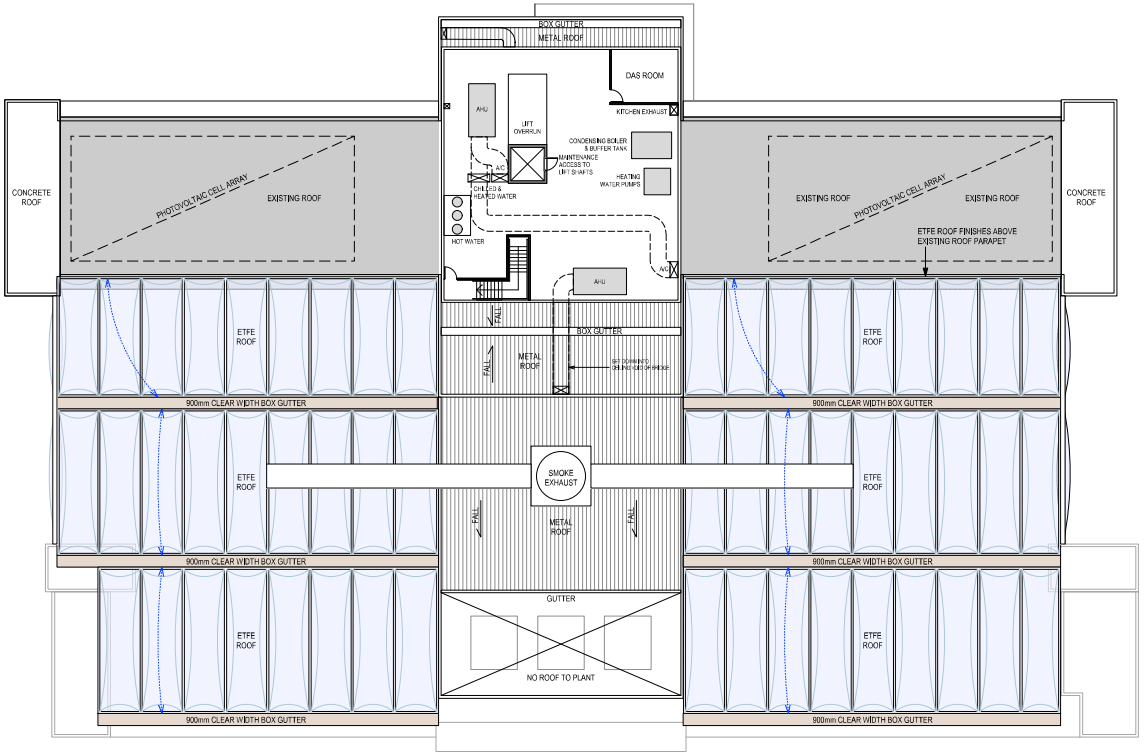
drawn	AdB / tw
checked	AdB
project no.	APP
drawing no.	SSDA-10
issue	01

18/05/2017 5:00 PM



25 WALLY'S WALK B - ROOF / LEVEL 8

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Scale 1:200 at A1 sheet

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project
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drawing
PROPOSED ROOF PLAN
LEVEL 8 - 25 WW B

scale: 1:200 @ A1
drawn: AdB / tw
checked: AdB
project no.: APP
drawing no.: **SSDA-11**
issue: **01**

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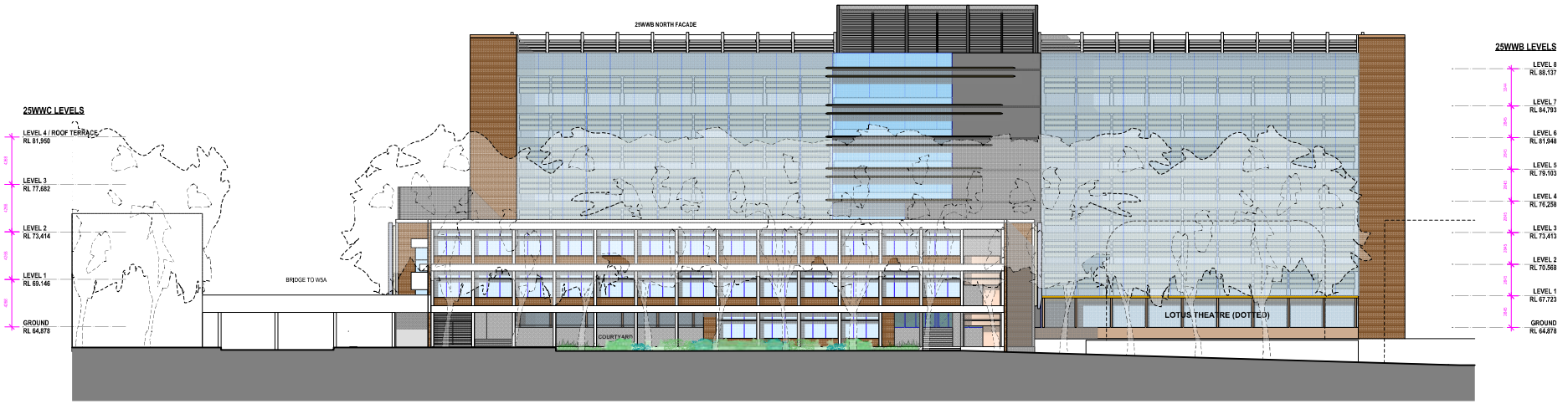
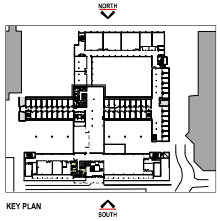
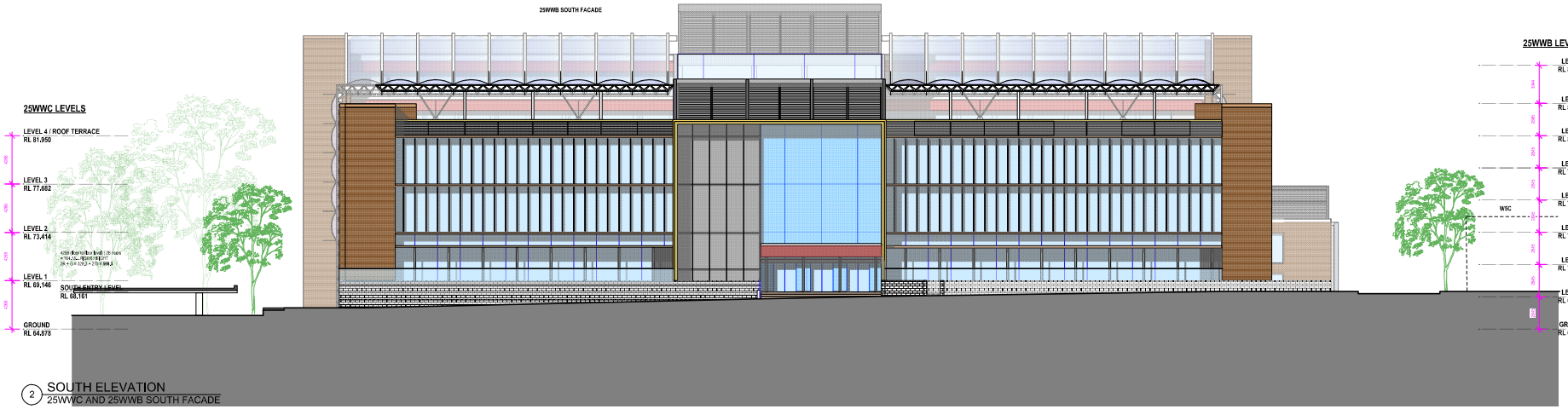


1 NORTH ELEVATION
25WWA AND 25WWB NORTH FACADE





2 SOUTH ELEVATION
25WWC AND 25WWB SOUTH FACADE

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APP_00	PROGRESS ISSUE	16-05-2017
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project
Macquarie University
Arts Precinct Project

drawing
NORTH ELEVATION
SOUTH ELEVATION

scale
1:200 @ A1 SHEET

drawing no.
SSDA-12

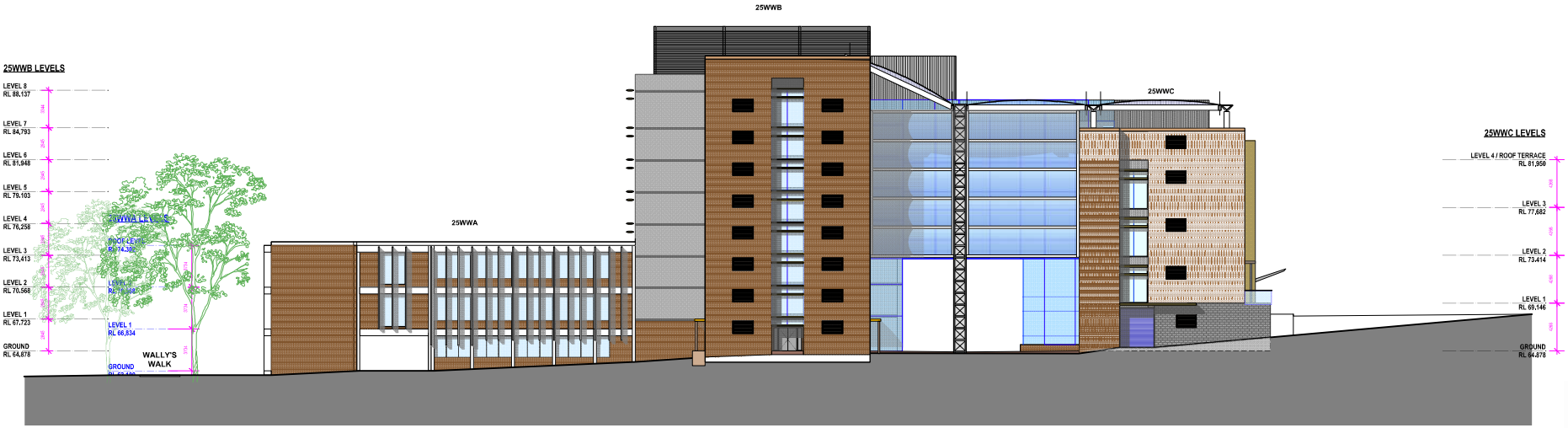
drawn
MB / TW

checked
Ad'B

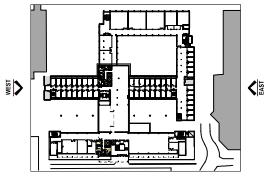
issue

project no.
APP

16/05/2017 18.00



1 EAST ELEVATION
25WWA - 25WWB - BRIDGE - 25WWC



KEY PLAN

2 WEST ELEVATION
25WWC - BRIDGE - 25WWB - 25WWA

issue	amendment	date
APP_00	PROGRESS ISSUE	16-05-2017
APP_01	DRAFT ISSUE	18-05-2017

0 2 4 6 8 10m
Scale 1:200 at A1 sheet

DRAFT

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project
Macquarie University
Arts Precinct Project

drawing
EAST ELEVATION
WEST ELEVATION

scale
1:200 @ A1 SHEET

drawing no.
SSDA-13

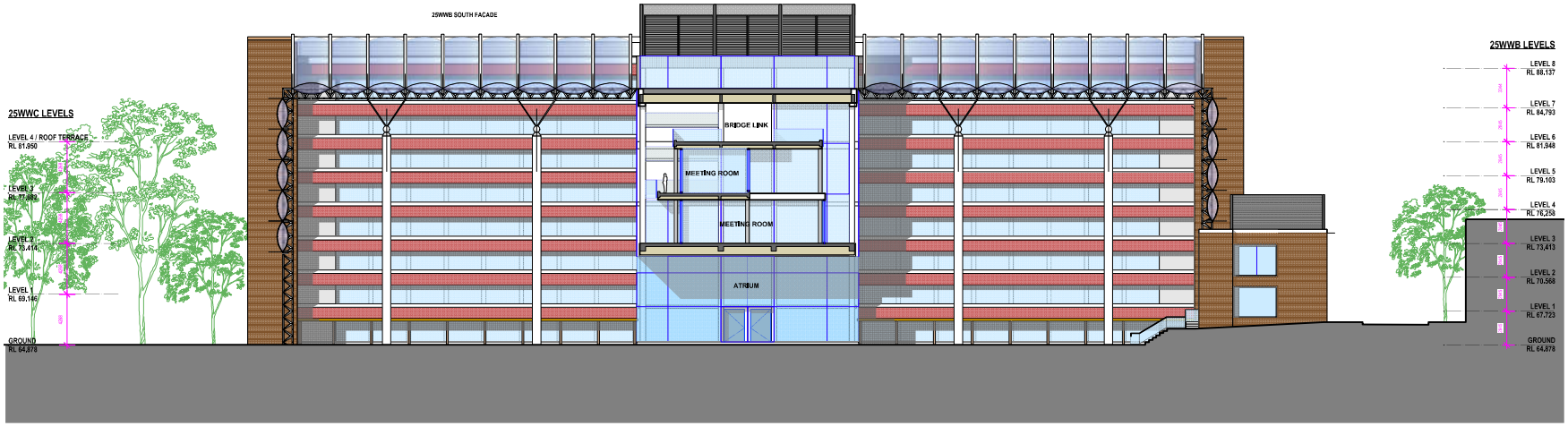
drawn
MB / TW

checked
Ad'B

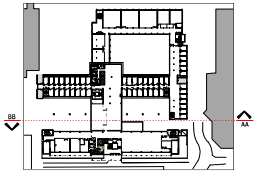
issue

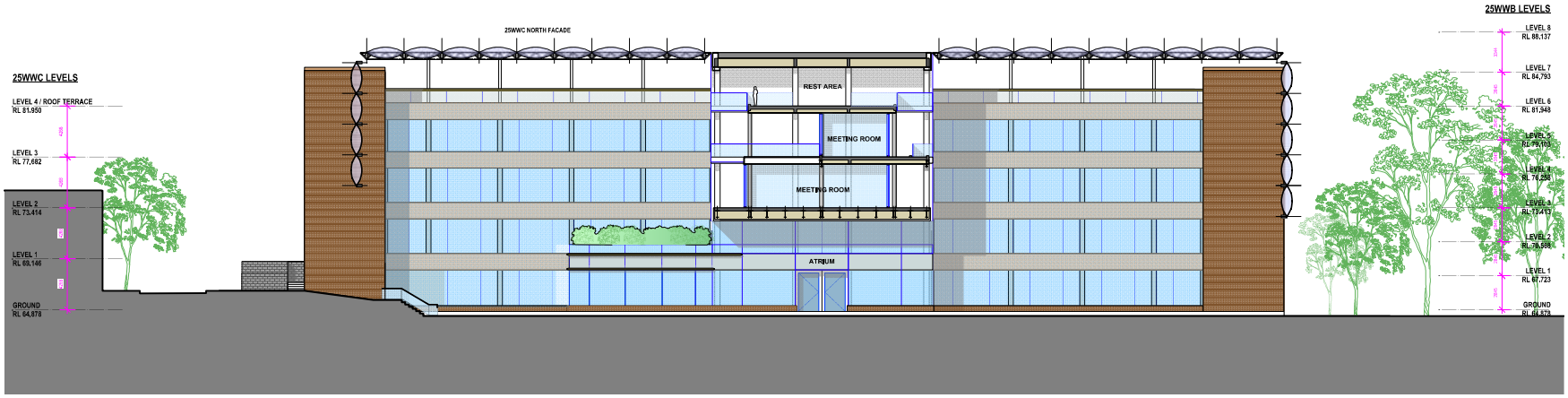
project no.
APP

16/05/2017 18.00



1 SECTION AA
THROUGH BRIDGE LINK - 25WWA SOUTH ELEVATION





2 SECTION BB
THROUGH BRIDGE LINK - 25WWC NORTH ELEVATION

Do not scale drawings. Verify all dimensions on site

issue	amendment	date
APP_00	PROGRESS ISSUE	16-05-2017
APP_01	DRAFT ISSUE	18-05-2017

0 2 4 6 8 10m
Scale 1:200 at A1 sheet

DRAFT

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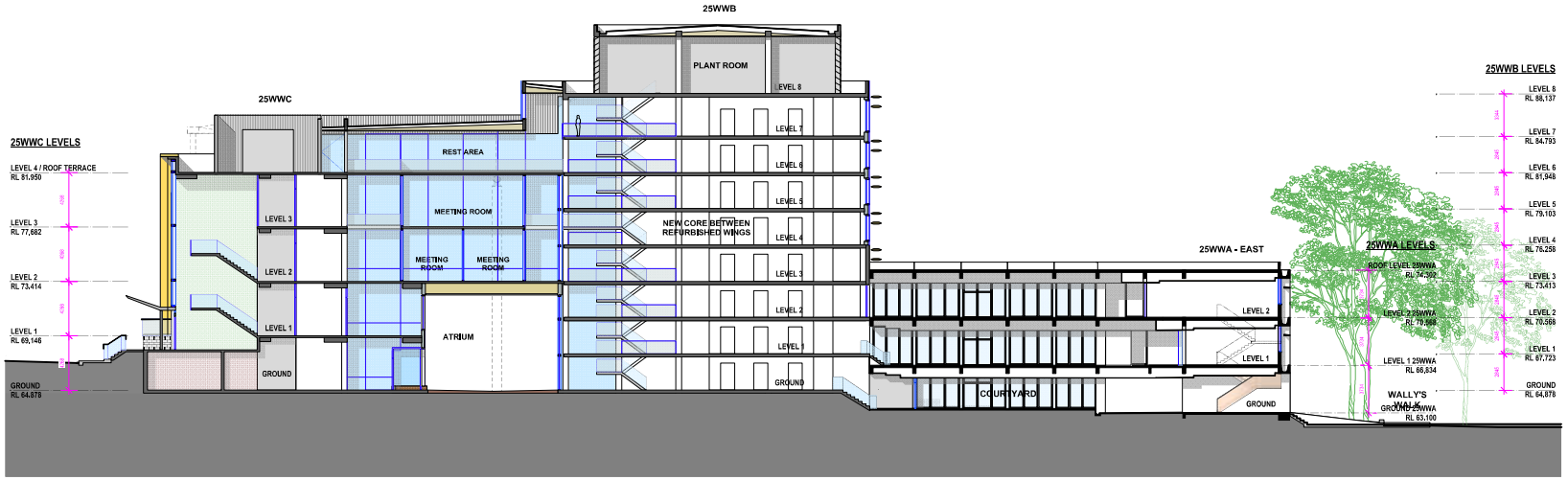
project
Macquarie University
Arts Precinct Project

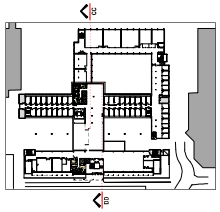
drawing
SECTION A-A
SECTION B-B

scale: 1:200 @ A1 SHEET
drawing no.: SSDA-14
drawn: MB / TW
checked: Ad'B
issue:
project no.: APP

16/05/2017 18.00



1 SECTION CC
THROUGH 25WWC - BRIDGE LINK - 25WWB CORE - 25WWA EAST WING



2 SECTION DD
THROUGH 25WWC - BRIDGE LINK - 25WWB CORE - COURT YARD - 25WWA NORTH WING

BNM&H ARCHITECTS + architectus

Do not scale drawings. Verify all dimensions on site

issue	amendment	date
APP. 00	PROGRESS ISSUE	18-05-2017
APP. 01	DRAFT ISSUE	18-05-2017

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Scale 1:200 at A1 sheet

DRAFT

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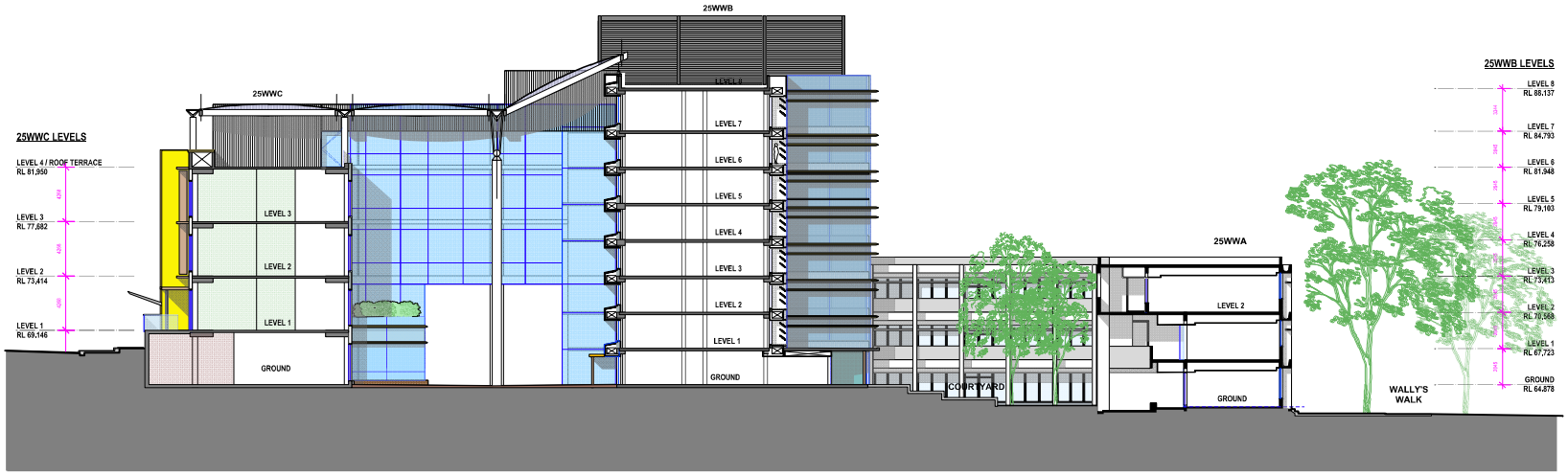
project
Macquarie University
Arts Precinct Project

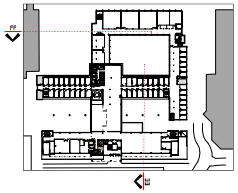
drawing
SECTION C-C
SECTION D-D

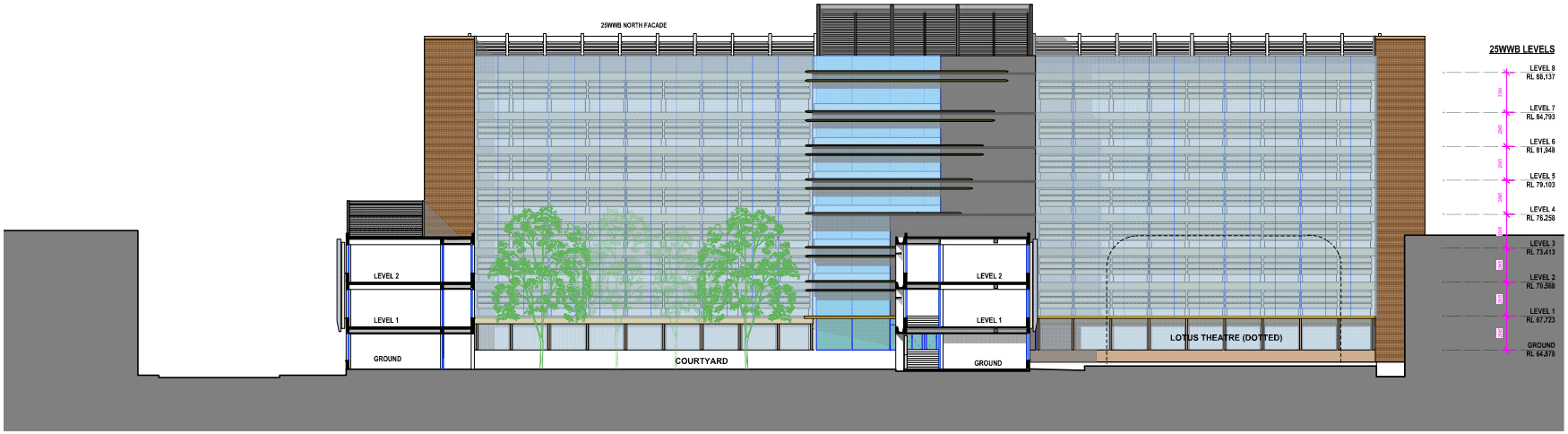
scale	1:200 @ A1 SHEET
drawn	MB / TW
checked	Ad'B
project no.	APP
drawing no.	**SSDA-15**
issue	

16/05/2017 18:00



1 SECTION EE
THROUGH 25WWC - ATRIUM - 25WWB - COURT YARD - 25WWA NORTH WING





2 SECTION FF
THROUGH 25WWA WEST WING - COURTYARD - 25WWA EAST WING

BNM&H ARCHITECTS + architectus™

Do not scale drawings. Verify all dimensions on site

issue	amendment	date
APP_00	PROGRESS ISSUE	16-05-2017
APP_01	DRAFT ISSUE	16-05-2017

0 2 4 6 8 10m
Scale 1:200 at A1 sheet

DRAFT

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project
Macquarie University
Arts Precinct Project

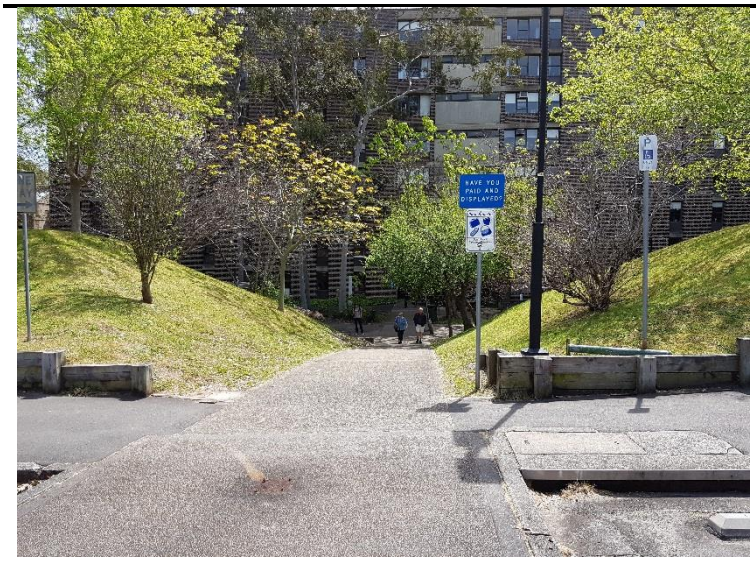
drawing
SECTION E-E
SECTION F-F

scale 1:200 @ A1 SHEET
drawing no. SSDA-16
drawn MB / TW
checked
issue Ad'B
project no. APP

16/05/2017 18:00

Selected Site Photos

Selected Site Photos taken on 6 October 2016



Photograph 1: Shows the south-western boundary of the site, facing north. Note the grassed soil mounds, bisected by concrete paved walkway, with Building W6A in the background, in the southern section of the site, constructed of fill material.

Photograph 2: A closer view of the 'western' soil mound at the site, facing south-east. Note the bike hub to the immediate north of it (central western end of the photograph).

Photograph 3: A closer view of the 'eastern' soil mound at the site, facing east. Note the carpark located to the immediate south of it (right hand section of the photograph).

Photograph 4: Shows the back part of Building W6A, in the central section of the site, facing north.

Photograph 5: Shows the eastern 'builing' of Building W6B, in the eastern section of the site, facing north-west. Western Road is located to the immediate east of this building, as seen in this photograph. Note the concrete pedestrian walkway bridged over Western Road from the north-eastern corner of Building W6B eastwards to Building W5A (lower right hand section of the photograph).

Photograph 6: Shows the gravel surfaced courtyard, in the middle section of the buildings, in the north-eastern section of the site, facing south-west. Note the waste bins for general refuse etc at the site (lower section of the photograph).

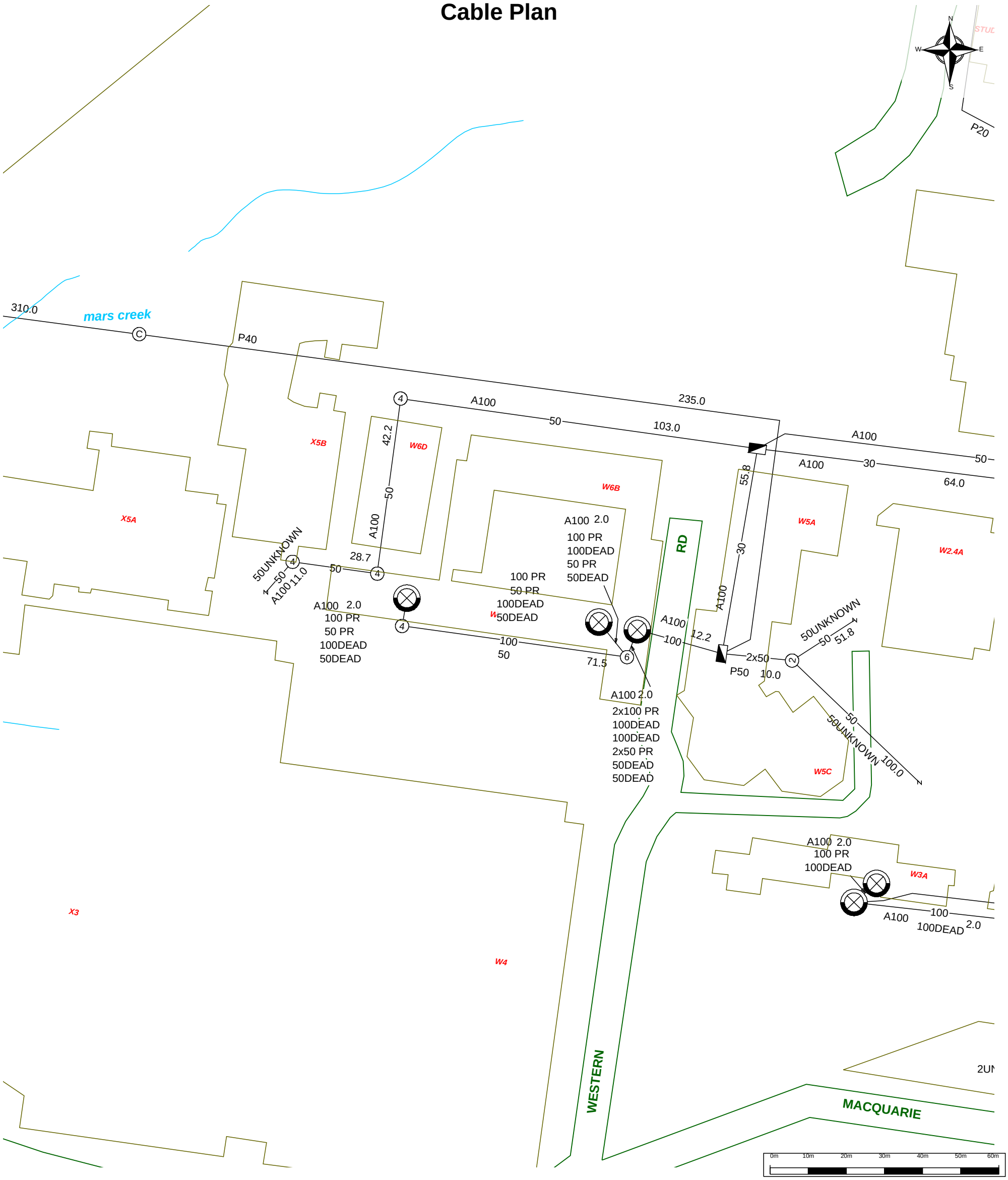
Photograph 7: Shows the Chemical Storage Room, located at the ground floor of Building W6B.

Photograph 8: Shows the northern 'building' of Building W6B, in the northern section of the site, facing south-west. Note the concrete paved, tree lined Wally's Walk to the immediate north of the building (lower right hand section of the photograph).

Photograph 9: Shows the western 'building' of Building W6B, in the north-western section of the site, facing south-east. Note part of Building W6A in the foreground.

Selected Underground Services Plans

Cable Plan



Telstra	For all Telstra DBYD plan enquiries - email - Telstra.Plans@team.telstra.com For urgent onsite contact only - ph 1800 653 935 (bus hrs)
TELSTRA CORPORATION LIMITED A.C.N. 051 775 556	
Generated On 23/09/2016 06:29:39	

Sequence Number: 55857813

Please read Duty of Care prior to any excavating

AARNet

Sequence Number: 55857816

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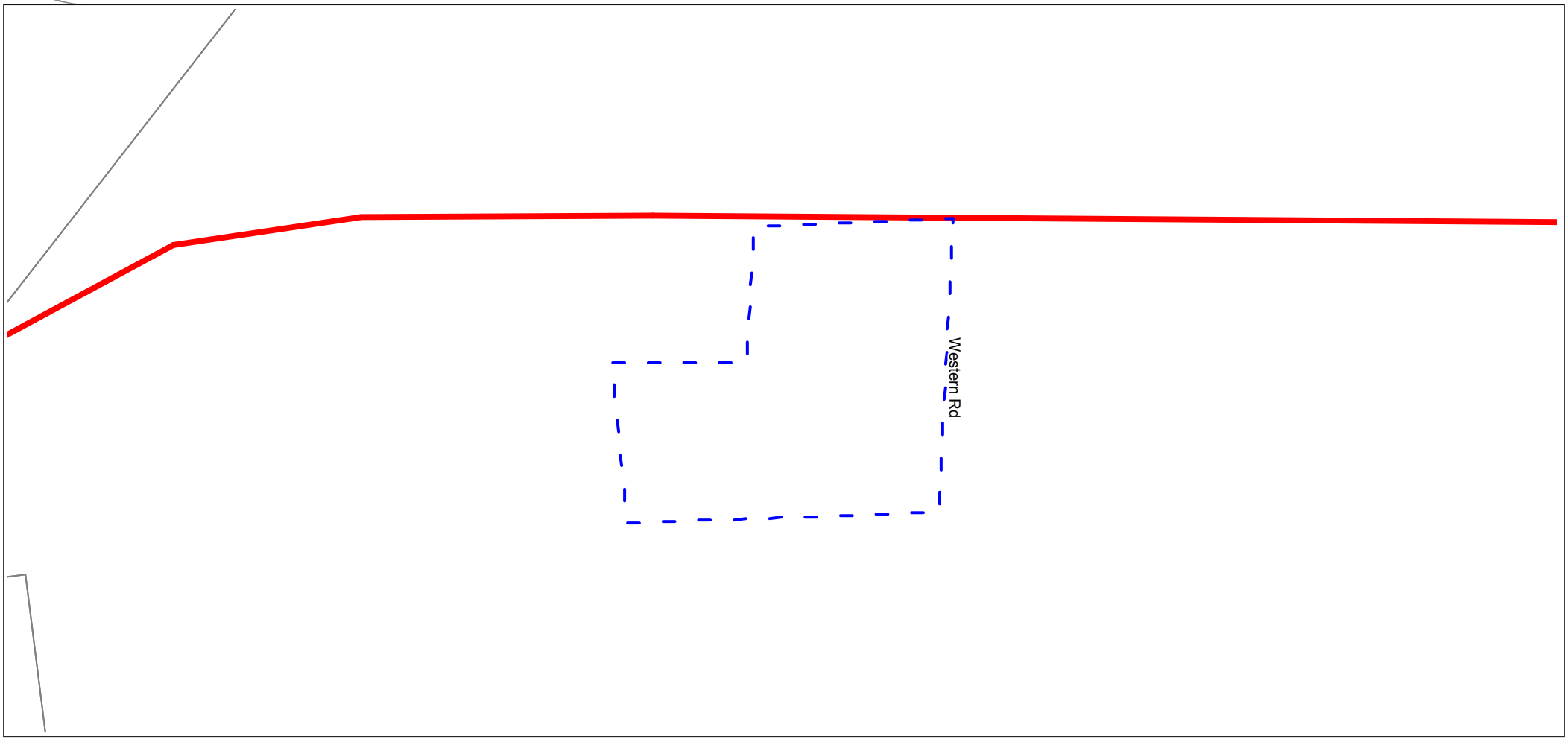

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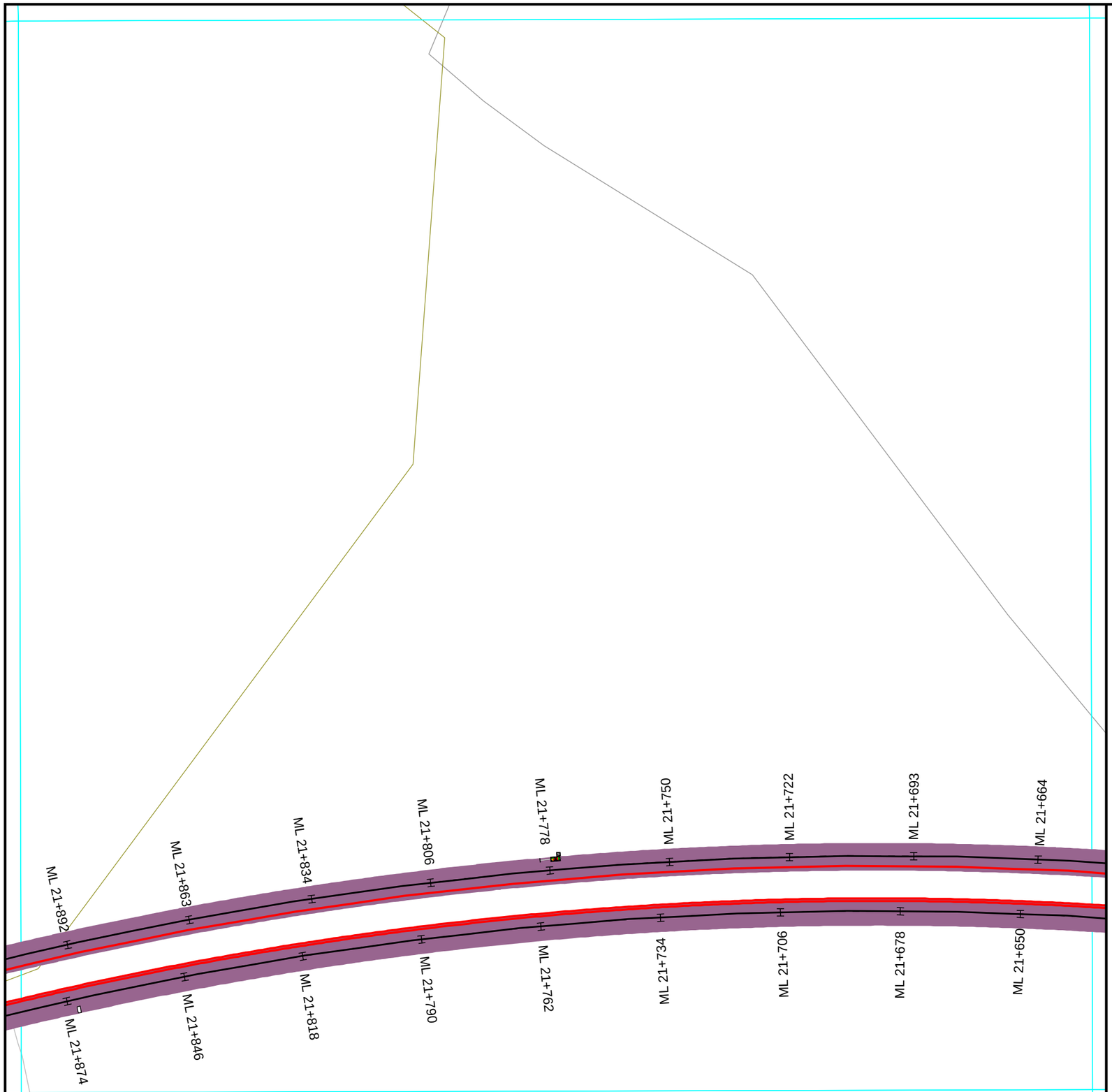
Enquiry Area

AARNet Assets

Cadastre



THIS PLAN IS NOT VALID UNLESS PRINTED IN COLOUR
SYDNEY TRAINS Dial Before You Dig Service Search

PLOTTED DATE: 24/07/2015

This plan is to be read in conjunction with Sydney Trains' Dial Before you Dig Terms & Conditions.

- Tunnel Section.Coverage Over
- HV Cable.11kV Location
- HV Cable.33kV Location
- OHW Structure.Location
- Mounting Post.Location
- Track Segment.Centreline Active
- Trench/Tunnel/Trough.Location
- UBD Map Grid.Coverage
- Road Segment.Centreline
- Road Segment.Local Road Centreline
- National Park.Coverage Current
- Lot.Coverage Standard
- Easement.Coverage Current

The precision of the location of the services on this plan varies depending on the source and method of capture.
This plan should be used as a guide only.
This plan shows only Sydney Trains electrical cables and tunnels located outside of the rail corridor.
Contact for further information:
Sydney Trains External Interface Manager Ph. 9847 8914
Airport Line Maintainance Manager Ph. 9669 8602

Exposure of or suspected damage to Sydney Trains' services must be reported immediately to Electrical Systems Operations
Ph. 9379 4911 or 1800 060 015

Transport Sydney Trains
WhereInfo... ais
PRODUCED BY SYDNEY TRAINS GIS FROM MAPPED DATA

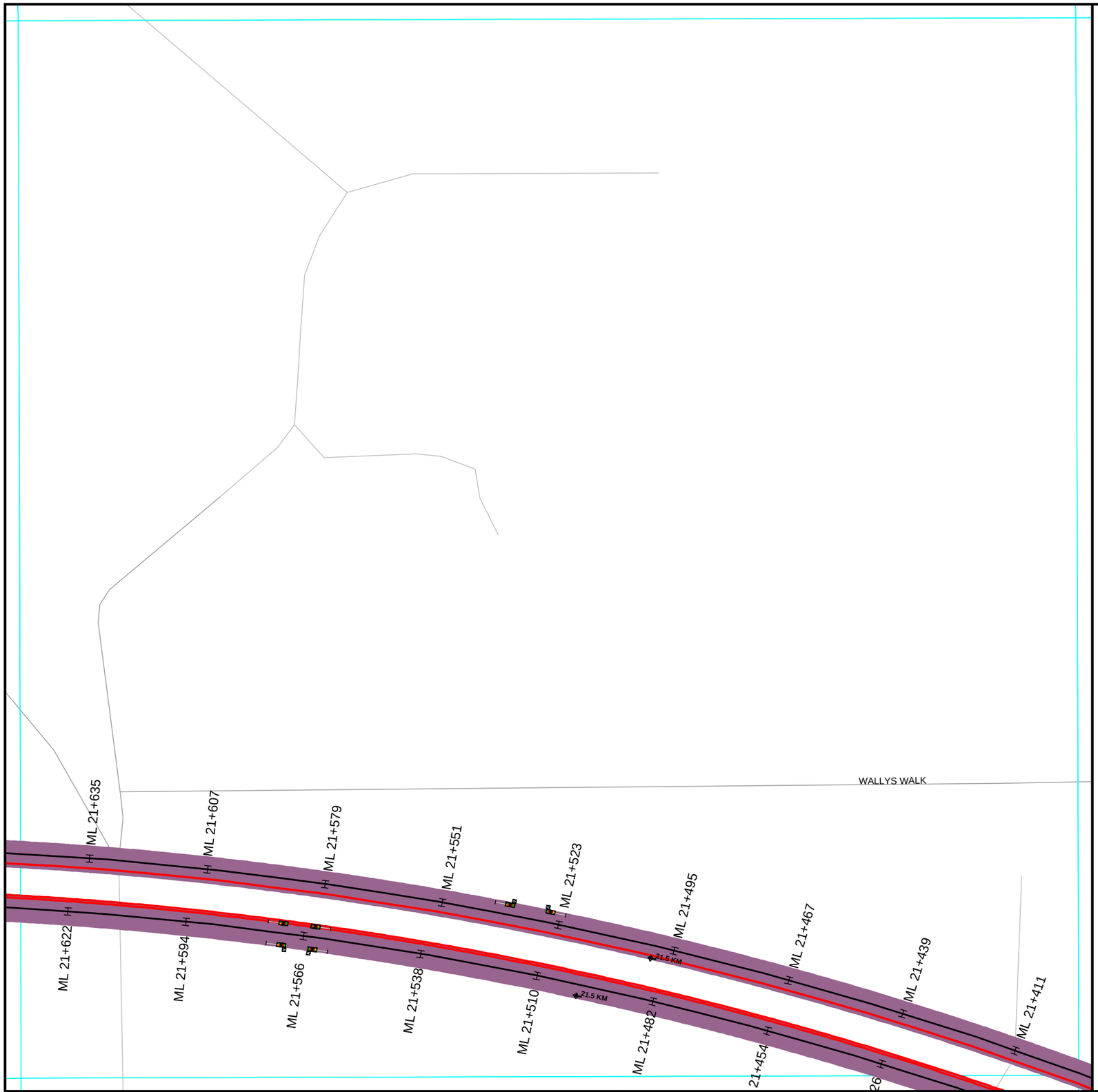
UBD: Sydney 173 M16

SYDNEY TRAINS HIGH VOLTAGE ELECTRICAL SERVICES SEARCH

N

PLOTTED DATE: 24/07/2015

PLOTTED BY: dgrimshaw



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SYDNEY TRAINS Dial Before You Dig Service Search

PLOTTED DATE: 24/07/2015

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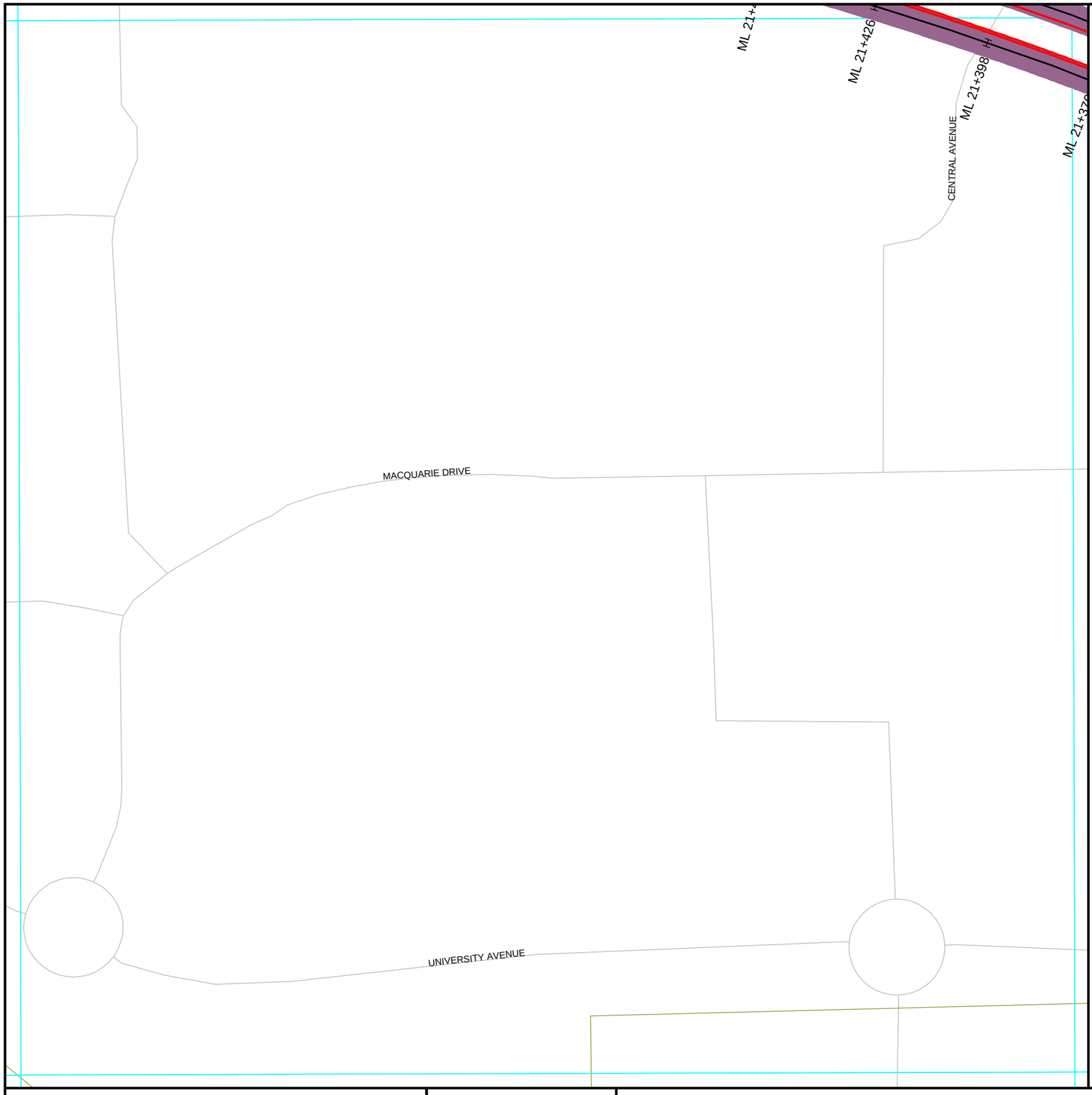
PLOTTED DATE: 24/07/2015

PLOTTED BY: dgrimshaw



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WhereInfo... ais
PRODUCED BY SYDNEY TRAINS GIS FROM MAPPED DATA

UBD: Sydney 193 N1

SYDNEY TRAINS HIGH VOLTAGE ELECTRICAL SERVICES SEARCH

N

PLOTTED DATE: 24/07/2015

PLOTTED BY: dgrimshaw

Lotsearch Environmental Risk and Planning Report

Lotsearch

Environmental Risk and Planning Report

Western Road, Macquarie Park, NSW 2113

Report Buffer: 1000m

Report Date: 11 Oct 2016 12:17:13

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

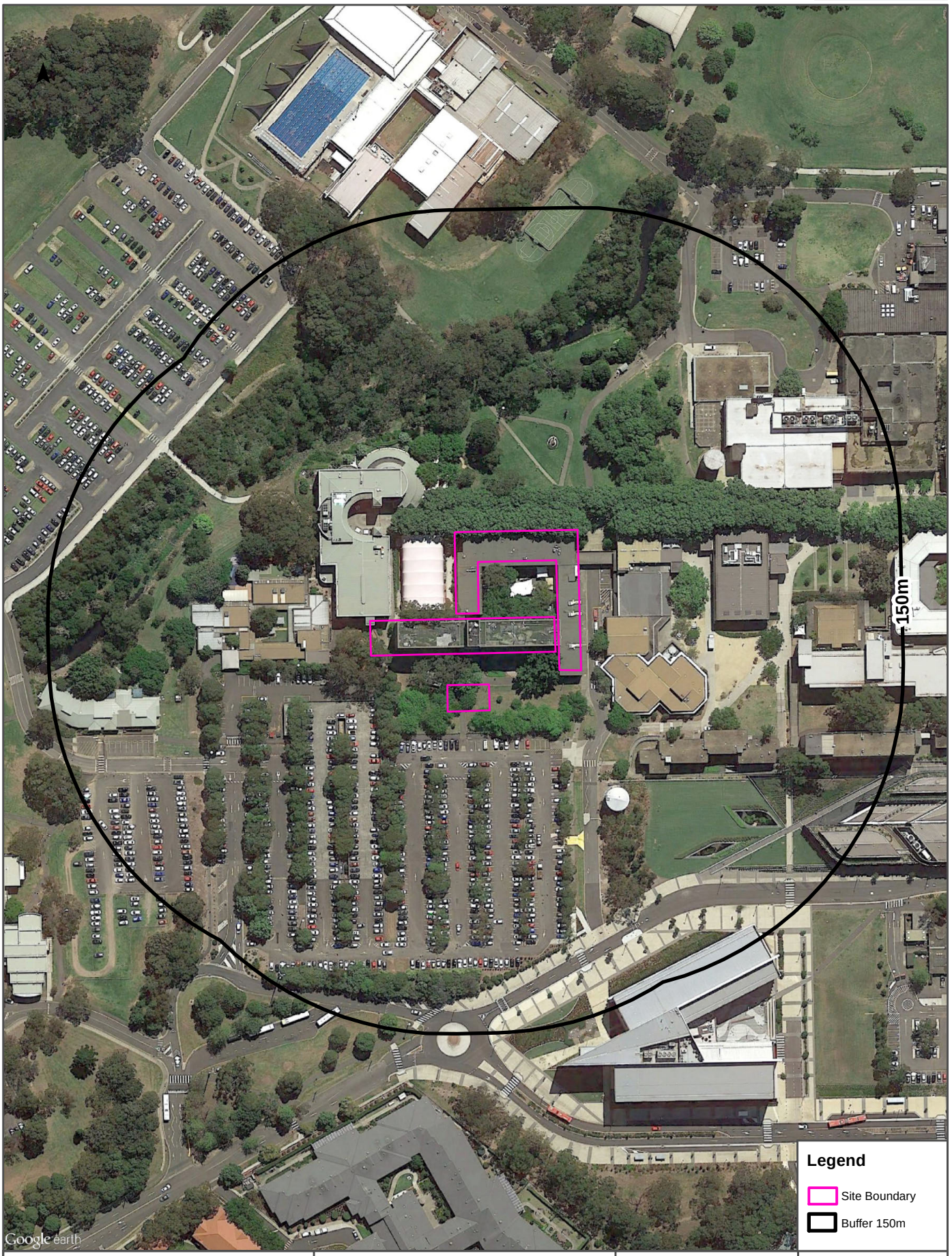
Datasets contained within this report, detailing their source and data currency:

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	No. Features Onsite	No. Features within 100m	No. Features within Buffer
Cadastre Boundaries	Land and Property Information	11/10/2016	11/10/2016	Daily	-	-	-
Topographic Data	Land and Property Information	10/04/2015	01/04/2015	As required	-	-	-
List of NSW contaminated sites notified to EPA	Environment Protection Authority	10/10/2016	30/08/2016	Monthly	0	0	1
Contaminated Land: Records of Notice	Environment Protection Authority	10/10/2016	10/10/2016	Monthly	0	0	0
Former Gasworks	Environment Protection Authority	10/10/2016	10/05/2013	Monthly	0	0	0
National Waste Management Site Database	Geoscience Australia	06/07/2016	15/11/2012	Quarterly	0	0	0
Licensed Activities under the POEO Act 1997	Environment Protection Authority	20/09/2016	20/09/2016	Monthly	1	1	1
Delicensed POEO Activities still Regulated by the EPA	Environment Protection Authority	20/09/2016	20/09/2016	Monthly	0	0	0
Former POEO Licensed Activities now revoked or surrendered	Environment Protection Authority	20/09/2016	20/09/2016	Monthly	1	5	7
UPSS Environmentally Sensitive Zones	Department of Environment, Climate Change and Water (NSW)	14/04/2015	12/01/2010	As required	0	0	1
UBD Business to Business Directory 1991	Hardie Grant			Not required	0	0	0
UBD Business Directory 1991 Motor Garages/Service Stations	Hardie Grant			Not required	0	0	0
UBD Business Directory 1970	Hardie Grant			Not required	0	0	0
UBD Business Directory 1970 Drycleaners & Motor Garages/Service Stations	Hardie Grant			Not required	0	0	1
UBD Business Directory 1950	Hardie Grant			Not required	0	0	0
UBD Business Directory 1950 Drycleaners & Motor Garages/Service Stations	Hardie Grant			Not required	0	0	1
Points of Interest	Land and Property Information	10/04/2015	01/04/2015	Annually	0	1	58
Tanks (Areas)	Land and Property Information	10/04/2015	01/04/2015	Annually	0	0	0
Tanks (Points)	Land and Property Information	10/04/2015	01/04/2015	Annually	0	0	0
Major Easements	Land and Property Information	11/06/2014	11/06/2014	As required	0	0	5
State Forest	Land and Property Information	11/04/2016	23/01/2015	As required	0	0	0
NSW National Parks and Wildlife Service Reserves	NSW Office of Environment and Heritage	11/04/2016	31/12/2015	Annually	0	0	1
Hydrogeology Map of Australia	Commonwealth of Australia (Geoscience Australia)	08/10/2014	17/03/2000	As required	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	0	0	19
Geological Units 1:100,000	NSW Department of Industry, Resources & Energy	20/08/2014		None planned	1	-	2
Geological Structures 1:100,000	NSW Department of Industry, Resources & Energy	20/08/2014		None planned	0	-	0
Naturally Occurring Asbestos Potential	NSW Department of Industry, Resources & Energy	04/12/2015	24/09/2015	Unknown	0	0	0
Soil Landscapes	NSW Office of Environment and Heritage	12/08/2014		None planned	1	-	4
Standard Local Environmental Plan Acid Sulfate Soils	NSW Planning and Environment	07/10/2016	07/10/2016	As required	0	-	-
Dryland Salinity Assessment	National Land and Water Resources Audit	18/07/2014	12/05/2013	None planned	0	0	0
Mining Subsidence Districts	Land and Property Information	11/10/2016	11/10/2016	As required	0	0	0
SEPP 14 - Coastal Wetlands	NSW Planning and Environment	17/12/2015	24/10/2008	Annually	0	0	0

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	No. Features Onsite	No. Features within 100m	No. Features within Buffer
SEPP 26 - Littoral Rainforest	NSW Planning and Environment	17/12/2015	05/02/1988	Annually	0	0	0
SEPP 71 - Coastal Protection	NSW Planning and Environment	17/12/2015	01/08/2003	Annually	0	0	0
SEPP Major Developments 2005	NSW Planning and Environment	09/03/2013	25/05/2005	Under Review	1	1	1
SEPP Strategic Land Use Areas	NSW Planning and Environment	06/07/2016	28/01/2014	Annually	0	0	0
Local Environmental Plan - Land Zoning	NSW Planning and Environment	03/10/2016	04/08/2016	Quarterly	1	1	64
Local Environmental Plan - Minimum Subdivision Lot Size	NSW Planning and Environment	03/10/2016	04/08/2016	Quarterly	0	-	-
Local Environmental Plan - Height of Building	NSW Planning and Environment	03/10/2016	04/08/2016	Quarterly	0	-	-
Local Environmental Plan - Floor Space Ratio	NSW Planning and Environment	03/10/2016	04/08/2016	Quarterly	0	-	-
Local Environmental Plan - Land Application	NSW Planning and Environment	03/10/2016	04/08/2016	Quarterly	1	-	-
Local Environmental Plan - Land Reservation Acquisition	NSW Planning and Environment	03/10/2016	04/08/2016	Quarterly	0	-	-
State Heritage Items	NSW Planning and Environment	03/10/2016	12/03/2015	Quarterly	0	0	0
Local Heritage Items	NSW Planning and Environment	03/10/2016	04/08/2016	Quarterly	1	1	4
Bushfire Prone Land	NSW Rural Fire Service	18/08/2016	12/08/2016	Quarterly	0	0	3
Native Vegetation of the Sydney Metropolitan Area	NSW Office of Environment and Heritage	08/10/2014	11/10/2013	As required	1	2	9
RAMSAR Wetlands	Commonwealth of Australia Department of the Environment	08/10/2014	24/06/2011	As required	0	0	0
ATLAS of NSW Wildlife	NSW Office of Environment and Heritage	11/10/2016	11/10/2016	Daily	-	-	-

Aerial Imagery 2015

Western Road, Macquarie Park, NSW 2113

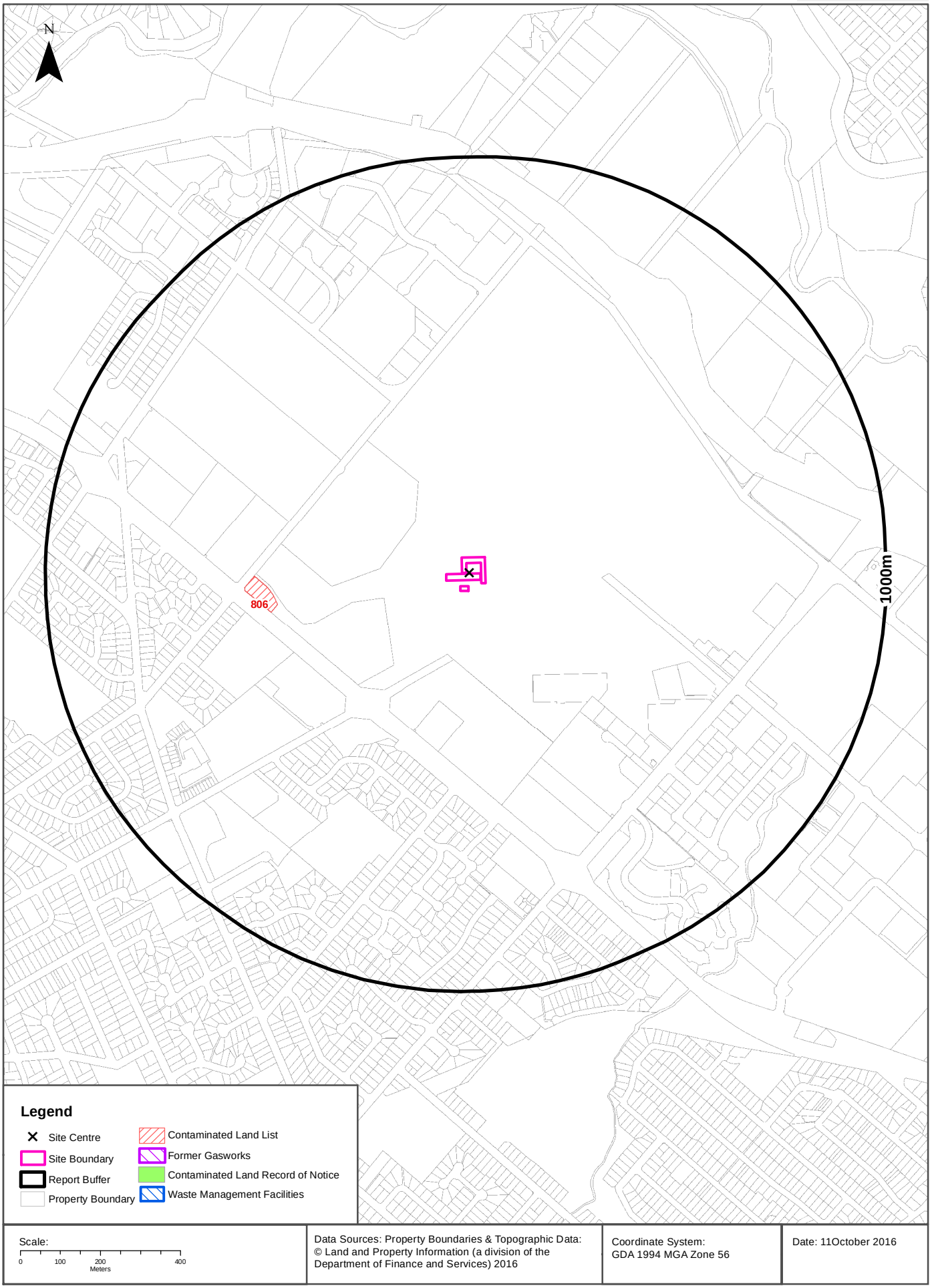


Scale:	Data Sources: Aerial Imagery © 2016 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.	Coordinate System: GDA 1994 MGA Zone 56	Date: 07October, 2016

0 25 50 100
Meters

Contaminated Land & Waste Management Facilities

Western Road, Macquarie Park, NSW 2113



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Coordinate System: GDA 1994 MGA Zone 56

Date: 11October 2016

Contaminated Land & Waste Management Facilities

Western Road, Macquarie Park, NSW 2113

List of NSW contaminated sites notified to EPA

Records from the NSW EPA Contaminated Land list within the report buffer:

Map Id	Site	Address	Suburb	Activity	EPA site management class	Status	Dist	Direction	LC
806	Coles Express Marsfield	189 Epping Road	Marsfield	Service Station	Under assessment	Current EPA List	425m	West	1

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

Western Road, Macquarie Park, NSW 2113

Contaminated Land: Records of Notice

Record of Notices within the report buffer:

Map Id	Area No	Name	Address	Suburb	Notices	Distance	Direction	LC
N/A	No records in buffer							

Contaminated Land Records of Notice Data Source: Environment Protection Authority

Terms of use and disclaimer for Contaminated Land: Record of Notices, please visit http://www.epa.nsw.gov.au/clm/clmdisclaimer.htm

Former Gasworks

Former Gasworks within the report buffer:

Map Id	Location	Council	Further Info	Distance	Direction	LC
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 report buffer:

Site Id	Owner	Name	Address	Suburb	Postcode	Landfill	Reprocess	Transfer	Distance	Direction	LC
N/A	No records in buffer										

Wate Management Facilities Data Source: Australian Governement Geoscience Australia

Current EPA Licensed Activities

Western Road, Macquarie Park, NSW 2113

Data Sources: Property Boundaries & Topographic Data: © Land and Property Information (a division of the Department of Finance and Services) 2016

Coordinate System: GDA 1994 MGA Zone 56

Date: 11October 2016

EPA Activities

Western Road, Macquarie Park, NSW 2113

Licensed Activities under the POEO Act 1997

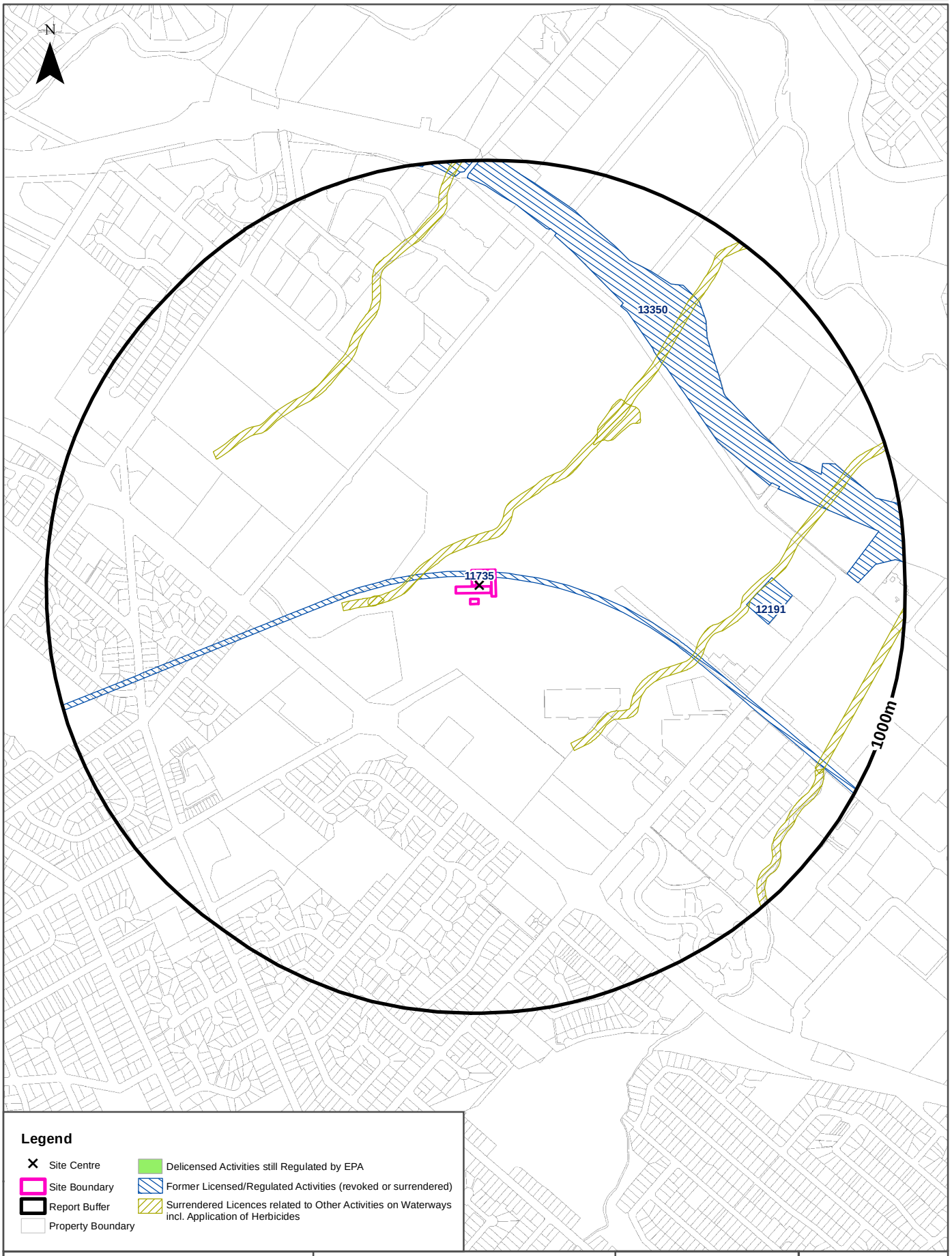
Licensed activities under the Protection of the Environment Operations Act 1997, within the report buffer:

EPL	Organisation	Name	Address	Suburb	Activity	Loc Conf	Distance	Direction
12208	SYDNEY TRAINS		PO BOX K349, HAYMARKET, NSW 1238		Railway systems activities	3	0m	Onsite

POEO Licence Data Source: Environment Protection Authority

Delicensed & Former Licensed EPA Activities

Western Road, Macquarie Park, NSW 2113



Data Sources: Property Boundaries & Topographic Data: © Land and Property Information (a division of the Department of Finance and Services) 2016

Coordinate System: GDA 1994 MGA Zone 56

Date: 11October 2016

EPA Activities

Western Road, Macquarie Park, NSW 2113

Delicensed Activities still regulated by the EPA

Delicensed activities still regulated by the EPA, within the report buffer:

Licence No	Organisation	Name	Address	Suburb	Activity	Loc Conf	Distance	Direction
N/A	No records in buffer							

Delicensed Activities Data Source: Environment Protection Authority

Former Licensed Activities under the POEO Act 1997, now revoked or surrendered

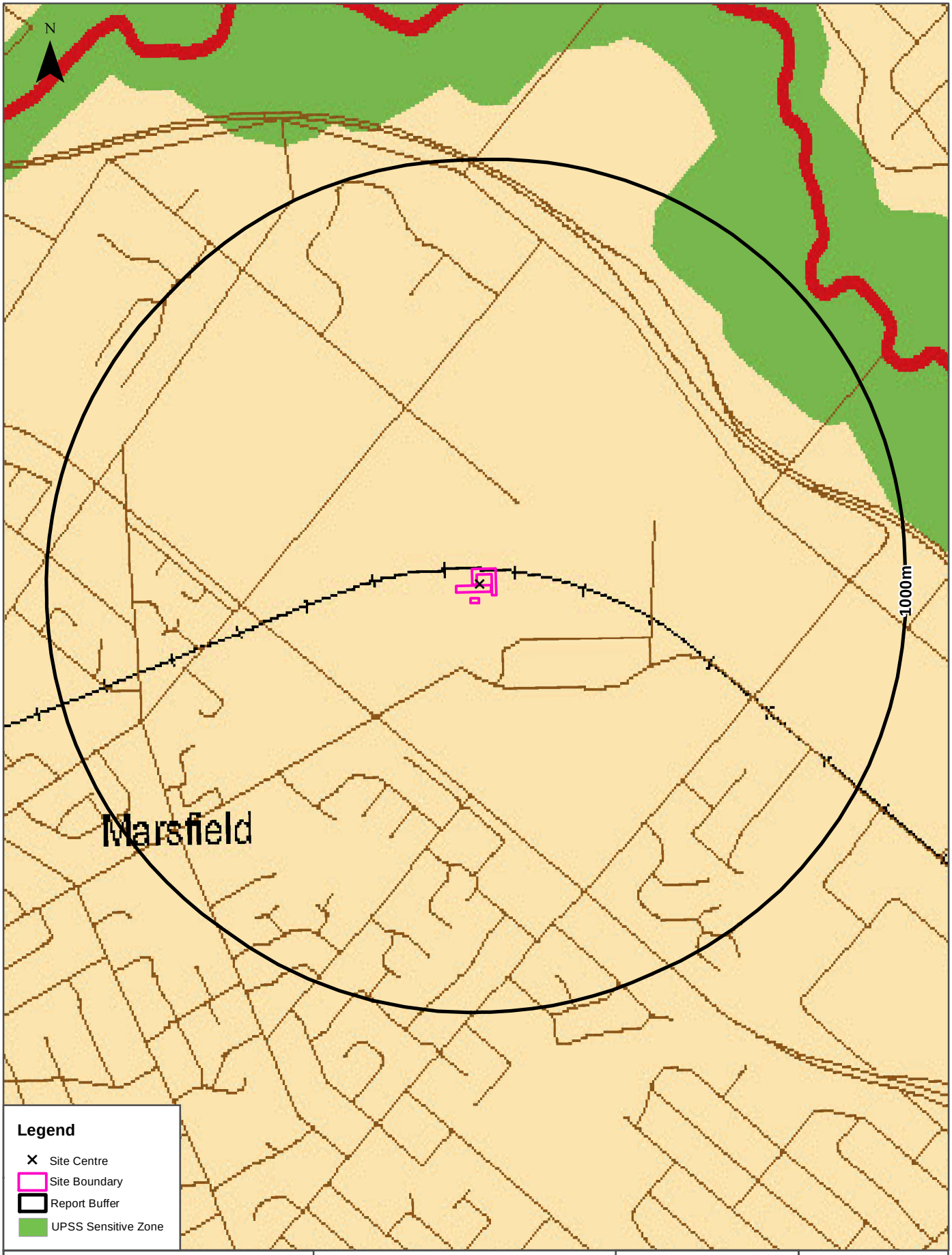
Former Licensed activities under the Protection of the Environment Operations Act 1997, now revoked or surrendered, within the report buffer:

Licence No	Organisation	Location	Status	Issued Date	Activity	Loc Conf	Distance	Direction
11735	HOCHTIEF AG	-, MACQUARIE PARK, NSW 2113	Surrendered	04/09/2002	Railway systems activities	3	0m	Onsite
4653	LUHRMANN ENVIRONMENT MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW	Surrendered		Other Activities / Non Scheduled Activity - Application of Herbicides	7	56m	-
4838	Robert Orchard	Various Waterways throughout New South Wales - SYDNEY NSW 2000	Surrendered		Other Activities / Non Scheduled Activity - Application of Herbicides	7	56m	-
5030	CITY OF RYDE	AREAS REQUIRING MOSQUITO TREATMENT WITHIN THE LGA OF RYDE CITY COUNCIL - RYDE NSW 2112	Surrendered		Miscellaneous licensed discharge to waters (at any time) - Pesticide application in areas requiring mosquito treatment	7	56m	-
6630	SYDNEY WEED & PEST MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW - PROSPECT, NSW, 2148	Surrendered		Other Activities / Non Scheduled Activity - Application of Herbicides	7	56m	-
12191	EIFFEL TECHNOLOGIES LIMITED	3 Innovation Road, NORTH RYDE, NSW 2113	Surrendered	25/11/2004	Hazardous, Industrial or Group A Waste Generation or Storage, Pharmaceutical and veterinary products production	1	613m	East
13350	CPB CONTRACTORS PTY LIMITED	M2 Motorway, Windsor Road, BAULKHAM HILLS, NSW 2153	Surrendered	23/12/2010	Road construction	3	625m	West

Former Licensed Activities Data Source: Environment Protection Authority

UPSS Sensitive Zones

Western Road, Macquarie Park, NSW 2113



Historical Business Directories

Western Road, Macquarie Park, NSW 2113

1991 Business to Business Directory Records

Records from the 1991 UBD Business to Business Directory within 150m of the site:

Business Activity	Organisation	Address	Ref No.	Location Confidence	Distance	Direction
N/A	No records in buffer					

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

1991 Business Directory Motor Garages & Service Stations

Motor Garages & Service Stations from the 1991 UBD Business Directory within 1km of the site:

Business Activity	Organisation	Address	Ref No.	Location Confidence	Distance	Direction
N/A	No records in buffer					

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

Historical Business Directories

Western Road, Macquarie Park, NSW 2113

1970 Business Directory Records

Records from the 1970 UBD Business Directory within 150m of the site:

Business Activity	Organisation & Premise	Ref No.	Location Confidence	Distance	Direction
N/A	No records in buffer				

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

1970 Business Directory Drycleaners & Service Stations

Drycleaners, Motor Garages & Service Stations from the 1970 UBD Business Directory within 1km of the site:

Business Activity	Organisation & Premise	Ref No.	Location Confidence	Distance	Direction
MOTOR SERVICE STATIONS-PETROL,OIL,Etc. (M716)	Pollard,H. Service Station,179 Epping Rd.EASTWOOD	341401	Building Match	460m	West

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

1950 Business Directory Records

Records from the 1950 UBD Business Directory within 150m of the site:

Business Activity	Organisation & Premise	Ref No.	Location Confidence	Distance	Direction
N/A	No records in buffer				

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

1950 Business Directory Drycleaners & Service Stations

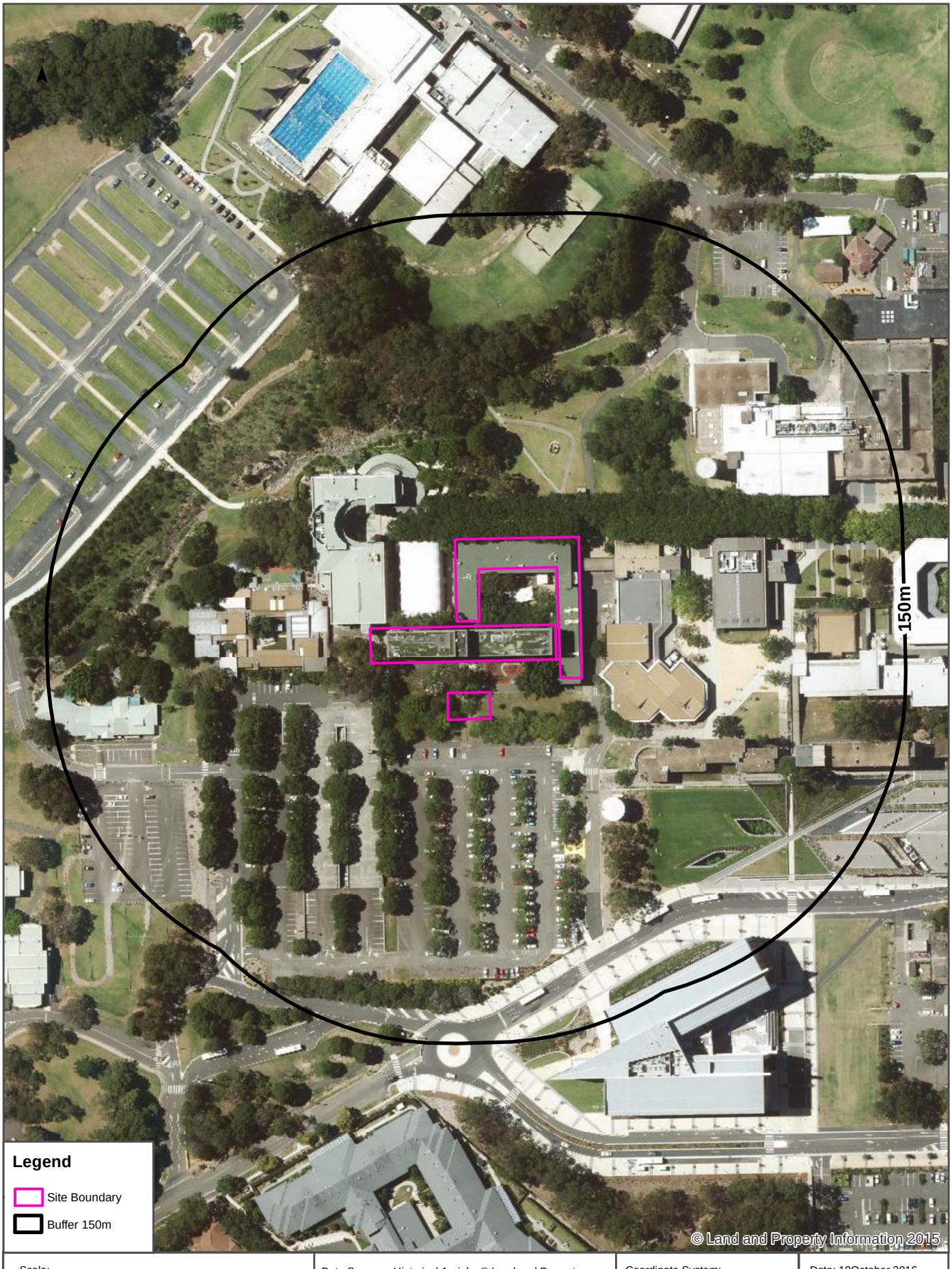
Drycleaners, Motor Garages & Service Stations from the 1950 UBD Business Directory within 1km of the site:

Activity	Organisation & Premise	Ref No.	Location Confidence	Distance	Direction
MOTOR GARAGES &/OR ENGINEERS	Jeffery, A., Agincourt Rd., Eastwood	83922	Road Match	917m	South West

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

Aerial Imagery 2014

Western Road, Macquarie Park, NSW 2113



Scale: 0 25 50 100 Meters

Data Sources: Historical Aerials: © Land and Property Information (a division of the Department of Finance and Services)

Coordinate System: GDA 1994 MGA Zone 56

Date: 10October 2016

Aerial Imagery 2009

Western Road, Macquarie Park, NSW 2113

Scale: 0 25 50 100 Meters

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Coordinate System: GDA 1994 MGA Zone 56

Date: 07October, 2016

Aerial Imagery 2003

Western Road, Macquarie Park, NSW 2113

Scale:
0 25 50 100
Meters

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Coordinate System:
GDA 1994 MGA Zone 56

Date: 07October, 2016

Aerial Imagery 1991

Western Road, Macquarie Park, NSW 2113

Data Sources: Historical Aerials: © Land and Property Information (a division of the Department of Finance and Services)

Coordinate System: GDA 1994 MGA Zone 56

Date: 07October 2016

Aerial Imagery 1982

Western Road, Macquarie Park, NSW 2113

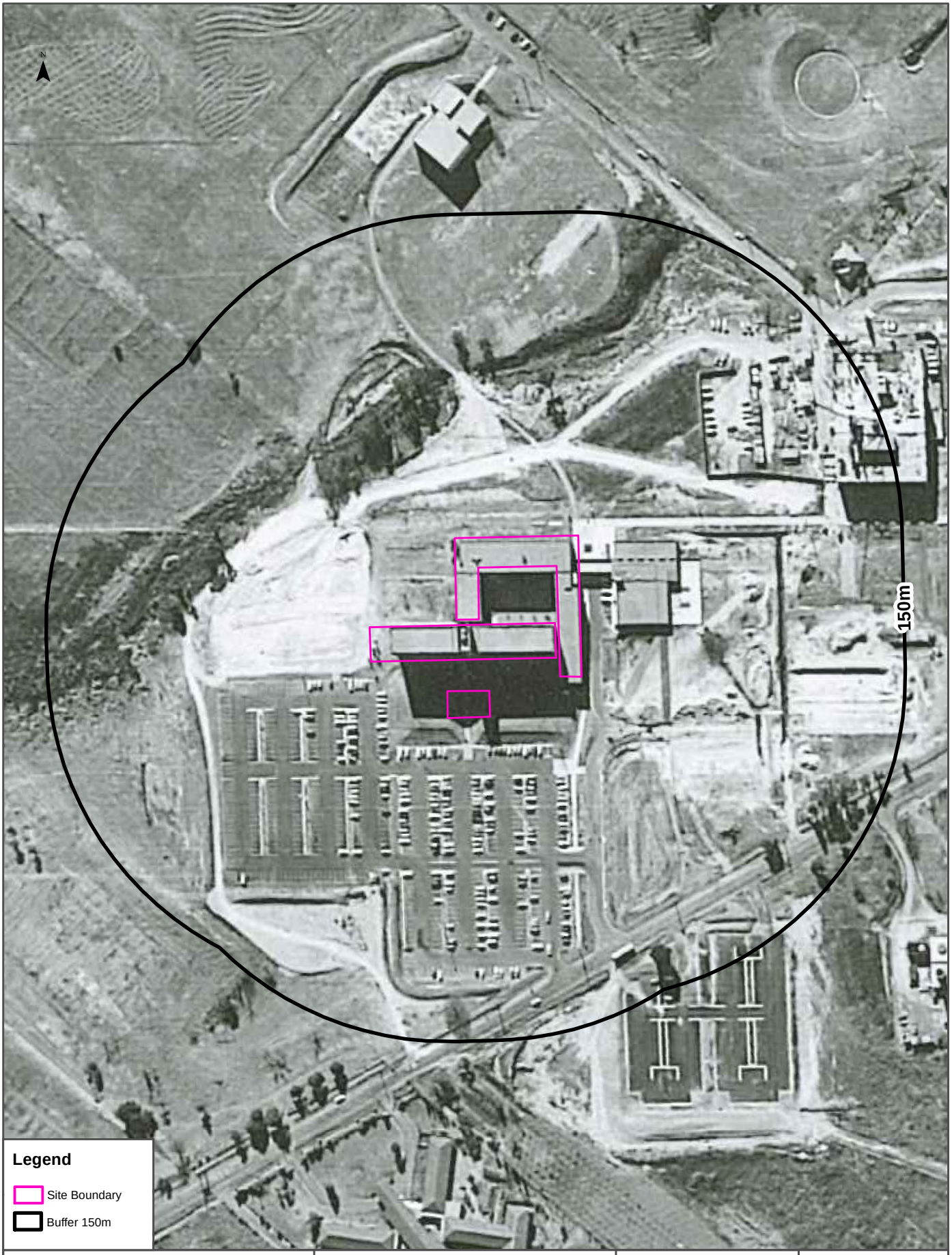
Data Sources: Historical Aerials: © Land and Property Information (a division of the Department of Finance and Services)

Coordinate System: GDA 1994 MGA Zone 56

Date: 07October 2016

Aerial Imagery 1970

Western Road, Macquarie Park, NSW 2113



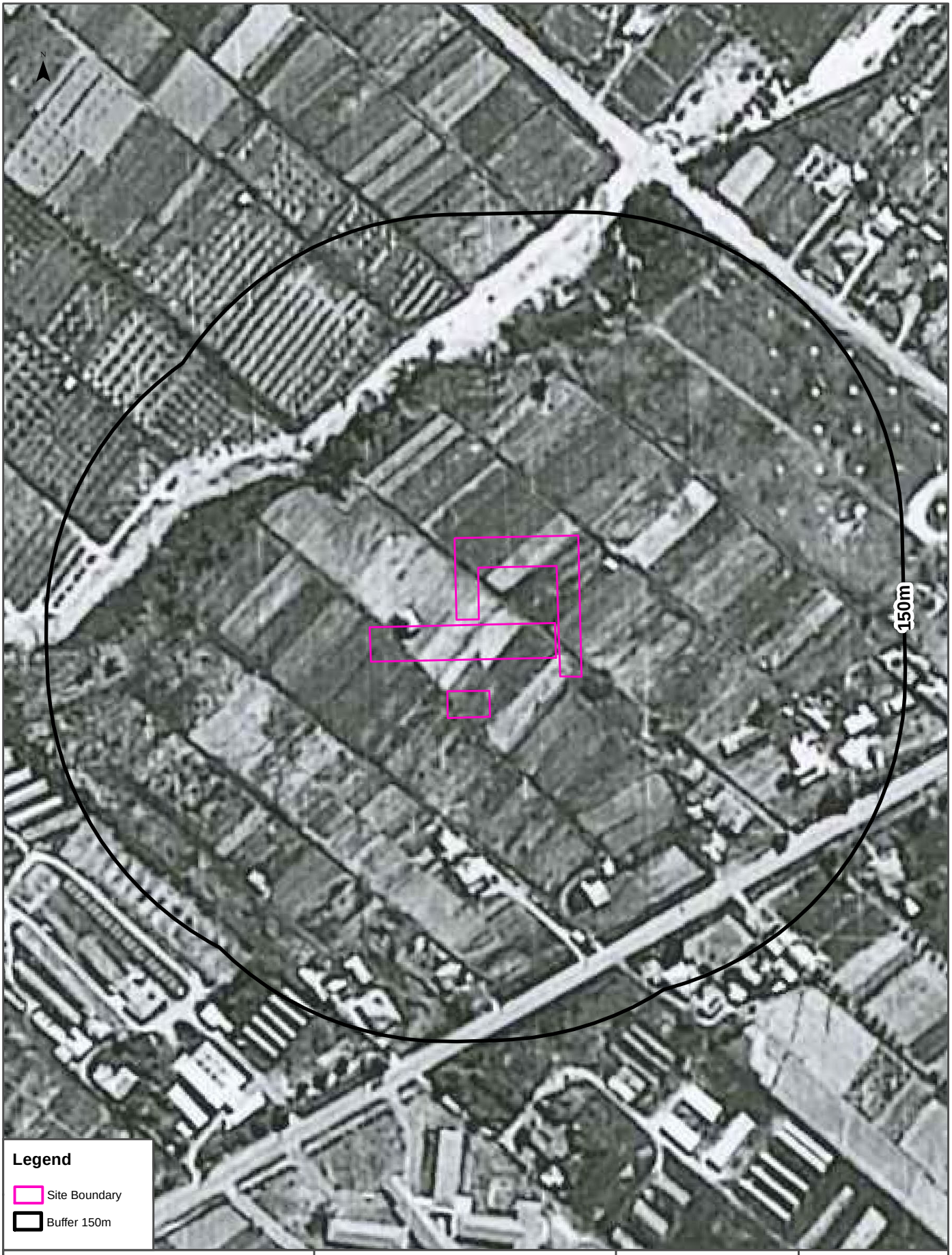
Data Sources: Historical Aerials: © Land and Property Information (a division of the Department of Finance and Services)

Coordinate System: GDA 1994 MGA Zone 56

Date: 07October 2016

Aerial Imagery 1965

Western Road, Macquarie Park, NSW 2113



Scale: 0 25 50 100 Meters

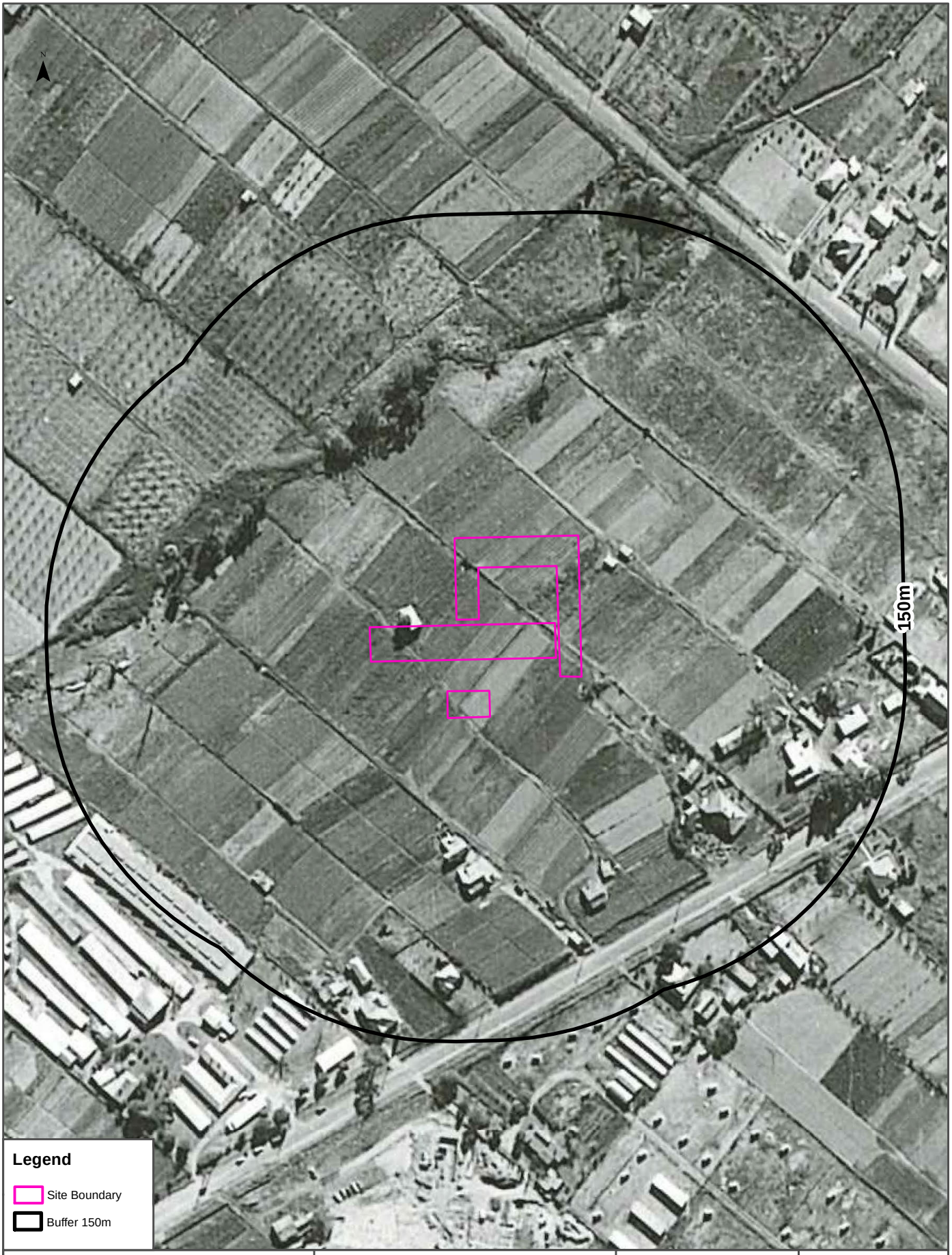
Data Sources: Historical Aerials: © Land and Property Information (a division of the Department of Finance and Services)

Coordinate System: GDA 1994 MGA Zone 56

Date: 07October 2016

Aerial Imagery 1961

Western Road, Macquarie Park, NSW 2113



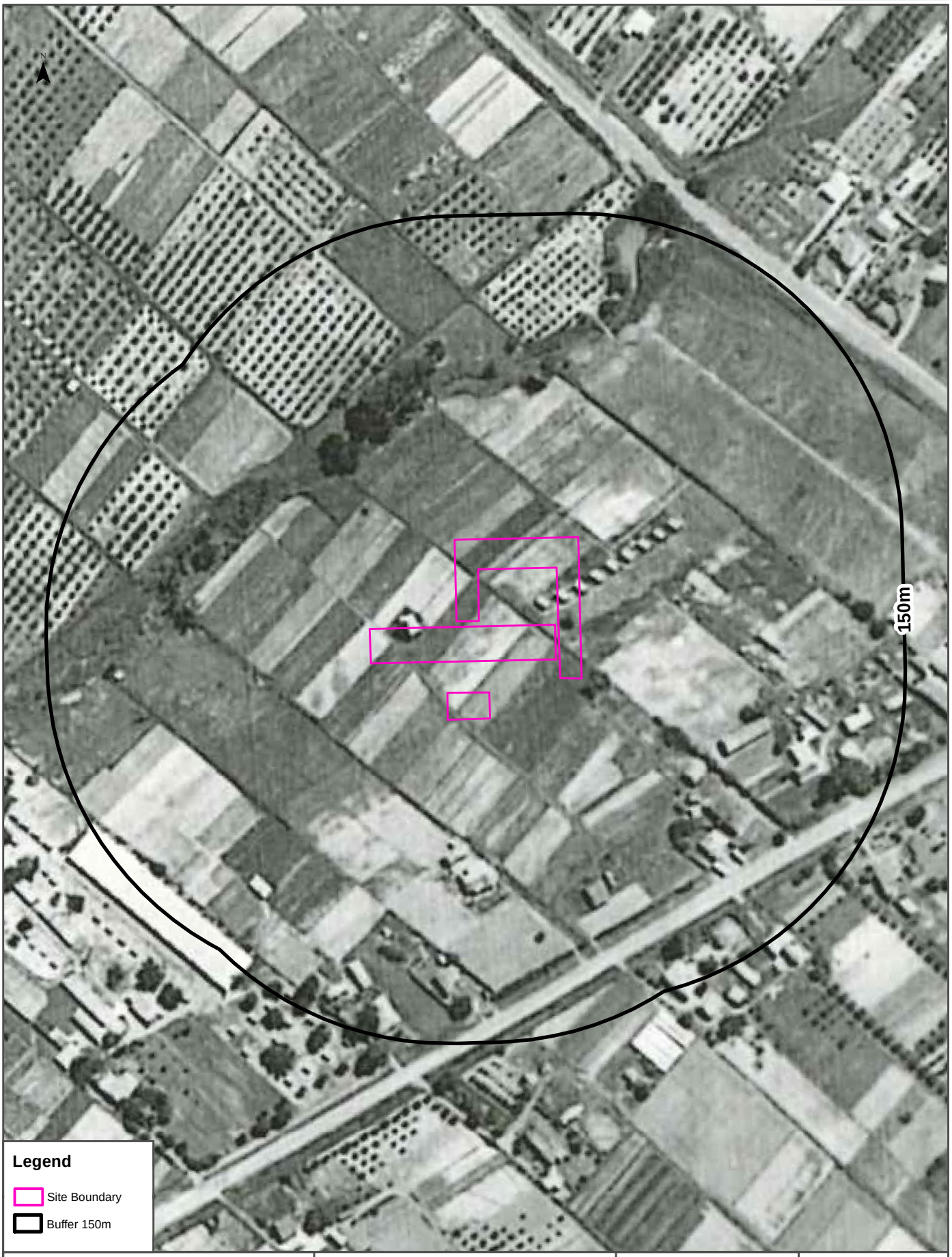
Data Sources: Historical Aerials: © Land and Property Information (a division of the Department of Finance and Services)

Coordinate System: GDA 1994 MGA Zone 56

Date: 07October 2016

Aerial Imagery 1956

Western Road, Macquarie Park, NSW 2113



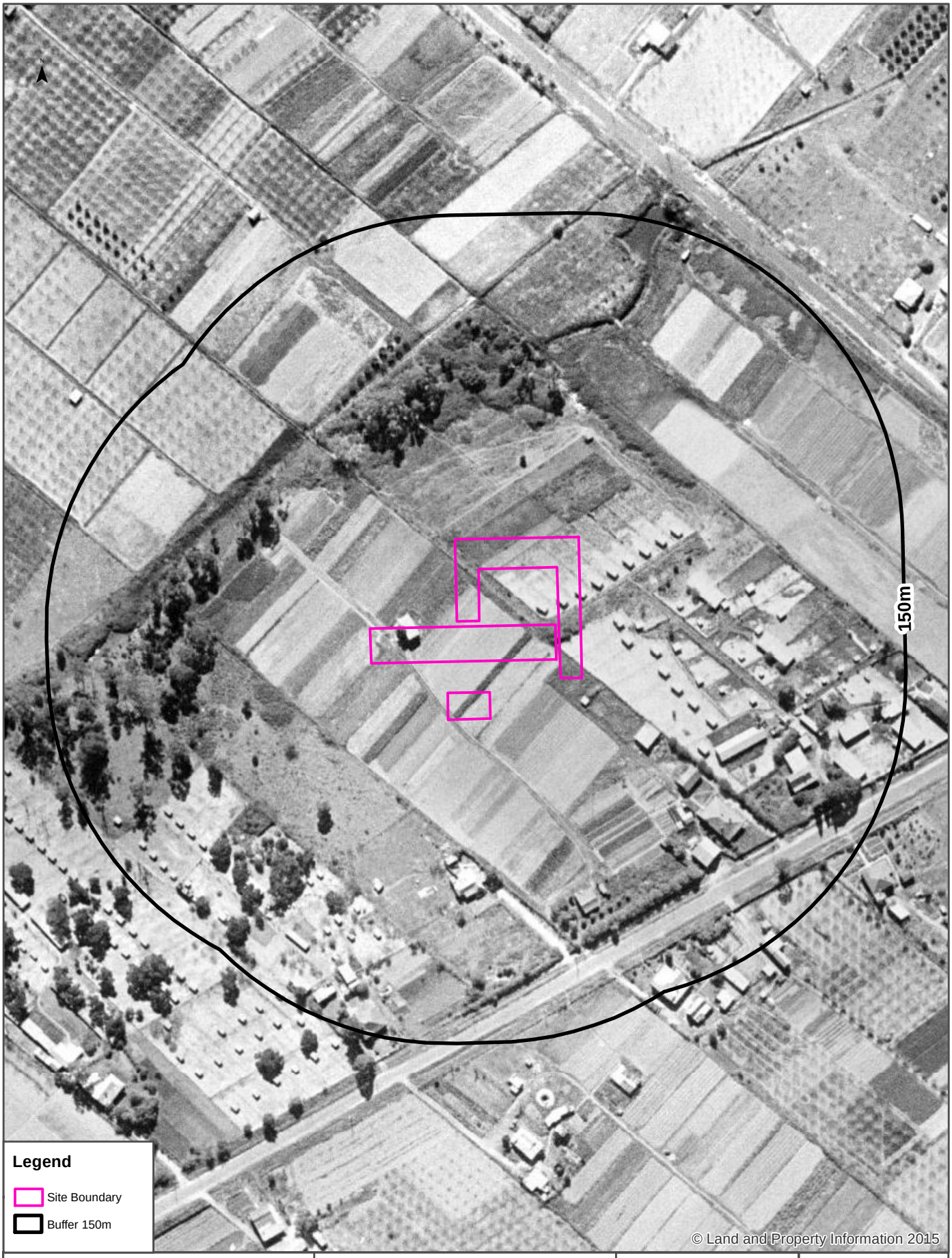
Data Sources: Historical Aerials: © Land and Property Information (a division of the Department of Finance and Services)

Coordinate System: GDA 1994 MGA Zone 56

Date: 07October 2016

Aerial Imagery 1943

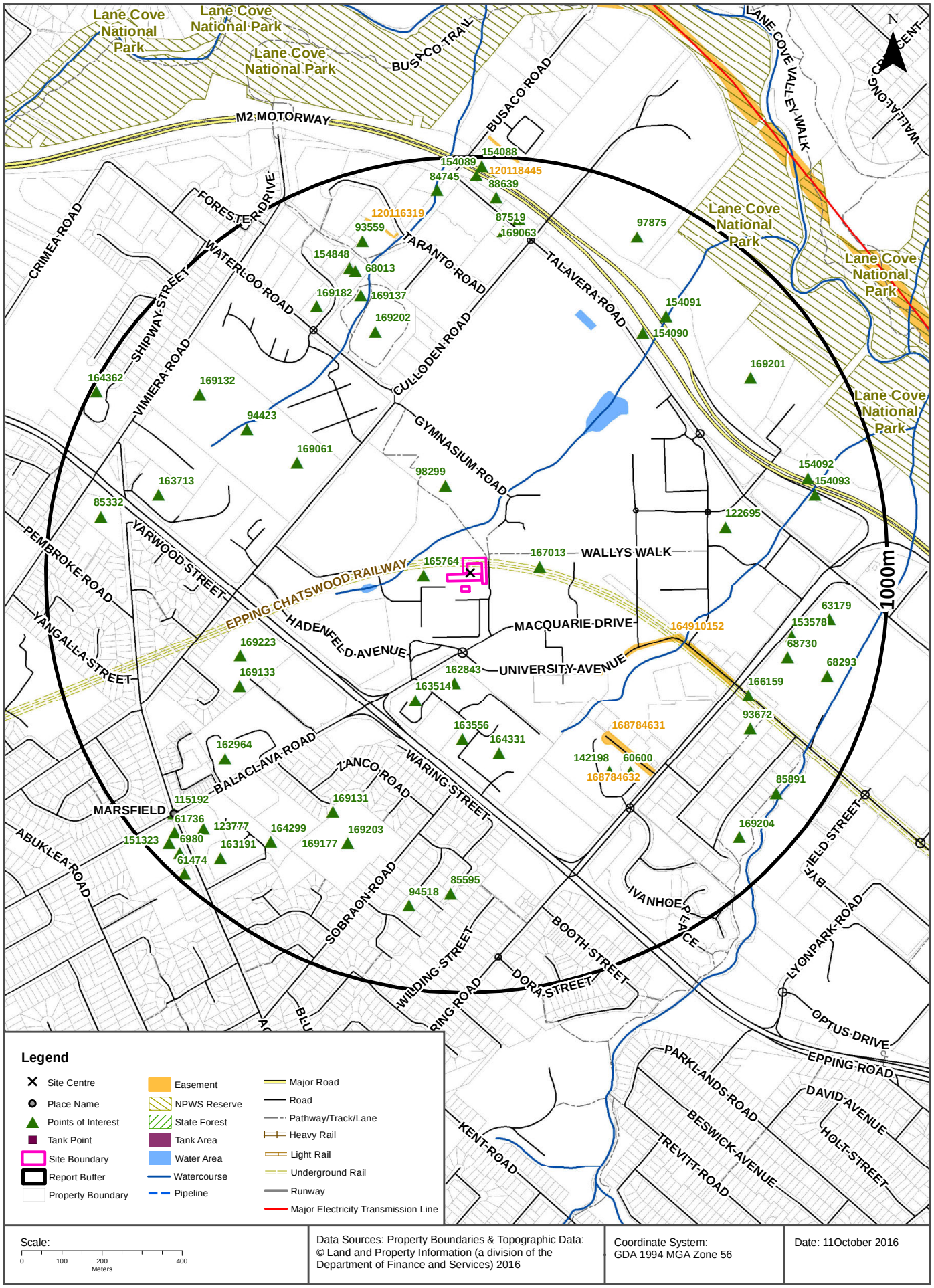
Western Road, Macquarie Park, NSW 2113



Scale:	Data Sources: Historical Aerials: © Land and Property Information (a division of the Department of Finance and Services)	Coordinate System: GDA 1994 MGA Zone 56	Date: 10October 2016

Topographic Features

Western Road, Macquarie Park, NSW 2113



Legend

- Site Centre
- Place Name
- Points of Interest
- Tank Point
- Site Boundary
- Report Buffer
- Property Boundary
- Easement
- NPWS Reserve
- State Forest
- Tank Area
- Water Area
- Watercourse
- Pipeline
- Major Road
- Road
- Pathway/Track/Lane
- Heavy Rail
- Light Rail
- Underground Rail
- Runway
- Major Electricity Transmission Line

Scale: 0 100 200 400 Meters

Data Sources: Property Boundaries & Topographic Data: © Land and Property Information (a division of the Department of Finance and Services) 2016

Coordinate System: GDA 1994 MGA Zone 56

Date: 11October 2016

Topographic Features

Western Road, Macquarie Park, NSW 2113

Points of Interest

What Points of Interest exist within the report buffer?

Map Id	Feature Type	Label	Distance	Direction
165764	Special School	MACQUARIE UNIVERSITY SPECIAL EDUCATION CENTRE	59m	West
167013	University	MACQUARIE UNIVERSITY	133m	East
98299	Sports Court	TENNIS COURTS	186m	North
162843	Community Home	BCS SHALOM CENTRE	228m	South
163514	Community Home	BCS DOROTHY HENDERSON LODGE	294m	South West
163556	Community Home	BCS COOINDA COURT	367m	South
164331	Retirement Village	WILLANDRA VILLAGE	409m	South
169061	Sports Centre	RIDING FOR THE DISABLED RYDE CENTRE	467m	North West
169223	Sports Field	PIONEER PARK	548m	West
142198	Education Facility	MORLING COLLEGE	559m	South East
169133	Picnic Area	PLAYGROUND	580m	South West
60600	Place Of Worship	BAPTIST CHURCH	590m	South East
122695	General Hospital	MACQUARIE UNIVERSITY HOSPITAL	602m	East
169202	Sports Field	WATERLOO PARK	606m	North
94423	Park	MARSFIELD PARK	617m	North West
169131	Park	PLAYGROUND	635m	South West
154090	Roadside Emergency Telephone	34	684m	North East
169203	Sports Field	DUNBAR PARK	688m	South West
169177	Athletics Track	Athletics Track	688m	South West
169137	Sports Court	BASKETBALL	703m	North
166159	Railway Station	MACQUARIE UNIVERSITY RAILWAY STATION	709m	South East
162964	Community Home	ST CATHERINE'S AGED CARE SERVICES	709m	South West
169182	Park	TRAFALGAR RESERVE	726m	North West
163713	Retirement Village	LEISURE LEA GARDENS	746m	West
93672	Park	ELOUERA RESERVE	749m	South East
154091	Roadside Emergency Telephone	33	751m	North East
85595	Park	LIBERTY PARK	753m	South
169132	Sports Field	TJ MILLNER FIELD	763m	North West
68013	Shopping Centre	TRAFALGAR SQUARE SHOPPING CENTRE	765m	North
68730	Sports Centre	MACQUARIE ICE RINK	772m	East
153578	Transport Interchange	MACQUARIE UNIVERSITY BUS INTERCHANGE	772m	East
154848	Medical Centre	MARSFIELD COMMUNITY HEALTH CENTRE	777m	North
164299	Retirement Village	SOUTHERN CROSS VILLAGE MARSFIELD	784m	South West

Map Id	Feature Type	Label	Distance	Direction
94518	Park	AUSTRALIA II PARK	793m	South
169201	Sports Field	CHRISTIE PARK	798m	North East
87519	Park	TALAVERA RESERVE	816m	North
154092	Roadside Emergency Telephone	35	826m	East
93559	Park	Park	830m	North
154093	Roadside Emergency Telephone	36	834m	East
169063	Club	MAQUARIE UNIVERISTY COMMUNITY GARDEN CLUB	850m	North
63179	Post Office	MACQUARIE CENTRE POST OFFICE	858m	East
123777	Community Facility	CURZON HALL	866m	South West
85332	Park	STEWART PARK	875m	West
68293	Shopping Centre	MACQUARIE SHOPPING CENTRE	879m	East
97875	Sports Court	TENNIS COURTS	885m	North East
85891	Park	QUANDONG RESERVE	890m	South East
169204	Park	WILGA RESERVE	891m	South East
163191	Community Home	SOUTHERN CROSS APARTMENTS MARSFIELD	892m	South West
115192	Suburb	MARSFIELD	894m	South West
88639	Park	WEERONA RESERVE	899m	North
84745	Park	Park	920m	North
61736	Place Of Worship	CATHOLIC CHURCH	924m	South West
6980	Community Facility	ST ANTHONYS PARISH HALL	951m	South West
151323	Primary School	ST ANTHONY'S CATHOLIC PRIMARY SCHOOL	952m	South West
154089	Roadside Emergency Telephone	32	954m	North
154088	Roadside Emergency Telephone	31	978m	North
61474	Place Of Worship	COMMUNITY CHURCH	980m	South West
164362	Retirement Village	VIMIERA VILLAGE	986m	North West

Topographic Features

Western Road, Macquarie Park, NSW 2113

Tanks (Areas)

What are the Tank Areas located within the report 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	Capture Method	Feature Currency	Distance	Direction
N/A	No records in buffer						

Tanks (Points)

What are the Tank Points located within the report 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	Capture Method	Feature Currency	Distance	Direction
N/A	No records in buffer						

Major Easements

What Major Easements exist within the report 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
164910152	Primary	Right of way		340m	South East
168784631	Primary	Right of way	16.105m & Var	474m	South East
168784632	Primary	Right of way	16.105m	563m	South East
120116319	Primary	Undefined		818m	North
120118445	Primary	Undefined		990m	North

Topographic Features

Western Road, Macquarie Park, NSW 2113

State Forest

What State Forest exist within the report buffer?

State Forest Number	State Forest Name	Distance	Direction
N/A	No records in buffer		

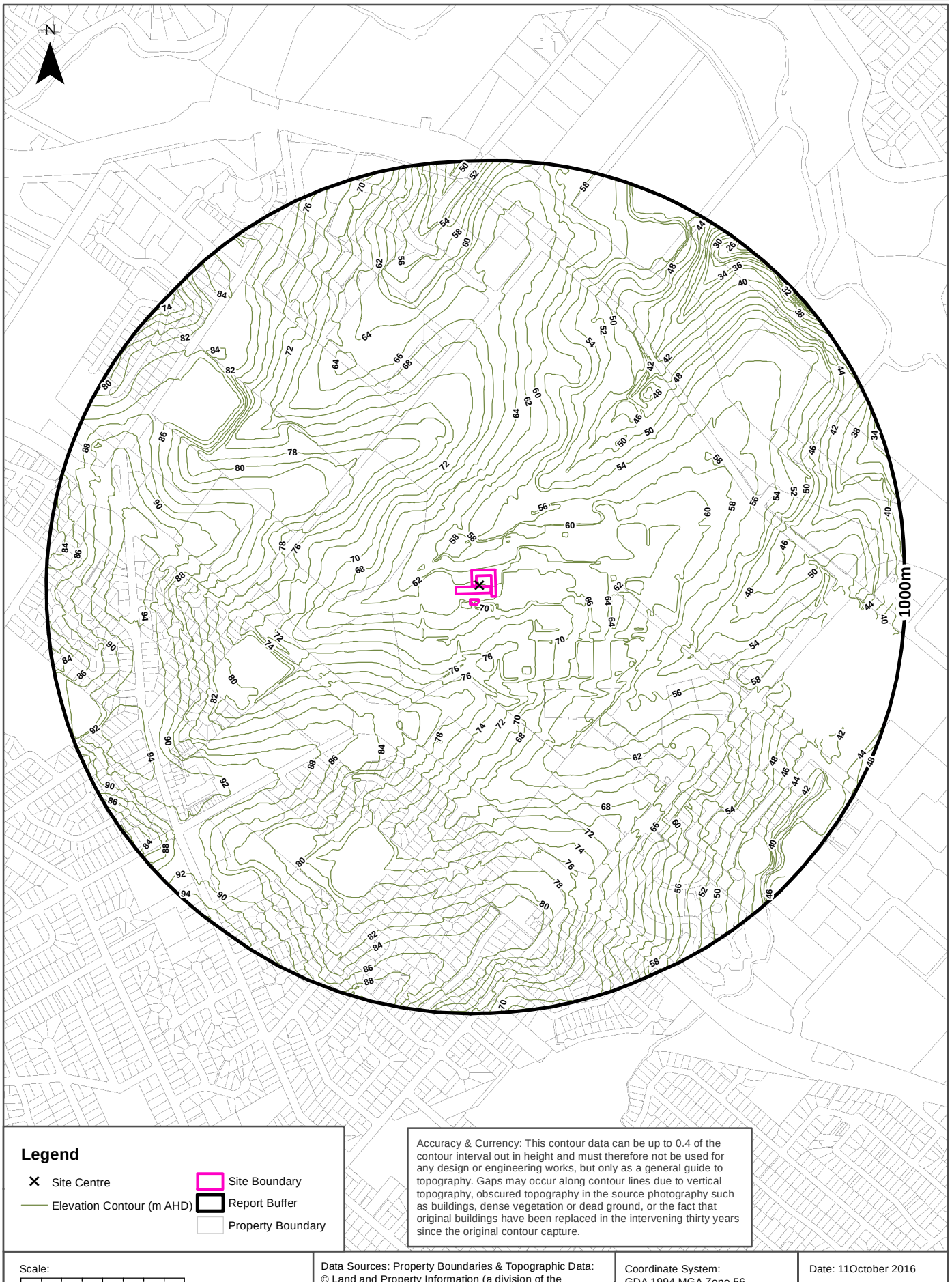
National Parks and Wildlife Service Reserves

What NPWS Reserves exist within the report buffer?

Reserve Number	Reserve Type	Reserve Name	Gazetted Date	Distance	Direction
N0083	NATIONAL PARK	Lane Cove National Park	24/04/1992	883m	North East

Elevation Contours (m AHD)

Western Road, Macquarie Park, NSW 2113



Legend

- Site Centre
- 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: 0 100 200 400 Meters

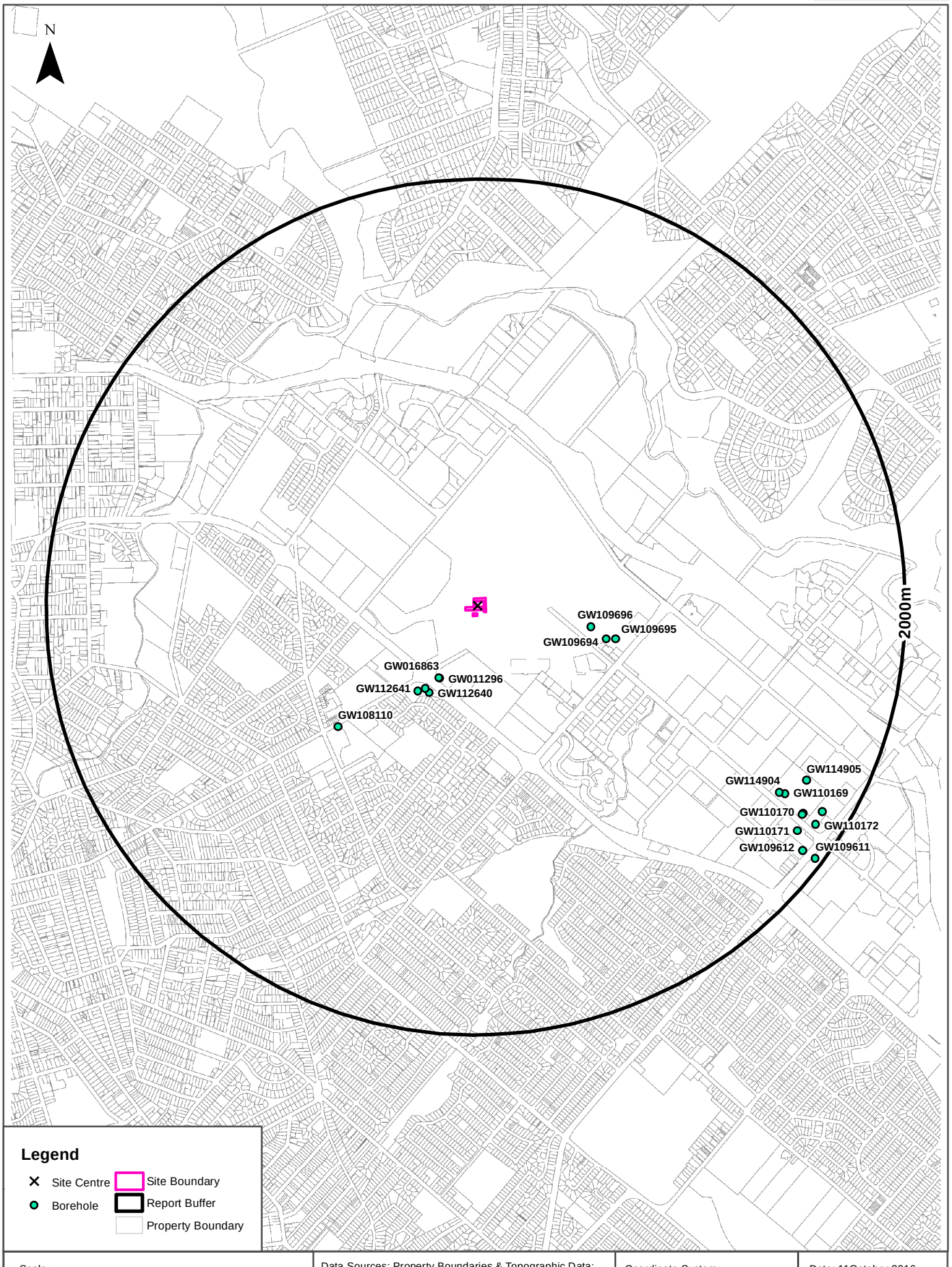
Data Sources: Property Boundaries & Topographic Data: © Land and Property Information (a division of the Department of Finance and Services) 2016

Coordinate System: GDA 1994 MGA Zone 56

Date: 11October 2016

Groundwater Boreholes

Western Road, Macquarie Park, NSW 2113



Hydrogeology & Groundwater

Western Road, Macquarie Park, NSW 2113

Hydrogeology

Description of aquifers on-site:

Description
Porous, extensive aquifers of low to moderate productivity

Description of aquifers within the report buffer:

Description
Porous, extensive aquifers of low to moderate productivity

Groundwater Boreholes

Boreholes within 2km of the site:

GW No.	Licence No	Work Type	Owner Type	Purpose	Contractor	Complete Date	Final Depth	Drilled Depth	Salinity	SWL	Yield	Elev	Dist	Dir
GW011296	10BL004479	Bore open thru rock	Private	Irrigation		01/09/1953	67.00	67.10	501-1000 ppm				337m	South West
GW016863	10BL007238	Bore open thru rock	Private	Irrigation		01/01/1958	45.70	45.70	0-500 ppm				338m	South West
GW112642	10BL603208	Bore	Private	Monitoring	Numac Drilling Services	05/08/2009	8.00	8.00					413m	South West
GW112640	10BL603208	Bore	Private	Monitoring	Numac Drilling Services	05/08/2009	8.00	8.00					422m	South West
GW112641	10BL603208	Bore	Private	Monitoring	Numac Drilling Services	05/08/2009	8.00	8.00					444m	South West
GW109696	10BL161772	Bore	Other Govt	Monitoring	Reynolds Drilling	27/01/2000	35.50						507m	East
GW109694	10BL161772	Bore	Other Govt	Monitoring	Coffey Geosciences Pty Ltd	12/12/2001	46.40						590m	East
GW109695	10BL161772	Bore	Other Govt	Monitoring	Reynolds Drilling	18/01/2000	44.30						633m	East
GW108110	10BL164626, 10BL602106, 10WA109513	Bore		Recreation	Groundtek Drilling	01/02/2005	81.00	81.00	2500	7.30	2.500		823m	South West
GW114904	10BL605704	Bore	Other Govt	Monitoring bore	Terratest	29/01/2015	9.00	9.00					1646m	South East
GW110169	10BL161366	Bore	Private	Monitoring	Drilltest Pty Ltd	09/09/2002	6.50	6.50					1673m	South East
GW114905	10BL605704	Bore	Other Govt	Monitoring bore	Terratest	29/01/2015	10.50	10.50					1730m	South East
GW110170	10BL161366	Bore	Private	Monitoring	Intertec Drilling Services	31/01/2000	43.00	43.00					1794m	South East
GW114903	10BL605704	Bore	Other Govt	Monitoring bore	Terratest Pty Ltd	29/01/2015	9.00	9.00					1794m	South East
GW110171	10BL161366	Bore	Private	Monitoring		08/02/2000	36.10	36.10					1818m	South East

GW No.	Licence No	Work Type	Owner Type	Purpose	Contractor	Complete Date	Final Depth	Drilled Depth	Salinity	SWL	Yield	Elev	Dist	Dir
GW109837	10BL161221	Bore	Private	Monitoring		21/12/2002	36.60			18.00			1867m	South East
GW110172	10BL161366	Bore	Private	Monitoring		09/03/2000	36.00	36.00					1874m	South East
GW109612	10BL161773	Bore	Other Govt	Monitoring	Coffee Partners (International) Pty Ltd	18/12/2001	1.15						1893m	South East
GW109611	10BL161773	Bore	Other Govt	Monitoring	Coffee Partners (International) Pty Ltd	18/12/2001	1.00						1964m	South East

Hydrogeology & Groundwater

Western Road, Macquarie Park, NSW 2113

Driller's Logs

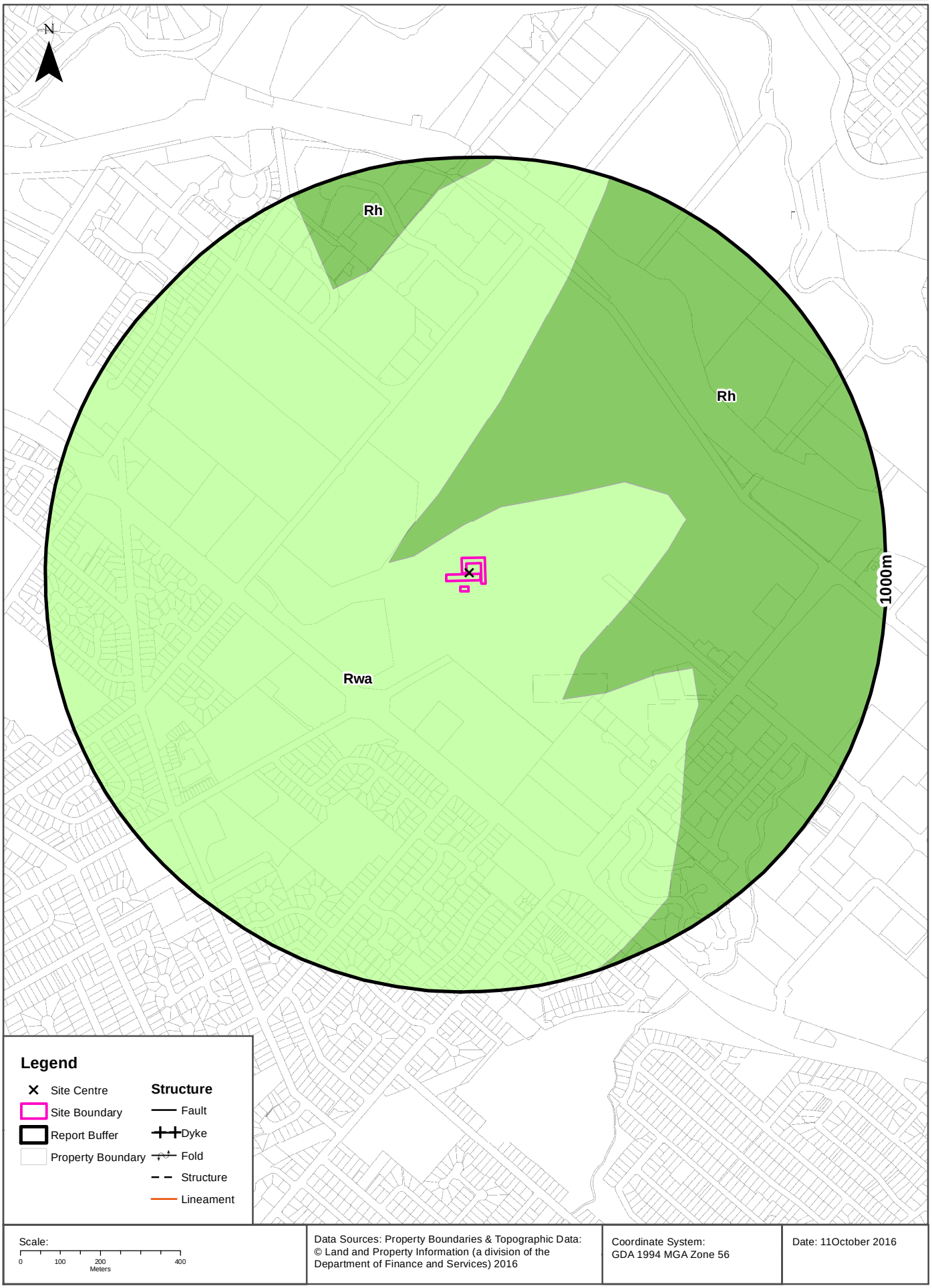
Drill log data relevant to the boreholes within 2km of the site:

Groundwater No	Drillers Log	Distance	Direction
GW011296	0.00m-58.21m Sandstone 58.21m-65.22m Shale Water Supply 65.22m-67.05m Sandstone	337m	South West
GW016863	0.00m-2.43m Clay Hard Sandy 2.43m-3.96m Sandstone 3.96m-5.79m Sandstone Yellow 5.79m-7.31m Sandstone White 7.31m-15.24m Sandstone Yellow 15.24m-17.67m Shale Sandy Water Supply 17.67m-24.99m Sandstone Yellow 24.99m-26.51m Shale Sandy Water Supply 26.51m-45.72m Sandstone White Silty	338m	South West
GW112642	0.00m-2.00m FILL 2.00m-6.00m SAND 6.00m-8.00m SHALE	413m	South West
GW112640	0.00m-2.00m FILL 2.00m-6.00m SAND 6.00m-8.00m SHALE	422m	South West
GW112641	0.00m-2.00m FILL 2.00m-6.00m SAND 6.00m-8.00m SHALE	444m	South West
GW108110	0.00m-15.00m SHALE WEATHERED 15.00m-81.00m SANDSTONE GREY	823m	South West
GW114904	0.00m-1.80m FILL, GRAVELLY CLAY,BROWN FIRM 1.80m-2.00m IRONSTONE 2.00m-2.80m CLAY,GREY RED AND WHITE FIRM 2.80m-3.00m IRONSTONE 3.00m-3.20m CLAY GREY RED AND WHITE, FIRM 3.20m-3.40m IRONSTONE 3.40m-9.00m CLAY AND SHLAE,RED AND ORANGE, HARD	1646m	South East
GW110169	0.00m-0.10m GRASS 0.10m-1.80m TOPSOIL,SILT,SAND,FINE,MEDIUM GRAINED,BROWN,DRY,FIRM 1.80m-3.00m SILTY CLAY,LOW PLASTICITY,GREY WITH ORANGE/RED MOTTLE,SOME IRONSTONE GRAVEL 3.00m-6.50m WEATHERED SHALE,BROWN,DRY,HARD, NO IRONSTONE GRAVEL	1673m	South East
GW114905	0.00m-0.30m FILL, SANDY GRAVEL,BLACK 0.30m-2.20m CLAY AND SHALE ORANGE AND BROWN,SOFT 2.20m-10.50m SHALE GREY SOFT	1730m	South East
GW110170	0.00m-0.10m ASPHALTIC CONCRETE,(30mm thick) 0.10m-0.25m FILL,SANDY GRAVEL,MEDIUM GRAINED 0.25m-5.25m SILTY CLAY,RED/BROWN AND GREY,MEDIUM-HIGH PLASTICITY,IRONSTONE 5.25m-6.50m SHALE,DARK GREY 6.50m-15.00m SHALE,DARK GREY 15.00m-21.20m SHALE AND SANDSTONE,SHALE DRK GREY,SANDSTONE L/GREY 21.20m-25.85m SANDSTONE L/GREY,FINE GRAINED,LAMINATED,SHALE 25.85m-39.50m SANDSTONE L/GREY,FINE TO MEDIUM GRAINED 39.50m-42.20m SANDSTONE,L/GREY,MEDIUM GRAINED 42.20m-43.00m SANDSTONE L/GREY,FINE TO MEDIUM GRAINED,MEDIUM BEDDED	1794m	South East
GW114903	0.00m-0.30m FILL, SANDY GRAVEL, BLACK 0.30m-2.10m CLAY AND WEATHERED SHALE,RED,ORANGE,SOFT 2.10m-9.00m SHALE, RED AND GREY,SOFT	1794m	South East

Groundwater No	Drillers Log	Distance	Direction
GW110171	0.00m-1.00m FILL,SANDY CLAYEY GRAVEL,BROWN,FINE TO COARSE 1.00m-2.30m SILTY CLAY,LIGHT GREY AND BROWN,HIGH PLASTICITY. 2.30m-3.40m SHALE,GREY AND BROWN,FINE TO COARSE GRAINED IRONSTONE,GRAVEL BANDS 3.40m-4.65m SHALE,DARK GREY AND BROWN ,VERY LOW STRENGH 4.65m-5.75m SHALE DARK GREY AND BROWN 5.75m-6.20m CORE LOSS (5.75m-6.2m) 6.20m-8.50m SHALE DARK GREY 8.50m-9.20m CORE LOOS (8.5m-9.2m) 9.20m-10.90m SHALE DRK GREY 10.90m-12.50m CORE LOSS (10.9m-12.5m) 12.50m-13.00m SHALE DARK GREY 13.00m-15.30m SHALE DARK GREY WITH LIGHT GRAINED SANDSTONE 15.30m-18.00m SHALE AND SANDSTONE 18.00m-22.40m SANDSTONE L/GREY,FINE GRAINED 22.40m-35.70m SANDSTONE L/GREY,MEDIUM GRAINED 35.70m-36.10m SANDSTONE L/GREY,FINE GRAINED	1818m	South East
GW109837	0.00m-3.60m FILL 3.60m-4.80m CLAY 4.80m-8.40m SHALE 8.40m-18.00m FINE SANDSTONE 18.00m-36.60m COARSE SANDSTONE	1867m	South East
GW110172	0.00m-0.10m SILTY SAND, BROWN,FINE GRAINED WITH ROOT,FIBRE 0.10m-0.40m FILL,(GRAVELLY SAND)BROWN,FINE TO MEDIUM GRAINED 0.40m-0.80m FILL,GRAVELLY SILTY CLAY,BROWN/GREY,MEDIUM PLASTICITY 0.80m-1.40m SILTY CLAY RED BROWN,MEDIUM TO HIGH PLASTICITY,IRONSTONE 1.40m-2.75m SILTY CLAY.RED. BROWN GREY,TRACES OF IRONSTONE/GRAVEL 2.75m-3.20m CORE LOSS 0.45m 3.20m-3.75m SHALE,LIGHT GREY/RED-BROWN WITH BABNDS OF IRONSTAINED SHALE 3.75m-8.30m SHALE,DARK GREY/BROW, IRONSTAINED 8.30m-13.30m SHALE,DARK GREY 13.30m-16.75m SHALE,DARK GREY,WITH FINE GRAINED LIGHT-GREY SANDSTONE 16.75m-20.20m SANDSTONE LIGHT GREY,FINE GRAINED,SHALE LAMINATIONS 20.20m-22.40m SANDSTONE L/GREY,FINE GRAINED 22.40m-27.90m SANDSTONE L/GREY,MEDIUM GRAINED 27.90m-30.10m SANDSTONE,L/GREY,MEDIUM COARSE GRAINED,GRAINED SHALE GRAVELS 30.10m-36.00m SANDSTONE LIGHT GREY,FINE TO MEDIUM GRAINED	1874m	South East

Geology 1:100,000

Western Road, Macquarie Park, NSW 2113



Data Sources: Property Boundaries & Topographic Data: © Land and Property Information (a division of the Department of Finance and Services) 2016

Coordinate System: GDA 1994 MGA Zone 56

Date: 11October 2016

Geology

Western Road, Macquarie Park, NSW 2113

Geological Units

What are the Geological Units onsite?

Symbol	Description	Unit Name	Group	Sub Group	Age	Dom Lith	Map Sheet	Dataset
Rwa	Black to dark grey shale and laminate	Ashfield Shale	Wianamatta Group		Triassic		Sydney	1:100,000

What are the Geological Units within the report buffer?

Symbol	Description	Unit Name	Group	Sub Group	Age	Dom Lith	Map Sheet	Dataset
Rh	Medium to coarse grained quartz sandstone, very minor shale and laminate lenses				Triassic		Sydney	1:100,000
Rwa	Black to dark grey shale and laminate	Ashfield Shale	Wianamatta Group		Triassic		Sydney	1:100,000

Geological Structures

What are the Geological Structures onsite?

Feature	Name	Description	Map Sheet	Dataset
No features				1:100,000

What are the Geological Structures within the report buffer?

Feature	Name	Description	Map Sheet	Dataset
No features				1:100,000

Geological Data Source : NSW Department of Industry, Resources & Energy

Naturally Occurring Asbestos Potential

Western Road, Macquarie Park, NSW 2113

Naturally Occurring Asbestos Potential

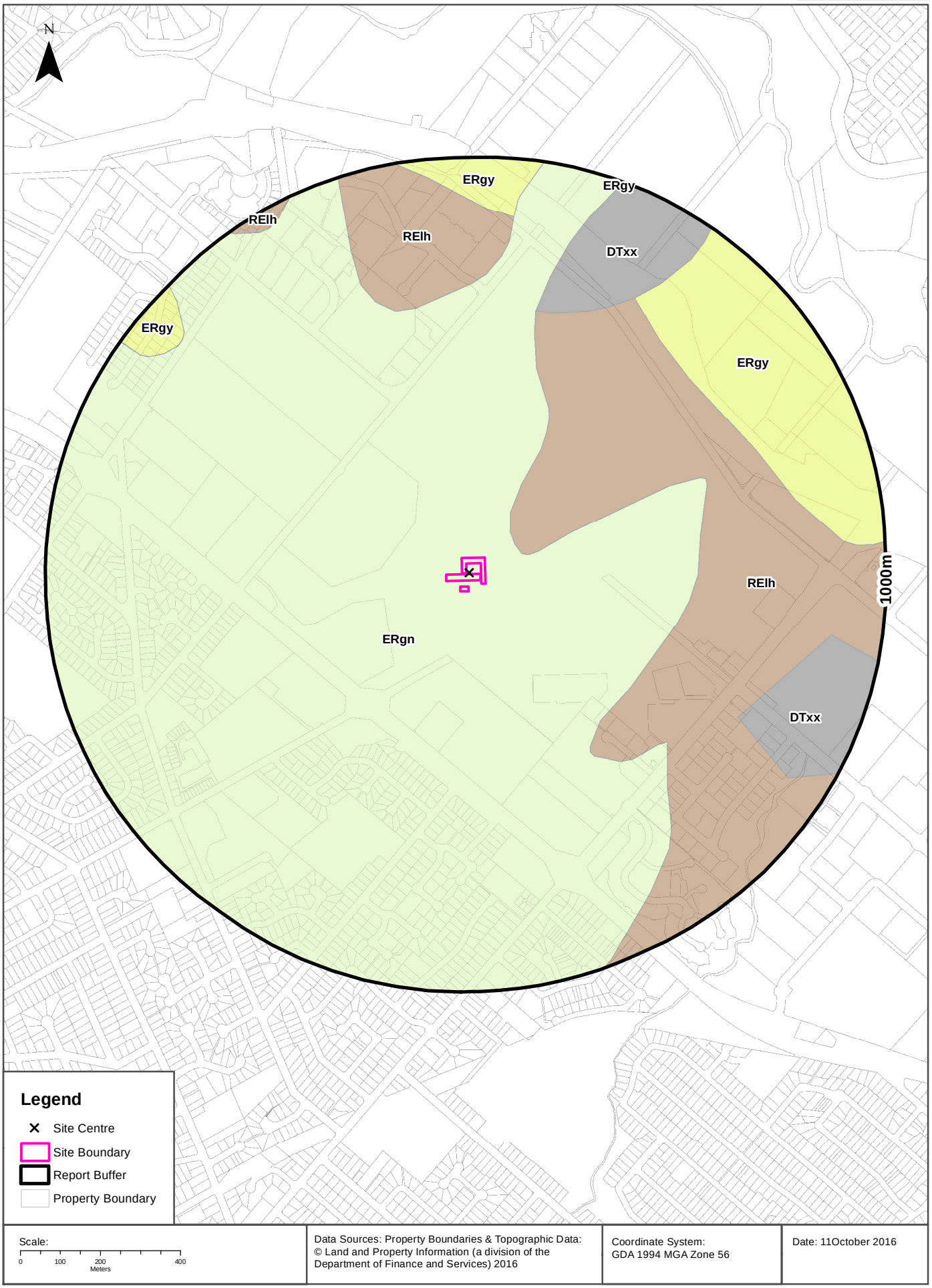
Naturally Occurring Asbestos Potential within the report buffer?

Potential	Sym	Strat Name	Group	Formation	Scale	Min Age	Max Age	Rock Type	Dom Lith	Description	Dist	Dir
No records in buffer												

Mining Subsidence District Data Source: © State of New South Wales through NSW Department of Industry, Resources & Energy

Soil Landscapes

Western Road, Macquarie Park, NSW 2113



Soils

Western Road, Macquarie Park, NSW 2113

Soil Landscapes

What are the onsite Soil Landscapes?

Soil Code	Name	Group	Process	Map Sheet	Scale
ERgn	GLENORIE		EROSIONAL	Sydney	1:100,000

What are the Soil Landscapes within the report buffer?

Soil Code	Name	Group	Process	Map Sheet	Scale
DTxx	DISTURBED TERRAIN		DISTURBED TERRAIN	Sydney	1:100,000
ERgn	GLENORIE		EROSIONAL	Sydney	1:100,000
ERgy	GYMEA		EROSIONAL	Sydney	1:100,000
RElh	LUCAS HEIGHTS		RESIDUAL	Sydney	1:100,000

Standard Local Environmental Plan Acid Sulfate Soils

Western Road, Macquarie Park, NSW 2113

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
N/A		

If the on-site Soil Class is 5, what other soil classes exist within 500m?

Soil Class	Description	LEP	Distance	Direction
N/A				

Dryland Salinity

Western Road, Macquarie Park, NSW 2113

Dryland Salinity

Is there Dryland Salinity data onsite?

No

Is there Dryland Salinity data within the report 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.

Mining Subsidence Districts

Western Road, Macquarie Park, NSW 2113

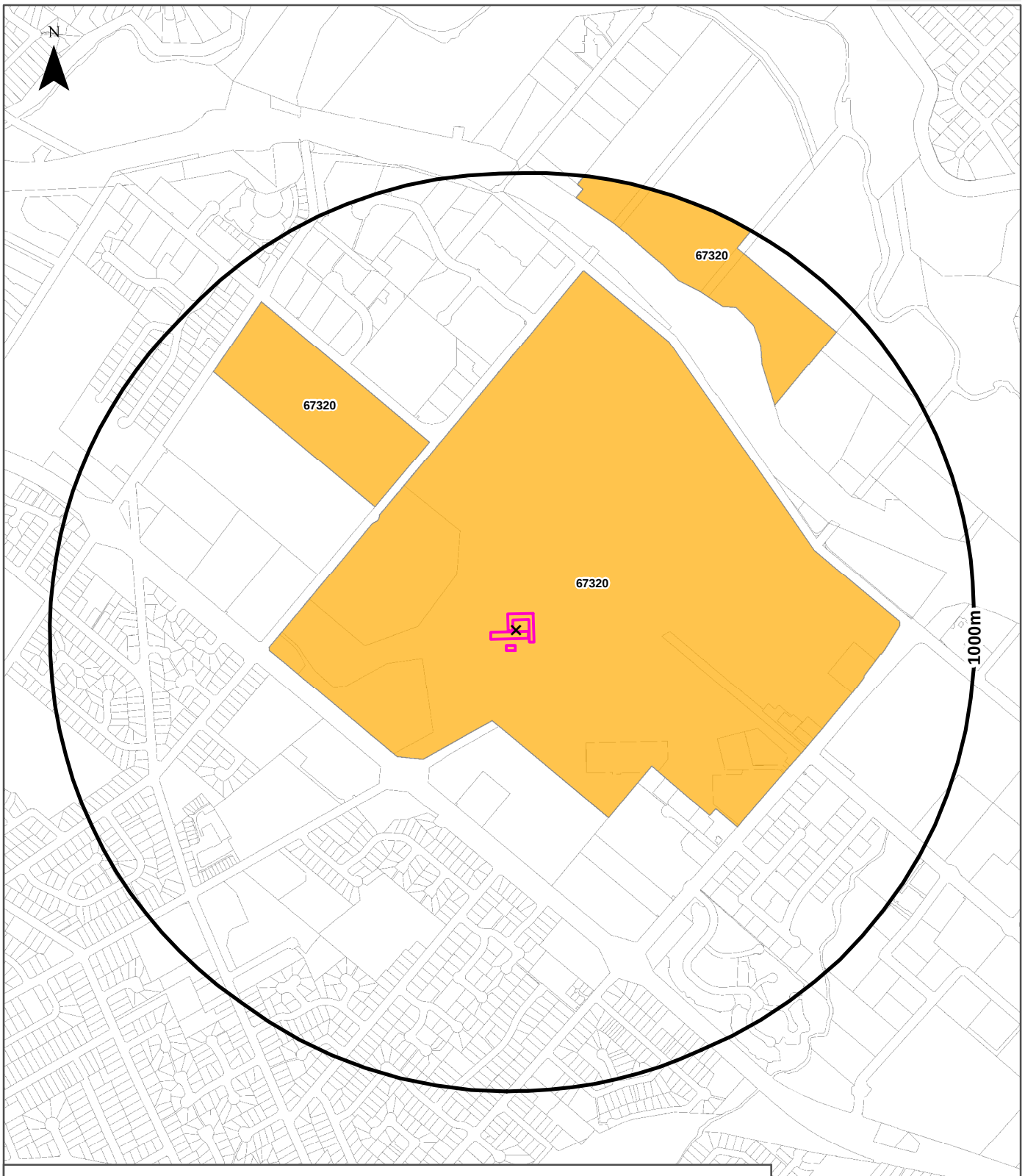
Mining Subsidence Districts

Mining Subsidence Districts within the report buffer?

District	Distance	Direction
There are no Mining Subsidence Districts within the report buffer		

State Environmental Planning Policy

Western Road, Macquarie Park, NSW 2113



Legend

- Site Centre
- Site Boundary
- Report Buffer
- Property Boundary
- SEPP 14 - Coastal Wetlands
- SEPP 26 - Littoral Rainforests
- SEPP 71 - Coastal Protection
- SEPP Major Developments 2005
- Strategic Land Use - Future Residential Growth Areas
- Strategic Land Use - Additional Rural Village Land
- Strategic Land Use -Biophysical Strategic Agricultural Land
- Strategic Land Use -Critical Industry Cluster (Equine)
- Strategic Land Use -Critical Industry Cluster (Viticulture)

Scale: 0 100 200 400 Meters

Data Sources: Property Boundaries & Topographic Data: © Land and Property Information (a division of the Department of Finance and Services) 2016

Coordinate System: GDA 1994 MGA Zone 56

Date: 11October 2016

Environmental Zoning

Western Road, Macquarie Park, NSW 2113

State Environmental Planning Policy Protected Areas

Are there any State Environmental Planning Policy Protected Areas onsite or within the report buffer?

Dataset	Onsite	Within Site Buffer	Distance
SEPP14 - Coastal Wetlands	No	No	N/A
SEPP26 - Littoral Rainforests	No	No	N/A
SEPP71 - Coastal Protection Zone	No	No	N/A

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 report buffer?

Map Id	Feature	Effective Date	Distance	Direction
67320	Macquarie University	11/09/2009	0m	North East

SEPP Major Development Data Source: NSW Department of Planning & Environment

State Environmental Planning Policy Strategic Land Use Areas

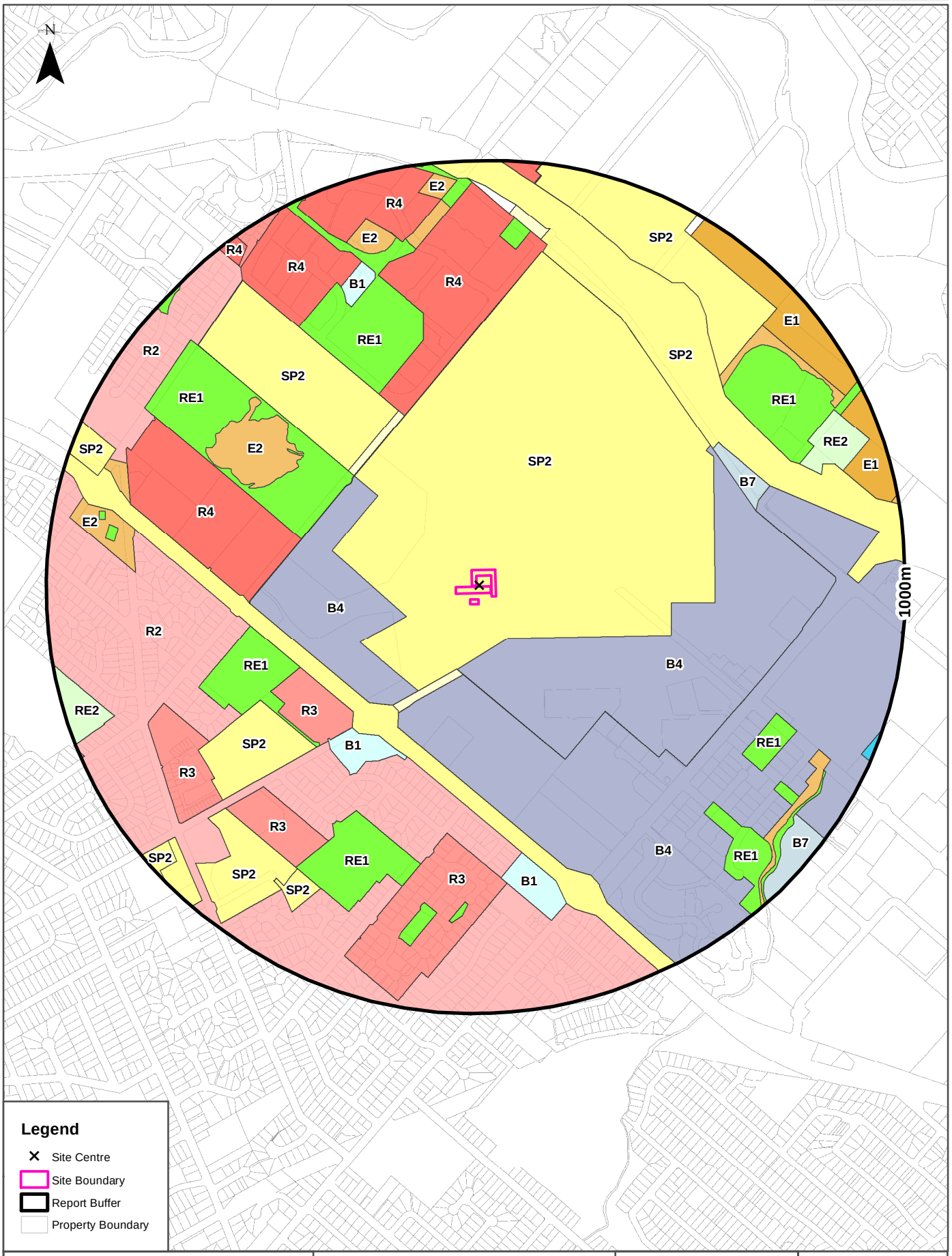
State Environmental Planning Policy Strategic Land Use Areas onsite or within the report buffer?

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

Western Road, Macquarie Park, NSW 2113



Scale: 0 100 200 400 Meters

Data Sources: Property Boundaries & Topographic Data: © Land and Property Information (a division of the Department of Finance and Services) 2016
Planning: NSW Crown Copyright - Planning & Environment

Coordinate System: GDA 1994 MGA Zone 56

Date: 11October 2016

Local Environmental Plan

Western Road, Macquarie Park, NSW 2113

Land Zoning

What Local Environmental Plan Land Zones exist within the report buffer?

Zone	Description	Purpose	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
SP2	Infrastructure	Educational Establishment	State Environmental Planning Policy (State Significant Precincts) 2005	24/03/2016	24/03/2016	24/03/2016	State Environmental Planning Policy (Major Development) Amendment (State Significant Precincts) 2016	0m	Onsite
B4	Mixed Use		State Environmental Planning Policy (State Significant Precincts) 2005	24/03/2016	24/03/2016	24/03/2016	State Environmental Planning Policy (Major Development) Amendment (State Significant Precincts) 2016	105m	East
B4	Mixed Use		State Environmental Planning Policy (State Significant Precincts) 2005	24/03/2016	24/03/2016	24/03/2016	State Environmental Planning Policy (Major Development) Amendment (State Significant Precincts) 2016	133m	West
SP1	Special Activities		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		162m	South West
B4	Mixed Use		Ryde Local Environmental Plan 2014	10/04/2015	10/04/2015	11/09/2015	Amendment No 2	172m	South East
SP2	Infrastructure	Classified Road	Ryde Local Environmental Plan 2014	10/04/2015	10/04/2015	11/09/2015	Amendment No 2	312m	South East
RE1	Public Recreation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		362m	North West
SP1	Special Activities		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		370m	North West
R3	Medium Density Residential		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		383m	South West
SP2	Infrastructure	Educational Establishment	State Environmental Planning Policy (State Significant Precincts) 2005	24/03/2016	24/03/2016	24/03/2016	State Environmental Planning Policy (Major Development) Amendment (State Significant Precincts) 2016	387m	North West
B1	Neighbourhood Centre		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		391m	South West
R4	High Density Residential		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		396m	West
R2	Low Density Residential		Ryde Local Environmental Plan 2014	10/04/2015	10/04/2015	11/09/2015	Amendment No 2	404m	South
R4	High Density Residential		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		414m	North
RE1	Public Recreation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		421m	West
E2	Environmental Conservation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		484m	North West
RE1	Public Recreation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		489m	North

Zone	Description	Purpose	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
SP2	Infrastructure	Convent and Hospital	Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		507m	South West
R3	Medium Density Residential		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		561m	South
RE1	Public Recreation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		576m	South West
B7	Business Park		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		607m	North East
B1	Neighbourhood Centre		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		615m	South
R3	Medium Density Residential		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		663m	South West
R3	Medium Density Residential		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		703m	South West
RE1	Public Recreation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		705m	North East
B1	Neighbourhood Centre		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		709m	North
E2	Environmental Conservation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		712m	North East
RE1	Public Recreation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		712m	South East
SP2	Infrastructure	Educational Establishment	State Environmental Planning Policy (State Significant Precincts) 2005	24/03/2016	24/03/2016	24/03/2016	State Environmental Planning Policy (Major Development) Amendment (State Significant Precincts) 2016	723m	North East
RE1	Public Recreation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		726m	South
R4	High Density Residential		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		730m	North West
RE1	Public Recreation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		730m	South East
RE1	Public Recreation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		737m	South
SP2	Infrastructure	Place of Public Worship	Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		764m	South West
SP2	Infrastructure	Educational Establishment	Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		772m	South West
E2	Environmental Conservation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		784m	West
RE1	Public Recreation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		784m	North
RE2	Private Recreation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		785m	East
E2	Environmental Conservation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		797m	North
E2	Environmental Conservation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		809m	North
SP1	Special Activities	Educational Establishment	Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		814m	North
R4	High Density Residential		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		820m	North
E2	Environmental Conservation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		822m	West
RE1	Public Recreation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		825m	South East
RE1	Public Recreation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		837m	West
R2	Low Density Residential		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		842m	North West
E2	Environmental Conservation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		862m	South East
RE1	Public Recreation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		872m	West
E1	National Parks and Nature Reserves		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		882m	East
E1	National Parks and Nature Reserves		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		883m	North

Zone	Description	Purpose	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
RE2	Private Recreation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		886m	West
SP2	Infrastructure	Educational Establishment	Ryde Local Environmental Plan 2014	10/04/2015	10/04/2015	11/09/2015	Amendment No 2	896m	North West
B7	Business Park		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		903m	South East
SP2	Infrastructure	Place of Public Worship	Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		908m	South West
E2	Environmental Conservation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		911m	North
SP2	Infrastructure	Educational Establishment	Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		927m	South West
R3	Medium Density Residential		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		932m	North West
R4	High Density Residential		Ryde Local Environmental Plan 2014	10/04/2015	10/04/2015	11/09/2015	Amendment No 2	938m	North West
R4	High Density Residential		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		950m	North
B3	Commercial Core		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		971m	South East
RE1	Public Recreation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		972m	North West
E2	Environmental Conservation		Ryde Local Environmental Plan 2014	10/04/2015	10/04/2015	11/09/2015	Amendment No 2	979m	East
B7	Business Park		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		991m	East
E2	Environmental Conservation		Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	11/09/2015		999m	North West

Local Environmental Plan

Western Road, Macquarie Park, NSW 2113

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	Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	10/04/2015		100

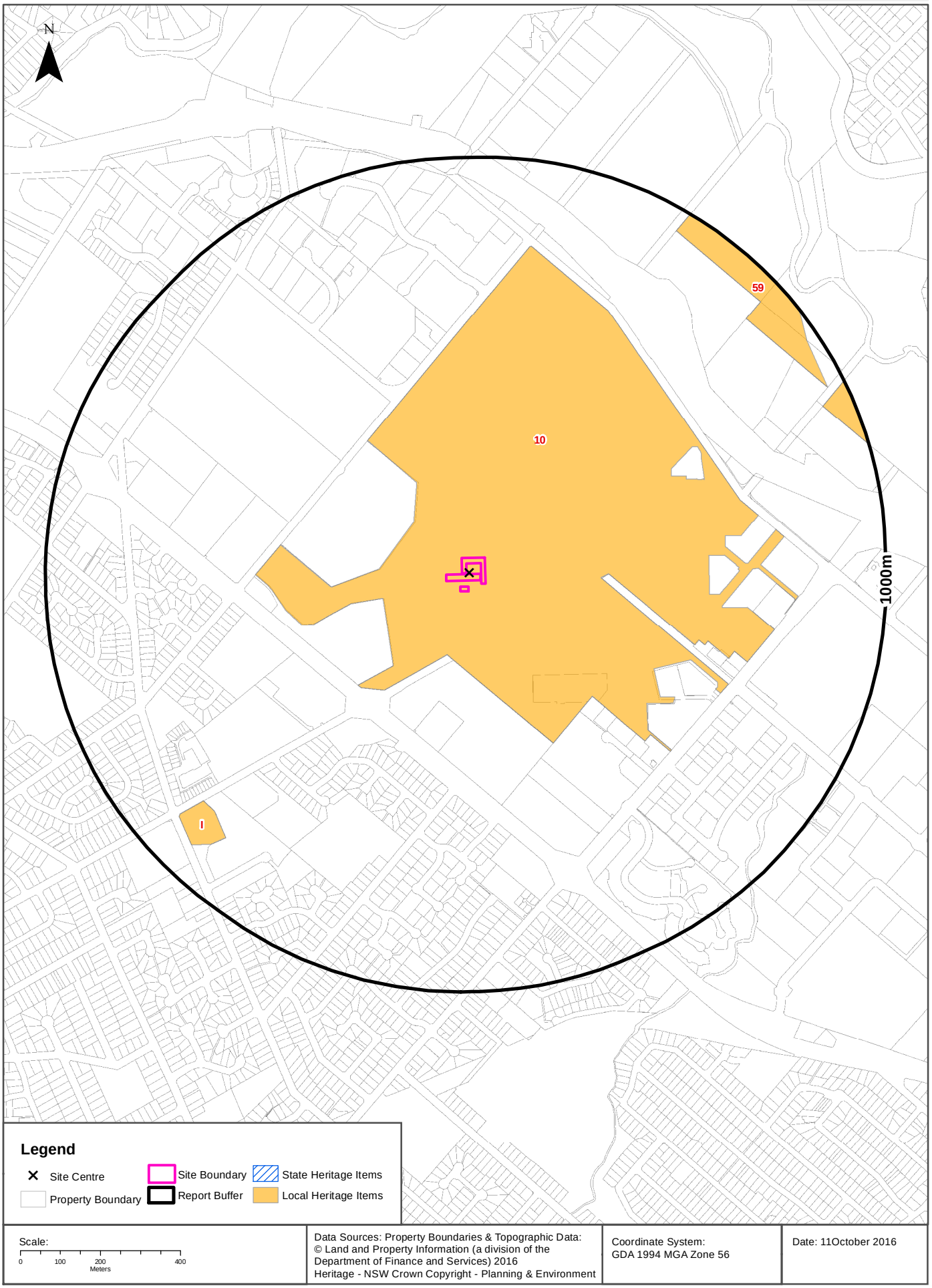
Land Reservation Acquisition

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

Western Road, Macquarie Park, NSW 2113



Heritage

Western Road, Macquarie Park, NSW 2113

State Heritage Items

What are the State Heritage Items located within the report buffer?

Map Id	Name	Address	LGA	Listing Date	Listing No	Plan No	Distance	Direction
N/A	No records in buffer							

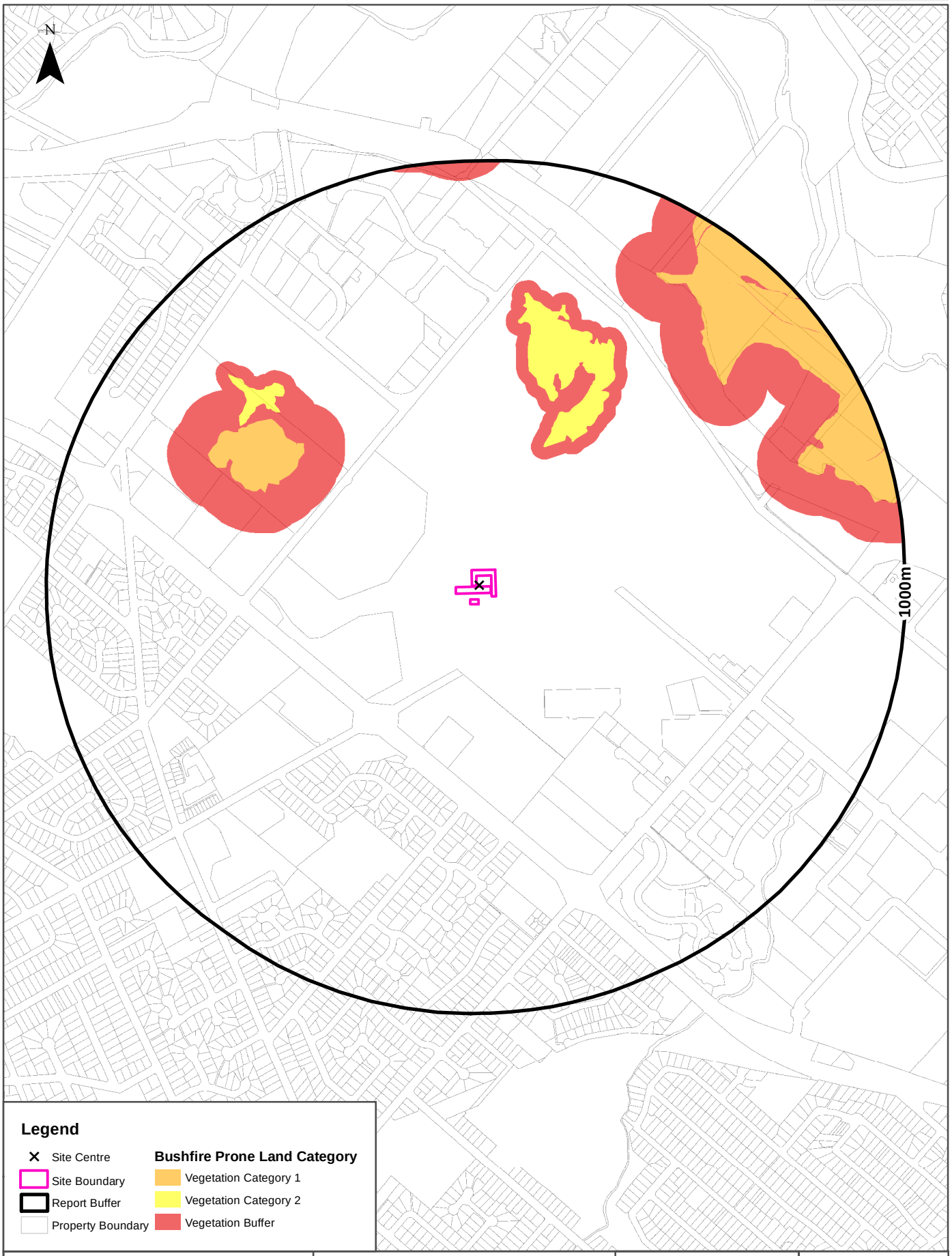
Local Heritage Items

What are the Local Heritage Items located within the report buffer?

Map Id	Name	Classification	Significance	LEP or Act	Published Date	Commenced Date	Currency Date	Distance	Direction
10	Macquarie University (ruins)	Item - General	Local	Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	10/04/2015	0m	Onsite
I	Curzon Hall (restaurant)	Item - General	State	Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	10/04/2015	815m	South West
59	9999	Item - General	State	Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	10/04/2015	883m	North East
59	9999	Item - General	State	Ryde Local Environmental Plan 2014	12/09/2014	12/09/2014	10/04/2015	923m	East

Natural Hazards - Bushfire Prone Land

Western Road, Macquarie Park, NSW 2113



Data Sources: Property Boundaries:
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Coordinate System:
GDA 1994 MGA Zone 56

Date: 11October 2016

Natural Hazards

Western Road, Macquarie Park, NSW 2113

Bushfire Prone Land

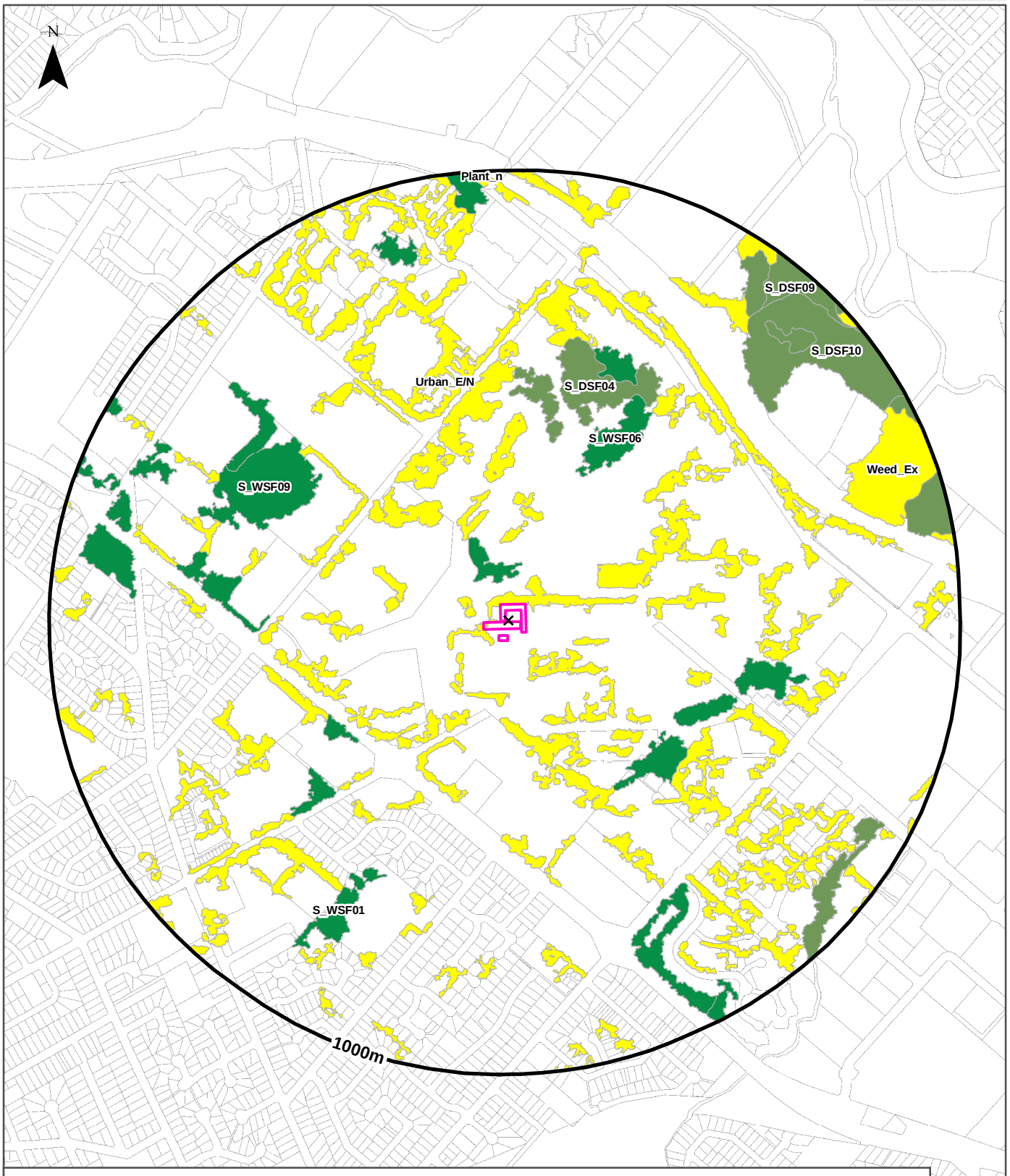
What are the nearest Bushfire Prone Land Categories that exist within the report buffer?

Bushfire Prone Land Category	Distance	Direction
Vegetation Buffer	291m	North
Vegetation Category 2	321m	North
Vegetation Category 1	486m	North West

Bushfire Prone Land Data Reference - NSW RFS GIS Data Set

Ecological Constraints - Native Vegetation & RAMSAR Wetlands

Western Road, Macquarie Park, NSW 2113



Legend

- Site Centre
- Site Boundary
- Report Buffer
- Property Boundary
- Rainforest
- Wet Sclerophyll Forests
- Dry Sclerophyll Forests
- Forested Wetlands
- Grassy Woodlands
- Heathlands
- Grasslands
- Freshwater Wetlands
- Saline Wetlands
- Artificial Wetlands
- Water
- Other
- RAMSAR Wetlands

Scale: 0 100 200 400 Meters

Data Sources: Property Boundaries & Topographic Data: © Land and Property Information (a division of the Department of Finance and Services) 2016

Coordinate System: GDA 1994 MGA Zone 56

Date: 11October 2016

Ecological Constraints

Western Road, Macquarie Park, NSW 2113

Native Vegetation

What native vegetation exists within the report buffer?

Map ID	Map Unit Name	Threatened Ecological Community NSW	Threatened Ecological Community EPBC Act	Understorey	Disturbance	Disturbance Index	Dominant Species	Dist	Direction
Urban_E/N	Urban_E/N: Urban Exotic/Native			00: Not assessed	00: Not assessed	0: Not assessed	Urban Exotic/ Native	0m	Onsite
S_WSF09	S_WSF09: Sydney Turpentine-Ironbark Forest	Sydney Turpentine Ironbark Forest	Turpentine Ironbark Forest (possible)	20: Weeds and exotics	20: Previously cleared 1943	3: High	S.glomulifera/ E.paniculata/ +/ - E.resinifera	48m	North
S_WSF06	S_WSF06: Coastal Shale-Sandstone Forest			13: Dry shrubs and grasses	15: Regrowth	1: Low	E.resinifera/ E.punctata	319m	North East
Weed_Ex	Weed_Ex: Weeds and Exotics			00: Not assessed	00: Not assessed	0: Not assessed	Exotic Species >90%cover	330m	North
S_DSF04	S_DSF04: Coastal Enriched Sandstone Dry Forest			15: Grassy natives and exotics	20: Previously cleared 1943	3: High	E.resinifera/ E.punctata	376m	North
S_WSF01	S_WSF01: Blue Gum High Forest	Blue Gum High Forest		15: Grassy natives and exotics	31: Parkland open understorey	4: Very high	E.saligna+/ - E.pilularis/ S.glomullifera/ E.paniculata/ A.costata	383m	South West
S_DSF10	S_DSF10: Hornsby Enriched Sandstone Exposed Woodland			19: Dense heath	22: Fire	1: Low	E.haemastoma/ A.littoralis/ E.piperita/ C.gummifera	710m	North East
S_DSF09	S_DSF09: Coastal Sandstone Gully Forest			11: Semi sheltered dry/mesic	13: Weeds	3: High	A.costata/ E.piperita/ +/ - C.gummifera/ S.glomulifera/ E.resinifera	838m	North East
Plant_n	Plant_n: Plantation (native and/or exotic)			00: Not assessed	00: Not assessed	0: Not assessed	Native or Exotic Plantations	918m	North

RAMSAR Wetlands

What RAMSAR Wetland areas exist within the report buffer?

Map Id	RAMSAR Name	Wetland Name	Designation Date	Source	Distance	Direction
N/A	No records in buffer					

Ecological Constraints

Western Road, Macquarie Park, NSW 2113

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
Amphibia	Myobatrachidae	Heleioporus australiacus	Giant Burrowing Frog	No	Vulnerable, Protected	Vulnerable
Amphibia	Myobatrachidae	Pseudophryne australis	Red-crowned Toadlet	No	Vulnerable, Protected	
Aves	Accipitridae	Circus assimilis	Spotted Harrier	No	Vulnerable, Protected	
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	Nettapus coromandelianus	Cotton Pygmy-Goose	No	Endangered, Protected	
Aves	Anatidae	Stictonetta naevosa	Freckled Duck	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	Callocephalon fimbriatum	Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local Government Areas	No	Endangered Population, 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	Ciconiidae	Ephippiorhynchus asiaticus	Black-necked Stork	No	Endangered, Protected	
Aves	Columbidae	Ptilinopus superbus	Superb Fruit-Dove	No	Vulnerable, Protected	
Aves	Falconidae	Falco hypoleucos	Grey Falcon	No	Endangered, Protected, Category 2 Sensitive Species	
Aves	Falconidae	Falco subniger	Black Falcon	No	Vulnerable, Protected	
Aves	Haematopodidae	Haematopus fuliginosus	Sooty Oystercatcher	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
Aves	Meliphagidae	Epthianura albifrons	White-fronted Chat	No	Vulnerable, Protected	
Aves	Meliphagidae	Epthianura albifrons	White-fronted Chat population in the Sydney Metropolitan Catchment Management Area	No	Endangered Population, Vulnerable, Protected	
Aves	Neosittidae	Daphoenositta chrysoptera	Varied Sittella	No	Vulnerable, Protected	
Aves	Petroicidae	Petroica boodang	Scarlet Robin	No	Vulnerable, Protected	
Aves	Petroicidae	Petroica phoenicea	Flame Robin	No	Vulnerable, Protected	

Class	Family	Scientific	Common	Exotic	NSW Status	Commonwealth Status
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	Polytelis swainsonii	Superb Parrot	No	Vulnerable, Protected, Category 3 Sensitive Species	Vulnerable
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	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	Burramyidae	Cercartetus nanus	Eastern Pygmy-possum	No	Vulnerable, Protected	
Mammalia	Dasyuridae	Dasyurus maculatus	Spotted-tailed Quoll	No	Vulnerable, Protected	Endangered
Mammalia	Emballonuridae	Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	No	Vulnerable, Protected	
Mammalia	Molossidae	Mormopterus norfolkensis	Eastern Freetail-bat	No	Vulnerable, Protected	
Mammalia	Peramelidae	Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	No	Endangered, Protected	Endangered
Mammalia	Peramelidae	Perameles nasuta	Long-nosed Bandicoot population in inner western Sydney	No	Endangered Population, Protected	
Mammalia	Petauridae	Petaurus australis	Yellow-bellied 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	
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	
Reptilia	Varanidae	Varanus rosenbergi	Rosenberg's Goanna	No	Vulnerable, Protected	
Flora	Convolvulaceae	Wilsonia backhousei	Narrow-leafed Wilsonia	No	Vulnerable, Protected	
Flora	Dilleniaceae	Hibbertia superans		No	Endangered, Protected	
Flora	Elaeocarpaceae	Tetratheca glandulosa		No	Vulnerable, Protected	
Flora	Elaeocarpaceae	Tetratheca juncea	Black-eyed Susan	No	Vulnerable, Protected	Vulnerable
Flora	Ericaceae	Epacris purpurascens var. purpurascens		No	Vulnerable, Protected	

Class	Family	Scientific	Common	Exotic	NSW Status	Commonwealth Status
Flora	Fabaceae (Faboideae)	Dillwynia tenuifolia		No	Vulnerable, Protected	
Flora	Fabaceae (Mimosoideae)	Acacia bynoeana	Bynoe's Wattle	No	Endangered, Protected	Vulnerable
Flora	Fabaceae (Mimosoideae)	Acacia clunies-rossiae	Kanangra Wattle	No	Vulnerable, Protected	
Flora	Fabaceae (Mimosoideae)	Acacia gordonii		No	Endangered, Protected	Endangered
Flora	Fabaceae (Mimosoideae)	Acacia pubescens	Downy Wattle	No	Vulnerable, Protected	Vulnerable
Flora	Fabaceae (Mimosoideae)	Acacia terminalis subsp. terminalis	Sunshine Wattle	No	Endangered, Protected	Endangered
Flora	Grammitidaceae	Grammitis stenophylla	Narrow-leaf Finger Fern	No	Endangered, Protected, Category 3 Sensitive Species	
Flora	Haloragaceae	Haloragodendron lucasii		No	Endangered, Protected	Endangered
Flora	Lobeliaceae	Hypsela sessiliflora		No	Endangered, Protected, Category 3 Sensitive Species	Extinct
Flora	Malvaceae	Lasiopetalum joyceae		No	Vulnerable, Protected	Vulnerable
Flora	Myrtaceae	Callistemon linearifolius	Netted Bottle Brush	No	Vulnerable, Protected, Category 3 Sensitive Species	
Flora	Myrtaceae	Darwinia biflora		No	Vulnerable, Protected	Vulnerable
Flora	Myrtaceae	Darwinia peduncularis		No	Vulnerable, Protected	
Flora	Myrtaceae	Eucalyptus camfieldii	Camfield's Stringybark	No	Vulnerable, Protected	Vulnerable
Flora	Myrtaceae	Eucalyptus nicholii	Narrow-leaved Black Peppermint	No	Vulnerable, Protected	Vulnerable
Flora	Myrtaceae	Eucalyptus scoparia	Wallangarra White Gum	No	Endangered, Protected	Vulnerable
Flora	Myrtaceae	Leptospermum deanei		No	Vulnerable, Protected	Vulnerable
Flora	Myrtaceae	Melaleuca biconvexa	Biconvex Paperbark	No	Vulnerable, Protected	Vulnerable
Flora	Myrtaceae	Melaleuca deanei	Deane's Paperbark	No	Vulnerable, Protected	Vulnerable
Flora	Myrtaceae	Syzygium paniculatum	Magenta Lilly Pilly	No	Endangered, Protected	Vulnerable
Flora	Myrtaceae	Triplarina imbricata	Creek Triplarina	No	Endangered, Protected	Endangered
Flora	Orchidaceae	Caladenia tessellata	Thick Lip Spider Orchid	No	Endangered, Protected, Category 2 Sensitive Species	Vulnerable
Flora	Orchidaceae	Cryptostylis hunteriana	Leafless Tongue Orchid	No	Vulnerable, Protected, Category 2 Sensitive Species	Vulnerable
Flora	Orchidaceae	Genoplesium baueri	Bauer's Midge Orchid	No	Endangered, Protected, Category 2 Sensitive Species	Endangered
Flora	Orchidaceae	Pterostylis nigricans	Dark Greenhood	No	Vulnerable, Protected, Category 2 Sensitive Species	
Flora	Orchidaceae	Pterostylis saxicola	Sydney Plains Greenhood	No	Endangered, Protected, Category 2 Sensitive Species	Endangered
Flora	Poaceae	Deyeuxia appressa		No	Endangered, Protected	Endangered
Flora	Proteaceae	Grevillea parviflora subsp. parviflora	Small-flower Grevillea	No	Vulnerable, Protected	Vulnerable
Flora	Proteaceae	Persoonia hirsuta	Hairy Geebung	No	Endangered, Protected, Category 3 Sensitive Species	Endangered
Flora	Proteaceae	Persoonia mollis subsp. maxima		No	Endangered, Protected	Endangered
Flora	Proteaceae	Persoonia nutans	Nodding Geebung	No	Endangered, Protected	Endangered
Flora	Rhamnaceae	Pomaderris prunifolia	P. prunifolia in the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas	No	Endangered Population	
Flora	Rubiaceae	Galium australe	Tangled Bedstraw	No	Endangered, Protected	

Class	Family	Scientific	Common	Exotic	NSW Status	Commonwealth Status
Flora	Thymelaeaceae	Pimelea curviflora var. curviflora		No	Vulnerable, Protected	Vulnerable
Flora	Thymelaeaceae	Pimelea spicata	Spiked Rice-flower	No	Endangered, Protected	Endangered
Flora	Zannichelliaceae	Zannichellia palustris		No	Endangered, Protected	
Flora	Hygrophoraceae	Camarophyllopsis kearneyi		No	Endangered, Protected	
Flora	Hygrophoraceae	Hygrocybe anomala var. ianthinomarginata		No	Vulnerable, Protected	
Flora	Hygrophoraceae	Hygrocybe aurantipes		No	Vulnerable, Protected	
Flora	Hygrophoraceae	Hygrocybe austropratensis		No	Endangered, Protected	
Flora	Hygrophoraceae	Hygrocybe collucera		No	Endangered, Protected	
Flora	Hygrophoraceae	Hygrocybe griseoramosa		No	Endangered, Protected	
Flora	Hygrophoraceae	Hygrocybe lanecovensis		No	Endangered, Protected	
Flora	Hygrophoraceae	Hygrocybe reesiae		No	Vulnerable, Protected	
Flora	Hygrophoraceae	Hygrocybe rubronivea		No	Vulnerable, 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 11/10/2016

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Section 149 Certificates

Locked Bag 2069, North Ryde NSW 1670
Facsimile 9952 8070
Telephone 9952 8222

City of Ryde

PLANNING CERTIFICATE UNDER SECTION 149 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979

Cert No: PLN2016/2712
Date: Thursday, 1 September 2016
Your Ref: LS000617

Applicant: Mr Howard Waldron (Lotsearch Pty Ltd)
Level 3
68 Alfred Street
Milsons Point NSW 2061

Property Address: 192 Balaclava Rd MACQUARIE PARK
Description: Lot 191 DP 1157041

Property Reference: 544572
Land Reference: 53353

INFORMATION PROVIDED PURSUANT TO SECTION 149(2) OF THE ACT.

1. NAMES OF RELEVANT ENVIRONMENTAL PLANNING INSTRUMENTS, DRAFT INSTRUMENTS AND DEVELOPMENT CONTROL PLANS THAT APPLY TO THE CARRYING OUT OF DEVELOPMENT ON THE LAND

a) LOCAL ENVIRONMENTAL PLAN AND DEEMED ENVIRONMENTAL PLANNING INSTRUMENTS
Ryde Local Environmental Plan 2014

b) DRAFT LOCAL ENVIRONMENTAL PLANS
Nil

c) DEVELOPMENT CONTROL PLANS
City of Ryde Development Control Plan 2014

d) STATE ENVIRONMENTAL PLANNING POLICIES AND INSTRUMENTS (includes Draft Policies)
The Minister for Planning has notified Council that the following State Environmental Planning Policies and Deemed State Environmental Plans apply to the land and should be specified in this certificate:

State Environmental Planning Policies
State Environmental Planning Policy No 19 - Bushland in Urban Areas.
State Environmental Planning Policy No 21 - Caravan Parks.
State Environmental Planning Policy No 30 - Intensive Agriculture.
State Environmental Planning Policy No 33 - Hazardous and Offensive Development.
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 No 65 - Design Quality of Residential Apartment Development.
State Environmental Planning Policy (Affordable Rental Housing) 2009
State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004

State Environmental Planning Policy (Exempt and Complying Development Codes) 2008
State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004
State Environmental Planning Policy (Infrastructure) 2007
State Environmental Planning Policy (Major Development) 2005
State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007
State Environmental Planning Policy (State and Regional Development) 2011
State Environmental Planning Policy (Temporary Structures) 2007

Deemed State Environmental Planning Policies
Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005

Draft State Environmental Planning Policies
State Environmental Planning Policy No 66 - Integration of Land Use and Transport 2001
State Environmental Planning Policy (Competition) 2010

Note: Specific constraints and zoning of the land may affect the applicability of certain provisions within the Policies listed above.

2. ZONING AND LAND USE UNDER RELEVANT LOCAL ENVIRONMENTAL PLANS

(a) ZONING and ZONING TABLE

Ryde Local Environmental Plan 2014 - Zone B4 - Mixed Use

1 Objectives of zone

- To provide a mixture of compatible land uses.
- To integrate suitable business, office, residential, retail and other development in accessible locations so as to maximise public transport patronage and encourage walking and cycling.
- To ensure employment and educational activities within the Macquarie University campus are integrated with other businesses and activities.
- To promote strong links between Macquarie University and research institutions and businesses within the Macquarie Park corridor.

2 Permitted without consent
Home occupations

3 Permitted with consent
Boarding houses; Building identification signs; Business identification signs; Child care centres; Commercial premises; Community facilities; Educational establishments; Entertainment facilities; Function centres; Hotel or motel accommodation; Information and education facilities; Medical centres; Passenger transport facilities; Recreation facilities (indoor); Registered clubs; Respite day care centres; Restricted premises; Roads; Seniors housing; Shop top housing; Waste or resource transfer stations; Any other development not specified in item 2 or 4.

4 Prohibited
Agriculture; Air transport facilities; Animal boarding or training establishments; Biosolids treatment facilities; Camping grounds; Caravan parks; Depots; Eco-tourist facilities; Farm buildings; General industries; Heavy industrial storage establishments; Heavy industries; Home occupations (sex services); Industrial training facilities; Resource recovery facilities; Sewage treatment plants; Sex services premises; Signage; Vehicle body repair workshops; Vehicle repair stations; Waste disposal facilities; Water recycling facilities; Water supply systems.

Ryde Local Environmental Plan 2014 - Zone SP2 Infrastructure - Educational Establishment

1 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.
• To ensure the orderly development of land so as to minimise any adverse effect of development on other land uses.

2 Permitted without consent
Nil

3 Permitted with consent
Roads; The purpose shown on the Land Zoning Map, including any development that is ordinarily incidental or ancillary to development for that purpose

4 Prohibited
Any development not specified in item 2 or 3

Schedule 1 - Additional permitted uses
Use of certain land at 192 Balaclava Road, Marsfield (Macquarie University)

(1) This clause applies to the land

(2) Development for the purposes of agriculture, car parks, commercial premises, health services facilities, high technology industries, light industries, places of public worship, recreation facilities (outdoor), research stations, residential accomodation, service stations, serviced apartments, signage, water recycling facilities and water treatment facilities is permitted with development consent on the land.

(b) DEVELOPMENT STANDARDS FOR THE ERECTION OF A DWELLING HOUSE
No development standards under the Local Environmental Plan apply to the land that fix minimum land dimensions for the erection of a dwelling house on the land.

(c) CRITICAL HABITAT
No. The land does not include or comprise critical habitat under the Local Environmental Plan.

(d) CONSERVATION AREA (however described)
No. The land has not been identified as being within a heritage conservation area under the Local Environmental Plan.

(e) ITEMS OF ENVIRONMENTAL HERITAGE (however described)
Yes. An item of environmental heritage under Ryde Local Environmental Plan 2014 is situated on the land.

2A. ZONING AND LAND USE UNDER STATE ENVIRONMENTAL PLANNING POLICY (SYDNEY REGION GROWTH CENTRES) 2006

This land **is not** subject to:

(a) Part 3 of the *State Environmental Planning Policy (Sydney Region Growth Centres) 2006* (the 2006 SEPP); or
(b) a Precinct Plan (within the meaning of the 2006 SEPP); or

(c) a proposed Precinct Plan (within the meaning of the 2006 SEPP) that is or has been the subject of community consultation or on public exhibition.

OTHER PRESCRIBED INFORMATION

3. COMPLYING DEVELOPMENT

Whether or not the land is land on which complying development may be carried out under each of the codes for complying development in *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.* If complying development may not be carried out on that land because of one of the requirements under that Policy, the reason why it may not be carried out.

General Housing Code and Rural Housing Code

Land which comprises a **Heritage Item** within an Environmental Planning Instrument

(a) Complying Development may not be carried out on that part of the land identified as containing a Heritage Item in Schedule 5 Environmental Heritage and identified in Ryde LEP 2014 Heritage Map.

Housing Alterations Code and General Development Code

Land which comprises a **Heritage Item** within an Environmental Planning Instrument

(a) Complying Development may not be carried out on that part of the land identified as containing a Heritage Item in Schedule 5 Environmental Heritage and identified in Ryde LEP 2014 Heritage Map.

Commercial and Industrial (New Buildings and Additions) Code

Land which comprises a **Heritage Item** within an Environmental Planning Instrument

(a) Complying Development may not be carried out on that part of the land identified as containing a Heritage Item in Schedule 5 Environmental Heritage and identified in Ryde LEP 2014 Heritage Map.

Subdivisions Code, Commercial and Industrial Alterations Code, Demolition Code and Fire Safety Code

Land which comprises a **Heritage Item** within an Environmental Planning Instrument

(a) Complying Development may not be carried out on that part of the land identified as containing a Heritage Item in Schedule 5 Environmental Heritage and identified in Ryde LEP 2014 Heritage Map.

Note : *It is necessary for the zoning, size of land and other criteria such as risk level of flood prone land and bushfire prone land to be in accordance with that specified in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 for certain types of development to occur under the Policy.*

4. COASTAL PROTECTION

Whether or not the land is affected by the operation of section 38 or 39 of the *Coastal Protection Act 1979*, but only to the extent that the council has been so notified by the Department of Services, Technology and Administration.

The land is not affected by the operation of section 38 or 39 of the Coastal Protection Act 1979.

4A Information relating to a coastal council

(1) Whether an order has been made 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.

NO

(2)(a) Whether the council has 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), and
(b) If works have been so placed—whether the council is satisfied that the works have been removed and the land restored in accordance with that Act.

NO notification received

4B Annual charges under Local Government Act 1993 for coastal protection services that relate to existing coastal protection works
Whether the owner (or any previous owner) of the land has consented in writing to the land being subject to annual charges under section 496B of the *Local Government Act 1993* for coastal protection services that relate to existing coastal protection works (within the meaning of section 553B of that Act).

NO

Note. "Existing coastal protection works" are works to reduce the impact of coastal hazards on land (such as seawalls, revetments, groynes and beach nourishment) that existed before the commencement of Section 553B of the *Local Government Act 1993.*

5. MINE SUBSIDENCE
Whether or not the land is proclaimed to be a mine subsidence district within the meaning of section 15 of the *Mine Subsidence Compensation Act 1961*.

No. The land has not been proclaimed to be a mine subsidence district.

6. ROAD WIDENING AND ROAD REALIGNMENT
Whether or not the land is affected by any road widening or road realignment.

The land is not affected by any road widening or road realignment under:
(a) Division 2 of Part 3 of the Roads Act 1993;
(b) any Environmental Planning Instrument.
(c) any resolution of Council.

7. COUNCIL AND OTHER PUBLIC AUTHORITY POLICIES ON HAZARD RISK RESTRICTIONS
Whether or not the land is affected by a policy adopted by the council, or adopted by any other public authority and notified to the council for the express purpose of its adoption by that authority being referred to in planning certificates issued by council, that restricts the development of the land because of the likelihood of:

(i) landslip — NO.
(ii) bush fire - YES.

(iii) tidal inundation — NO.
(iv) subsidence YES.

(v) acid sulphate soil — NO.
(vi) any other risk (other than flooding) — NO.

Note: *The fact that land has not been identified as being affected by a policy to restrict development because of the risks referred to does not mean that the risk is non-existent.*

7A. FLOOD RELATED DEVELOPMENT CONTROLS INFORMATION

(1) Whether or not development on that land or part of the land for the purposes of dwelling houses, dual occupancies, multi dwelling housing or residential flat buildings (not including development for the purposes of group homes or seniors) living is subject to flood related development controls - YES

(2) Whether or not development on that land or part of the land for any other purpose is subject to flood related development controls - YES

(3) Words and expressions in this clause have the same meanings as in the instrument set out in the schedule to the Standard Instrument (Local Environmental Plans) Order 2006.

8. LAND RESERVED FOR ACQUISITION

Whether or not any environmental planning instrument or proposed environmental planning instrument referred to in Clause 1 makes provision in relation to the acquisition of the land by a public authority, as referred to in section 27 of the Act.

No Environmental Planning Instrument applying to the land provides for the acquisition of the land by a public authority pursuant to Section 27 of the Act.

9. CONTRIBUTIONS PLANS

The name of each contributions plan applying to the land:

City of Ryde Section 94 Development Contributions Plan 2007 – Interim Update (2014)

9A BIODIVERSITY CERTIFIED LAND

This 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 the subject of a biobanking agreement under Part 7A of the Threatened Species Conservation Act 1995.

11. BUSH FIRE PRONE LAND

The land described in this certificate is bush fire prone land (as defined in the Act).

12. PROPERTY VEGETATION PLANS

The land is not subject to a property vegetation plan under the Native Vegetation Act 2003.

13. ORDERS UNDER TREES (DISPUTES BETWEEN NEIGHBOURS) ACT 2006

There has not been an order 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

There is no direction in force under section 75P (2)(c1) of the Environmental Planning and Assessment Act 1979.

15. SITE COMPATIBILITY CERTIFICATES AND CONDITIONS FOR SENIORS HOUSING

Part A: There has been no Site Compatibility Certificate issued (of which Council is aware) under Clause 25 of State Environmental Planning Policy (Housing for Senior or People with a Disability) 2004.

Part B: There has not been any development consent granted since 11 October 2007 for development to which State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004 applies.

16. SITE COMPATIBILITY CERTIFICATES FOR INFRASTRUCTURE

There is no valid Site Compatibility Certificate (Infrastructure) of which the Council is aware in respect of proposed development on the land.

17. SITE COMPATIBILITY CERTIFICATES AND CONDITIONS FOR AFFORDABLE RENTAL HOUSING

There is no current Site Compatibility Certificate (Affordable Rental Housing) that Council is aware in respect of proposed development on the land.

There are no terms of a kind referred to in clause 17(1) or 37(1) of State Environmental Planning Policy (Affordable Rental Housing) 2009 that have been imposed as a condition of consent to a development application in respect of the land.

18. PAPER SUBDIVISION INFORMATION

(1) The name of any development plan adopted by a relevant authority that applies to the land or that is proposed to be subject to a consent ballot. NIL

(2) The date of any subdivision order that applies to the land. NIL

(3) Words and expressions used in this clause have the same meaning as they have in Part 16C of this Regulation.

Note: *City of Ryde does not hold any paper subdivision within the meaning of this clause.*

19. SITE VERIFICATION CERTIFICATES

There is no current site verification certificate of which the Council is aware in respect of the land.

Note. *The following matters are prescribed by section 59 (2) of the Contaminated Land Management Act 1997 as additional matters to be specified in a planning certificate*:

(a)The land to which this certificate relates IS NOT significantly contaminated land.
(b)The land to which this certificate relates IS NOT subject to a management order.
(c)The land to which this certificate relates IS NOT the subject of an approved voluntary management proposal.
(d)The land to which this certificate relates IS NOT subject to an ongoing maintenance order .
(e)The land to which this certificate relates IS NOT subject to a site audit statement.

ADDITIONAL INFORMATION PROVIDED UNDER SECTION 149(5) OF THE ACT

Environmental planning instruments or development control plans may place restrictions on matters such as:

i) the purpose for which buildings, works or land may be erected, carried out or used;
ii) the extent of development permitted;
iii) minimum site requirements; and/or
iv) the means of vehicular access to the land.

The instruments and the plans should be examined in relation to the specific restrictions which may apply to any development which may be proposed.

Registers of Consents may be examined at Council's Customer Service Centre for particulars relating to development consents which may have been issued for the use or development of the land.

Enquiries regarding areas reserved for Classified Road and Regional Open Space should be directed to the Roads and Maritime Services and Department of Planning and Infrastructure respectively.

The information provided concerning the Coastal Protection Act, 1979 is only to the extent that the Council has been notified by the Department of Services, Technology and Administration.

Council has adopted by resolution a policy concerning the management of contaminated land. This policy applies to all land in the City of Ryde and will restrict development of the land if the circumstances set out in the policy prevail. Copies of the policy are available on Council's Website at www.ryde.nsw.gov.au.

FURTHER ADDITIONAL INFORMATION UNDER SECTION 149(5) OF THE ACT

Bush Fire Prone Land
The following map indicates the property has been identified as bush fire prone land: City of Ryde - Bush Fire Prone Land Map certified by the Commissioner for the NSW Rural Fire Service.

Bushland
The following studies /internal reports indicate the land may contain both endangered and inadequately conserved bushland: Urban Bushland in the Ryde LGA by OCULUS Landscape Architecture Urban Design Environmental Planning April 2001. This report identifies that the subject property contains both endangered and inadequately conserved bushland. Details are available by inspection of the report and maps held by Council's Customer Service Centre. For any proposed development of the land existing endangered bushland must be retained and all proposed development must take into account any aspects that may adversely effect the sustainability of the subject bushland. For development of land containing inadequately conserved bushland further investigation may be required to determine the condition and value of the existing bushland.

The Commonwealth Minister for the Environment and Heritage has listed the Blue Gum High Forest and the Turpentine Ironbark Forest of the Sydney Basin Bioregion as critically endangered ecological communities under the Environment Protection and Biodiversity and Conservation Act 1999, which is Federally administered legislation.

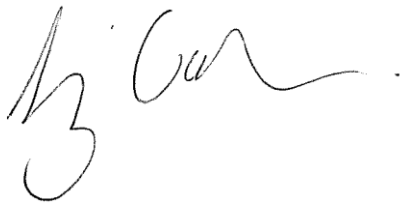
Council records show that your property may contain a Turpentine-Ironbark Forest community. Any action or activity that is proposed on this land which, is likely to have a significant impact on this endangered community, must be referred to the Minister for assessment and approval. It is the proponents responsibility to obtain this approval and any questions relating to this can be referred to the Department of the Environment Heritages Community Information Unit on 1800 803 772.

Subsidence
The following studies/reports indicate that the land is subject to subsidence: Maps Titled - 'Instability Risk Zones in the City of Ryde' dated 22 August, 2003 to be read in conjunction with Report titled 'Ryde City Council Instability Risk Zones - City of Ryde Geotechnical Advice - Areas of Extensive Man- made fill' 23 June 2003 by Geotechnique Pty Ltd. These maps and reports identify that the subject land is affected by subsidence risk.

Details are available by inspection of the maps and report held by Council's Customer Service Centre. For proposed development of geotechnical report may be required to accurately define the degree of risk associated with the proposed development.

No further additional information is available under this Section with respect to this property.

***Note**: The information in this certificate is current as of the date of the certificate.*



Liz Coad
Acting Director City Strategy and Planning

Appendix B: Borehole Logs

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Borehole No. 1
1 / 2

BOREHOLE LOG

Client: CAPITAL INSIGHT PTY LTD

Project: PROPOSED NEW BUILDING & REFURBISHMENT OF BUILDINGS W6A & W6B

Location: MACQUARIE UNIVERSITY, NORTH RYDE, NSW

Job No.: 29807ZR **Method:** HAND AUGER **R.L. Surface:** ~64.2 m

Date: 28/9/16 **Datum:** AHD

Plant Type: **Logged/Checked By:** A.C.K./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING AND 6/10/16	■			■	REFER TO DCP TEST RESULTS	64				FILL: Silty clay, low to medium plasticity, dark grey brown mottled brown, trace of fine to medium grained ironstone gravel.	MC>PL			APPEARS MODERATELY TO POORLY COMPACTED
	■			■										
	■			■										
									CL-CH	FILL: Silty clay, medium to high plasticity, orange brown and dark grey brown, trace of fine grained sandstone gravel and fine grained ironstone gravel.	MC>>PL	VSt	300 300 250	RESIDUAL HP TESTING ON REMOULDED AUGER SAMPLE
							1			SILTY CLAY: medium to high plasticity, orange brown and light brown mottled light grey, trace of fine grained ironstone gravel and fine grained sand.	MC<PL	H		TOO FRIABLE FOR HP TESTING
						63								
										REFER TO CORED BOREHOLE LOG				WASH BORE CASING 1.10m TO 1.61m
							2							
						62								
							3							
						61								
							4							
						60								
							5							
						59								
							6							
						58								

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Borehole No. 1
2 / 2

CORED BOREHOLE LOG

Client: CAPITAL INSIGHT PTY LTD
Project: PROPOSED NEW BUILDING & REFURBISHMENT OF BUILDINGS W6A & W6B
Location: MACQUARIE UNIVERSITY, NORTH RYDE, NSW

Job No.: 29807ZR | **Core Size:** TT56 | **R.L. Surface:** ~64.2 m
Date: 28/9/16 | **Inclination:** VERTICAL | **Datum:** AHD
Plant Type: MELVELLE | **Bearing:** N/A | **Logged/Checked By:** A.C.K./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$ (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT SPACING (mm) (500, 300, 100, 50, 30, 10)	DEFECT DETAILS: DESCRIPTION (Type, inclination, thickness, planarity, roughness, coating.) Specific / General
		63			START CORING AT 1.61m					
100% RETURN					CORE LOSS 0.88m					
		62	2							
					SILTY CLAY: medium plasticity, light grey and orange brown, trace of fine grained ironstone gravel.	RS	H			(2.63m) HP: 550kPa (2.70m) HP: >600kPa (2.85m) HP: 425kPa
			3				VSt			(3.05m) HP: 275kPa
		61			CORE LOSS 0.11m					
					SANDSTONE: fine grained, light grey, with grey laminae, bedded at 0-5°.	DW	M			(3.48m) J, 70°, P, R (3.58m) J, 85°, Un, R (3.63m) J, 70°, P, R
			4				L - M			(3.85m) XWS, 0°, 15 mm.t (3.90m) XWS, 0 - 20°, 15 mm.t (3.94m) J, 70°, P, R (4.13m) J, 85°, Un, R
		60								(4.55m) XWS, 0°, 150 mm.t
			5		CORE LOSS 0.59m					
		59			SANDSTONE: fine grained, light grey, with grey laminae, bedded at 0-5°.	DW	L			(5.36m) J, 75°, Un, R
						XW	EL			
			6			DW	L			(6.00m) J, 85°, P, R, CLAY INFILL
		58			CORE LOSS 0.08m					
					SANDSTONE: fine grained, light grey, with grey laminae, bedded at 0-5°.	SW	M			(6.52m) XWS, 0°, 70 mm.t
			7							
		57								(7.19m) CS, 0 - 30°, 20 mm.t (7.22m) CS, 0°, 70 mm.t
					END OF BOREHOLE AT 7.30 m					50mm DIA. PVC MONITORING WELL INSTALLED TO 3.0m DEPTH, MACHINE SLOTTED FROM 0.5m TO 3.0m, 2mm SAND FILTER PACK FROM 0.4m TO 7.30m, BENTONITE SEAL FROM 0.1m TO 0.4m, BACK FILLED TO SURFACE

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Borehole No. 2
1 / 2

BOREHOLE LOG

Client: CAPITAL INSIGHT PTY LTD

Project: PROPOSED NEW BUILDING & REFURBISHMENT OF BUILDINGS W6A & W6B

Location: MACQUARIE UNIVERSITY, NORTH RYDE, NSW

Job No.: 29807ZR **Method:** HAND AUGER **R.L. Surface:** ~64.0 m

Date: 28/9/16 **Datum:** AHD

Plant Type: **Logged/Checked By:** A.C.K./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING AND 6/10/16	■			■	REFER TO DCP TEST RESULTS					FILL: Silty clay, low to medium plasticity, dark brown, trace of root fibres.	MC<PL			APPEARS MODERATELY COMPACTED
	■			■					CL-CH	SILTY CLAY: medium to high plasticity, orange brown mottled light grey, trace of root fibres.	MC>PL	VSt	390 350 365	RESIDUAL HP TESTING ON REMOULDED AUGER SAMPLES
				■		63	1			as above, but orange brown and light brown.	MC~PL	VSt - H	465 350 415	
										SILTY CLAY: medium to high plasticity, light grey mottled orange brown, trace of fine to medium grained ironstone gravel.	MC<PL	H	465 500 410	HAND AUGER REFUSAL ON INFERRED IRONSTONE GRAVEL
						62	2			REFER TO CORED BOREHOLE LOG				WASH BORE CASING 1.5m TO 1.8m
						61	3							
						60	4							
						59	5							
						58	6							

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Borehole No. 2
2 / 2

CORED BOREHOLE LOG

Client: CAPITAL INSIGHT PTY LTD
Project: PROPOSED NEW BUILDING & REFURBISHMENT OF BUILDINGS W6A & W6B
Location: MACQUARIE UNIVERSITY, NORTH RYDE, NSW

Job No.: 29807ZR | **Core Size:** TT56 | **R.L. Surface:** ~64.0 m
Date: 28/9/16 | **Inclination:** VERTICAL | **Datum:** AHD
Plant Type: MELVELLE | **Bearing:** N/A | **Logged/Checked By:** A.C.K./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$ (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT SPACING (mm) (500, 300, 100, 50, 30, 10)	DEFECT DETAILS: DESCRIPTION (Type, inclination, thickness, planarity, roughness, coating.) Specific / General
					START CORING AT 1.80m					
100% RETURN		62	2		CORE LOSS 0.31m					
					SILTY CLAY: medium plasticity, light grey mottled orange brown, trace of fine grained ironstone gravel, root fibres.	RS	St - VSt			(2.16m) HP: 210kPa (2.23m) HP: 340kPa (2.41m) HP: 220kPa (2.59m) HP: 170kPa
					SILTY CLAY: medium plasticity, light grey, trace of fine grained sand.					
		61	3		CORE LOSS 0.61m					
					SILTY CLAY: low to medium plasticity, light grey, trace of fine grained sand.	RS	St - VSt			(4.09m) HP: 380kPa (4.18m) HP: 180kPa
		60	4		SANDSTONE: fine grained, light grey and red brown.	XW - DW	EL - VL			(4.31m) CS, 0°, 20 mm.t (4.34m) CS, 0°, 10 mm.t (4.44m) Cr, 5°, 40 mm.t
					CORE LOSS 0.46m					
		59	5		SANDSTONE: fine grained, light grey with high strength iron indurated bands.	XW - DW	EL - VL			(4.98m) CS, 0°, 40 mm.t (5.13m) J, 30°, P, S, CLAY INFILL
					CORE LOSS 0.32m					
					SANDSTONE: fine grained, grey, with high strength iron indurated bands, bedded at 0-5°.	DW	VL - L			(5.73m) J, 80°, Un, R (5.81m) XWS, 0 - 30°, 30 mm.t (5.91m) Be, 5°, P, R, CLAY INFILL (5.98m) Cr, 0°, 40 mm.t
		58	6		CORE LOSS 0.18m					
					SANDSTONE: fine grained, light grey with grey laminae, and iron indurated seams and bands, bedded at 0-15°.	DW	M			(6.50m) Be, 15°, P, R (6.61m) XWS, 5°, 20 mm.t (6.72m) CS, 0 - 5°, 30 mm.t (6.75m) J, 90°, P, R (6.84m) J, 70°, P, R, CLAY INFILL
		57	7		END OF BOREHOLE AT 7.50 m					50mm DIA. PVC MONITORING WELL INSTALLED TO 3.0m DEPTH, MACHINE SLOTTED FROM 1.0m TO 3.0m, 2mm SAND FILTER PACK FROM 0.6m TO 7.50m, BENTONITE SEAL FROM 0.15m TO 0.6m, BACK FILLED TO SURFACE

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GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. 3
1 / 1

BOREHOLE LOG

Client: CAPITAL INSIGHT PTY LTD
Project: PROPOSED NEW BUILDING & REFURBISHMENT OF BUILDINGS W6A & W6B
Location: MACQUARIE UNIVERSITY, NORTH RYDE, NSW

Job No.: 29807ZR **Method:** SPIRAL AUGER **R.L. Surface:** ~63.1 m
Date: 27/9/16 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** T.P./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
						63				FILL: Sandy gravel, fine to medium grained, igneous, dark grey.	D			IGNEOUS GRAVEL COVER
									CL-CH	SILTY CLAY: medium to high plasticity, light grey mottled red brown, with ironstone gravel.	MC~PL	H		RESIDUAL
					N = 18 8,7,11								>600 580 400	
						62	1			as above, but low to medium plasticity.	MC<PL			
					N > 16 13,16/ 150mm REFUSAL									TOO FRIABLE FOR HP TESTING
						61	2			SANDSTONE: fine grained, light grey, with iron indurated bands.	XW	EL		
						60	3							
										SANDSTONE: fine to medium grained, grey and dark grey, thinly bedded with medium strength iron indurated bands.	DW	VL - L		VERY LOW TO LOW 'TC' BIT RESISTANCE WITH MODERATE BANDS
						59	4							
ON COMPLETION						58	5					H		VERY HIGH RESISTANCE
										END OF BOREHOLE AT 5.20 m				'TC' BIT REFUSAL
						57	6							

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GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. 4
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BOREHOLE LOG

Client: CAPITAL INSIGHT PTY LTD
Project: PROPOSED NEW BUILDING & REFURBISHMENT OF BUILDINGS W6A & W6B
Location: MACQUARIE UNIVERSITY, NORTH RYDE, NSW

Job No.: 29807ZR **Method:** SPIRAL AUGER **R.L. Surface:** ~64.2 m
Date: 27/9/16 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** T.P./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING						64				ASPHALTIC CONCRETE: 35mm.t	M			
										FILL: Clayey gravel, fine to medium grained, igneous, dark grey.				
				■	N = 17 5,7,10		1		CH	SILTY CLAY: high plasticity, red brown mottled light grey, with ironstone gravel.	MC>PL	VSt - H	340 540 400	RESIDUAL
						63			CL	SILTY CLAY: medium plasticity, light grey mottled orange and red brown, with ironstone gravel.	MC<PL	H		
				■	N = 34 15,15,19		2						>600 >600 >600	
						62			-	SANDSTONE: fine grained, light grey, laminae, bedded, with L strength iron indurated and clay bands.	XW - DW	EL - VL		
							3				DW	L - M		LOW 'TC' BIT RESISTANCE AND MODERATE TO HIGH BANDS
ON COMPLETION OF CORING AND ON 6/10/16 ▼						61				as above, but with high strength iron indurated bands.				
							4							4.2-4.4m WATER SAMPLE
						60				REFER TO CORED BOREHOLE LOG				
							5							
						59								
							6							
						58								

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GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. 4 2 / 2

CORED BOREHOLE LOG

Client: CAPITAL INSIGHT PTY LTD

Project: PROPOSED NEW BUILDING & REFURBISHMENT OF BUILDINGS W6A & W6B

Location: MACQUARIE UNIVERSITY, NORTH RYDE, NSW

Job No.: 29807ZR | **Core Size:** | **R.L. Surface:** ~64.2 m

Date: 27/9/16 | **Inclination:** VERTICAL | **Datum:** AHD

Plant Type: JK305 | **Bearing:** N/A | **Logged/Checked By:** T.P./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$ (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT SPACING (mm) (500, 300, 100, 50, 30, 10)	DEFECT DETAILS: DESCRIPTION Type, inclination, thickness, planarity, roughness, coating. Specific / General
		60			START CORING AT 4.41m					
100% RETURN		59	5		SANDSTONE: fine to medium grained, light grey, with dark grey laminae, bedded at 0-10° and iron indurated bands.	DW	M			(4.50m) CS, 0 - 5°, 10 mm.t, HP: 220kPa (4.59m) CS, 3°, 2 mm.t (4.73m) CS, 0 - 5°, 8 mm.t (4.81m) CS, 4°, 4 mm.t (4.97m) CS, 0°, 60 mm.t (5.18m) XWS, 0 - 5°, 90 mm.t (5.26m) XWS, 1°, 2 mm.t (5.27m) XWS, 1°, 2 mm.t (5.32m) J, Un, R, CLAY INFILL, SUB VERTICAL (5.45m) CS, 0 - 5°, 25 mm.t, HP: 70kPa (5.70m) CS, 0°, 10 mm.t (5.87m) CS, 0 - 5°, 45 mm.t, HP:120kPa (6.07m) XWS, 0 - 5°, 6 mm.t (6.16m) CS, 0 - 5°, 90 mm.t, HP: 240, 320kPa
		58	6		SANDSTONE: fine to medium grained, light grey with grey laminae, bedded at 5-15° and iron indurated bands.					
		57	7		SANDSTONE: fine to medium grained, light grey.	SW				(6.79m) XWS, 0 - 5°, 9 mm.t (6.85m) Be, 15°, P, R, IS (7.00m) CS, 0°, 5 mm.t
		56	8		END OF BOREHOLE AT 7.42 m					GROUNDWATER MONITORING WELL INSTALLED TO A DEPTH OF APPROXIMATELY 7.42m, CLASS 18 MACHINE SLOTTED PVC PIPE FROM 7.42m TO 3.42m, CASING FROM3.42m TO 0.1m, 2mm SAND FILTER PACK FROM 7.42m TO 1.5m, BENTONITE SEAL FROM 1.5m TO 0.2m, BACKFILLED WITH SAND TO THE SURFACE, COMPLETED WITH A STEEL GATIC COVER AND LOCKABLE CAP
		55	9							
		54	10							

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Borehole No. 5
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BOREHOLE LOG

Client: CAPITAL INSIGHT PTY LTD
Project: PROPOSED NEW BUILDING & REFURBISHMENT OF BUILDINGS W6A & W6B
Location: MACQUARIE UNIVERSITY, NORTH RYDE, NSW

Job No.: 29807ZR **Method:** SPIRAL AUGER **R.L. Surface:** ~64.6 m
Date: 28/9/16 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** T.P./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
									-	ASPHALTIC CONCRETE: 50mm.t	M			
									CL	FILL: Gravelly sand, fine to medium grained, dark brown, fine to medium grained igneous gravel.	MC<PL	H		RESIDUAL
					N = 31 10,12,19	64	1			SILTY CLAY: medium plasticity, light grey, with XW strength sandstone bands, and iron indurated bands.			>600 580 >600	
					N > 8 11,8,0/ 0mm REFUSAL	63	2			SANDSTONE: fine grained, light grey, with medium strength iron indurated bands and VL bands.	XW	EL		VERY LOW 'TC' BIT RESISTANCE WITH MODERATE BANDS
										SANDSTONE: fine to medium grained, grey and dark grey, with medium strength iron indurated bands, thinly bedded.	DW	L		LOW RESISTANCE
						62	3							
						61	4							MODERATE RESISTANCE
						60	5							LOW TO MODERATE RESISTANCE
						59	6							MODERATE RESISTANCE
ON COMPLETION						58								6.8-7.1m WATER SAMPLE

JK_LIB_CURRENT - V8.00.GLB Log J & K AUGERHOLE - MASTER 29807ZR NORTH RYDE.GPJ <<DrawingFile>> 11/11/2016 09:50 Produced by gINT Professional, Developed by Datgel

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GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. 5
2 / 2

BOREHOLE LOG

Client: CAPITAL INSIGHT PTY LTD
Project: PROPOSED NEW BUILDING & REFURBISHMENT OF BUILDINGS W6A & W6B
Location: MACQUARIE UNIVERSITY, NORTH RYDE, NSW

Job No.: 29807ZR **Method:** SPIRAL AUGER **R.L. Surface:** ~64.6 m
Date: 28/9/16 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** T.P./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
				■						SANDSTONE: fine to medium grained, grey and dark grey, with medium strength iron indurated bands, thinly bedded. *(continued)*	DW	M		MODERATE RESISTANCE
						57	8			END OF BOREHOLE AT 7.50 m				
						56	9							
						55	10							
						54	11							
						53	12							
						52	13							
						51								

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Borehole No. 6
1 / 2

BOREHOLE LOG

Client: CAPITAL INSIGHT PTY LTD
Project: PROPOSED NEW BUILDING & REFURBISHMENT OF BUILDINGS W6A & W6B
Location: MACQUARIE UNIVERSITY, NORTH RYDE, NSW

Job No.: 29807ZR **Method:** SPIRAL AUGER **R.L. Surface:** ~66.3 m
Date: 28/9/16 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** T.P./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
									-	ASPHALTIC CONCRETE: 70mm.t				
									-	FILL: Sandy gravel, fine to medium grained, dark grey and brown igneous, fine to coarse grained sand.	M			
						66			CL	SANDY CLAY: low plasticity, light grey, orange brown and red brown, fine grained sand, with ironstone gravel.	MC<PL	(VSt - H)		RESIDUAL TOO FRIABLE FOR HP TESTING
					N = 17 6,6,11		1							
						65					MC~PL	VSt		
					N > 16 6,16/ 100mm REFUSAL								250 400	
							2				MC<PL	(VSt - H)		
						64			-	SANDSTONE: fine grained, light grey, with low to medium strength iron indurated bands.	XW - DW	EL - VL		VERY LOW TO LOW 'TC' BIT RESISTANCE WITH MODERATE BANDS
ON COMPLETION OF CORING							3							
ON 6/10/16						63					DW	L		3.4-3.6m WATER SAMPLE LOW TO MEDIUM RESISTANCE
ON COMPLETION OF AUGERING							4							4.0-4.2m WATER SAMPLE
						62				REFER TO CORED BOREHOLE LOG				50mm DIA. PVC MONITORING WELL INSTALLED TO 7.3m DEPTH, MACHINE SLOTTED FROM 7.3m TO 3.3m, CASING FROM 3.3m TO 0.1m, 2mm SAND FILTER PACK FROM 7.3m TO 2.8m, BENTONITE SEAL FROM 2.8m TO 0.2m, AND COMPLETED WITH GATIC COVER AT SURFACE
							5							
						61								
							6							
						60								

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Borehole No. 6
2 / 2

CORED BOREHOLE LOG

Client: CAPITAL INSIGHT PTY LTD

Project: PROPOSED NEW BUILDING & REFURBISHMENT OF BUILDINGS W6A & W6B

Location: MACQUARIE UNIVERSITY, NORTH RYDE, NSW

Job No.: 29807ZR | **Core Size:** | **R.L. Surface:** ~66.3 m

Date: 28/9/16 | **Inclination:** VERTICAL | **Datum:** AHD

Plant Type: JK305 | **Bearing:** N/A | **Logged/Checked By:** T.P./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS: DEFECT SPACING (mm)	DEFECT DETAILS: DESCRIPTION (Type, inclination, thickness, planarity, roughness, coating.) Specific / General
ON COMPLETION OF AUGERING					START CORING AT 4.27m					
100% RETURN		62			CORE LOSS 0.65m					
			5		SANDSTONE: fine grained, grey, with dark grey laminae, thinly bedded at 0-5°, and iron indurated bands.	DW	M			(4.93m) J, 45°, Un, R, IS (4.99m) J, 60°, P, S, IS
		61								(5.17m) J, SUBVERTICAL, P, R, IS (5.20m) Be, 0 - 5°, P, R, IS (5.28m) CS, 0 - 5°, 40 mm.t, HP: 200kPa
										(5.49m) CS, 0 - 5°, 40 mm.t, HP: 120kPa (5.55m) CS, 0°, 2 mm.t
			6							
		60								(6.13m) XWS, 0°, 18 mm.t (6.25m) Be, 0 - 5°, P, CLAY INFILL (6.35m) Be, 0°, P, S, CLAY INFILL
										(6.51m) J, SUBVERTICAL, Un, R, IS (6.55m) J, 22°, Un, R, IS (6.57m) Be, 0°, P, R, IS
			7							(6.82m) CS, 0 - 15°, 45 mm.t, HP: 170kPa (6.89m) XWS, 10°, 5 mm.t (6.97m) XWS, 0 - 5°, 30 mm.t (7.10m) CS, 0 - 5°, 18 mm.t, HP: 220kPa
		59			END OF BOREHOLE AT 7.30 m					
			8							
		58								
			9							
		57								
			10							
		56								

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Borehole No. 7
1 / 2

BOREHOLE LOG

Client: CAPITAL INSIGHT PTY LTD
Project: PROPOSED NEW BUILDING & REFURBISHMENT OF BUILDINGS W6A & W6B
Location: MACQUARIE UNIVERSITY, NORTH RYDE, NSW

Job No.: 29807ZR **Method:** SPIRAL AUGER **R.L. Surface:** ~67.7 m
Date: 27/9/16 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** T.P./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING									-	ASPHALTIC CONCRETE: 25mm.t				ROADBASE
									CH	FILL: Sandy gravel, fine to medium grained igneous, blue grey and brown, fine to medium grained sand.	MC>PL	VSt		RESIDUAL
						67	1			SILTY CLAY: high plasticity, light grey mottled red brown and orange brown, trace of root fibres.			260 320 300	
										as above, but no root fibres and with ironstone gravel.	MC<PL	H	>600 580 >600	
						66	2		-	SANDSTONE: fine to medium grained, light grey, with low to medium strength iron indurated bands and clay bands.	XW	EL		VERY LOW TO LOW 'TC' BIT RESISTANCE
ON COMPLETION OF CORING & AFTER 22 HRS						65	3							
ON 7/10/16						64	4							4.21-4.4m WATER SAMPLE
						63	5			SANDSTONE: fine to medium grained, light grey and grey, with low to medium strength iron indurated bands, thinly bedded.	DW	L		LOW TO MODERATE RESISTANCE
						62	6			REFER TO CORED BOREHOLE LOG				50mm DIA. PVC MONITORING WELL INSTALLED TO 8.6m DEPTH, MACHINE SLOTTED 8.6m TO 4.6m, CASING 4.6m TO 0.1m, 2mm SAND FILTER PACK 8.6m TO 3.9m, BENTONITE SEAL 3.8m TO 0.2m, COMPLETED WITH GATIC COVER AT SURFACE
						61								

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GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. 7
2 / 2

CORED BOREHOLE LOG

Client: CAPITAL INSIGHT PTY LTD
Project: PROPOSED NEW BUILDING & REFURBISHMENT OF BUILDINGS W6A & W6B
Location: MACQUARIE UNIVERSITY, NORTH RYDE, NSW

Job No.: 29807ZR | **Core Size:** | **R.L. Surface:** ~67.7 m
Date: 27/9/16 | **Inclination:** VERTICAL | **Datum:** AHD
Plant Type: JK305 | **Bearing:** N/A | **Logged/Checked By:** T.P./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$ (EL 0.03, VL 0.1, L 0.3, M 1, H 3, VH 10, EH)	DEFECT SPACING (mm) (500, 300, 100, 50, 30, 10)	DEFECT DETAILS: DESCRIPTION Type, inclination, thickness, planarity, roughness, coating. Specific / General
					START CORING AT 5.70m					
100% RETURN		62	6		SANDSTONE: fine to medium grained, light grey and grey, thinly bedded at 0-10°, with iron indurated bands and dark grey laminae.	DW	VL M			(6.00m) CS, 0 - 5°, 25 mm.t (6.18m) XWS, 0 - 5°, 90 mm.t (6.24m) J, 65°, P, R, IS
		61	7		SANDSTONE: fine to medium grained, light grey and grey. very high strength iron indurated band 6.72m-6.81m. low to moderate strength bands, 7.25m-7.34m, 7.52m-7.62m.	XW	EL			(7.49m) CS, 0 - 5°, 60 mm.t, HP: 210kPa (7.64m) J, 45°, Un, R
		60	8		SANDSTONE: fine to medium grained, light grey and grey, thinly bedded at 0-10°, with dark grey laminae.	DW	L - M			(7.75m) CS, 0 - 10°, 20 mm.t, HP: 270kPa (8.03m) XWS, 0 - 5°, 110 mm.t (8.36m) XWS, 0 - 10°, 90 mm.t (8.44m) J, 45°, Un, R (8.50m) CS, 0 - 5°, 10 mm.t (8.57m) XWS, 0 - 5°, 55 mm.t
		59	9		END OF BOREHOLE AT 8.60 m					
		58	10							
		57	11							
		56								

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GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. 8
1 / 1

BOREHOLE LOG

Client: CAPITAL INSIGHT PTY LTD
Project: PROPOSED NEW BUILDING & REFURBISHMENT OF BUILDINGS W6A & W6B
Location: MACQUARIE UNIVERSITY, NORTH RYDE, NSW

Job No.: 29807ZR **Method:** SPIRAL AUGER **R.L. Surface:** ~63.3 m
Date: 27/9/16 **Datum:** AHD
Plant Type: JK305 **Logged/Checked By:** T.P./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
										ASPHALTIC CONCRETE: 100mm.t				
						63			-	FILL: Gravelly sand, fine to medium grained, brown, fine grained igneous gravel.	D			
					N > 18 8,18/ 100mm REFUSAL				CL	SANDY CLAY: low to medium plasticity,	MC<PL	(H)		RESIDUAL TOO FRIABLE FOR HP TESTING
							1			SANDSTONE: fine grained, light grey.	XW	EL		
						62				SANDSTONE: fine to medium grained, light grey, with iron indurated bands.	XW - DW	EL - VL		
						61	2							
							3			as above, but with XW bands.	DW	VL - L		
						60								
							4							
						59								
							5							
						58				SANDSTONE: fine to medium grained, light grey, with high to very high strength iron indurated bands.		L		LOW 'TC' BIT RESISTANCE
▼							6					M - H		MEDIUM TO HIGH RESISTANCE
						57						H - VH		HIGH TO VERY HIGH RESISTANCE
														6.0-6.5m WATER SAMPLE

END OF BOREHOLE AT 7.00 m

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GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. 9
1 / 2

BOREHOLE LOG

Client: CAPITAL INSIGHT PTY LTD
Project: PROPOSED NEW BUILDING & REFURBISHMENT OF BUILDINGS W6A & W6B
Location: MACQUARIE UNIVERSITY, NORTH RYDE, NSW

Job No.: 29807ZR **Method:** SPIRAL AUGER **R.L. Surface:** ~63.0 m
Date: 28/9/16 **Datum:** AHD
Plant Type: JK308 **Logged/Checked By:** A.F./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING										CONCRETE: 160mm.t				8mm DIA. REINFORCEMENT, 30mm TOP COVER
									-	FILL: Gravelly sand, fine to coarse grained, brown, fine to medium grained igneous and sandstone gravel, trace of silt and brick fragments.	M			
					N = 20 5,7,13				CL		MC<PL	H		RESIDUAL
										SANDY CLAY: medium plasticity, orange brown, fine grained sand, trace of ironstone gravel.			470 500 450	
						62	1			SANDSTONE: fine to medium grained, red grey, with clay seams and M strength iron indurated bands.	XW	EL		VERY LOW 'TC' BIT RESISTANCE WITH LOW TO MODERATE BANDS
						61	2							
											DW	VL - L		
on 6/10/16						60	3							3.35-3.55m WATER SAMPLE
						59	4							
						58	5							
										as above, but light grey and grey, without iron indurated bands.	SW	M		MODERATE RESISTANCE
						57	6			REFER TO CORED BOREHOLE LOG				50mm DIA. PVC MONITORING WELL INSTALLED TO 8.8m DEPTH, MACHINE SLOTTED 8.78m TO 2.8m, CASING 2.8m TO SURFACE, 2mm SAND FILTER PACK 8.8m TO 1m, BENTONITE SEAL 0.1m TO SURFACE, COMPLETED WITH STEEL GATIC COVER AT SURFACE

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GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. 9 2 / 2

CORED BOREHOLE LOG

Client: CAPITAL INSIGHT PTY LTD
Project: PROPOSED NEW BUILDING & REFURBISHMENT OF BUILDINGS W6A & W6B
Location: MACQUARIE UNIVERSITY, NORTH RYDE, NSW

Job No.: 29807ZR | **Core Size:** | **R.L. Surface:** ~63.0 m
Date: 28/9/16 | **Inclination:** VERTICAL | **Datum:** AHD
Plant Type: JK308 | **Bearing:** N/A | **Logged/Checked By:** A.F./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, structure, minor components.	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS: DEFECT SPACING (mm)	DEFECT DETAILS: DESCRIPTION (Type, inclination, thickness, planarity, roughness, coating.) Specific / General
					START CORING AT 5.60m					
100% RETURN		57	6		INTERBEDDED SANDSTONE AND SHALE: fine to medium grained, brown grey, bedded at 5-10°.	DW	L			(5.68m) Be, 5°, Un, R, IS
						XW	EL			
						DW	VL			(6.00m) FRACTURED BAND 50mm.t
										(6.10m) J, 85°, Un, R, IS
										(6.17m) J, 70°, Un, R, IS
					as above, but grey and light grey, with high strengh seams.	XW	EL			
		56	7			DW	M			
						XW	EL			(7.52m) Be, 19°, Un, R, IS
					SANDSTONE: fine grained, light grey, bedded at 5-10°.	SW	H			(7.77m) Be, 5°, Un, R, IS
										(7.82m) CS, 5°, 60 mm.t
		55	8		as above, but bedded at 15°.					(8.11m) CS, 5°, 55 mm.t
										(8.20m - 8.46m) XWSx4, 15°, 3 mm.t
							M			
		54	9		END OF BOREHOLE AT 8.78 m					
		53	10							
		52	11							

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GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. 10
1 / 1

BOREHOLE LOG

Client: CAPITAL INSIGHT PTY LTD

Project: PROPOSED NEW BUILDING & REFURBISHMENT OF BUILDINGS W6A & W6B

Location: MACQUARIE UNIVERSITY, NORTH RYDE, NSW

Job No.: 29807ZR **Method:** SPIRAL AUGER **R.L. Surface:** ~61.9 m

Date: 28/9/16 **Datum:** AHD

Plant Type: JK305 **Logged/Checked By:** T.P./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION										CONCRETE: 105mm.t				7mm DIA. REINFORCEMENT, 35mm TOP COVER
									-	FILL: Sandy gravel, fine to medium grained igneous, dark grey, fine to coarse grained sand.	M			
									CH	SILTY CLAY: high plasticity, red brown mottled light grey, with ironstone gravel, trace of roots and root fibres.	MC>PL	VSt - H		RESIDUAL
					N = 13 5,6,7	61	1						440 390 450	
					N = 13 6,6,7	60	2						590 340 490	
												H		
					N > 20 13,20/ 150mm REFUSAL	59	3						450 450	
										SANDSTONE: fine grained, light grey, with low strength iron indurated bands.	XW	EL		
						58	4							
											DW	VL - L		VERY LOW TO LOW 'TC' BIT RESISTANCE
						57	5							
										END OF BOREHOLE AT 5.20 m				
						56	6							
						55								

JK Geotechnics
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

Borehole No. 11
1 / 1

BOREHOLE LOG

Client: CAPITAL INSIGHT PTY LTD

Project: PROPOSED NEW BUILDING & REFURBISHMENT OF BUILDINGS W6A & W6B

Location: MACQUARIE UNIVERSITY, NORTH RYDE, NSW

Job No.: 29807ZR **Method:** SPIRAL AUGER **R.L. Surface:** ~63.2 m

Date: 30/9/16 **Datum:** AHD

Plant Type: JK205 **Logged/Checked By:** T.P./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
										CONCRETE: 100mm.t				NO REINFORCEMENT OBSERVED
						63			CL-CH	SILTY CLAY: medium to high plasticity, red brown mottled light grey, with ironstone gravel.	MC<PL	H		RESIDUAL
					N > 22 11,22/ 150mm REFUSAL								>600 >600	
						62	1			SANDSTONE: fine grained, light grey, with iron indurated bands and clay bands.	XW - DW	EL - VL		
						61	2							
						60	3							3.2-3.4m VERY HIGH STRENGTH IRONSTONE BAND
▼ ON COMPLETION						59	4							3.9-4.5m WATER SAMPLE
						58	5			SANDSTONE: fine to medium grained, grey and dark grey, thinly bedded with medium strength iron indurated bands.	DW	M		
▶						57	6			END OF BOREHOLE AT 6.50 m				'TC' BIT REFUSAL

JK_LIB_CURRENT - V8.00.GLB Log J & K AUGERHOLE - MASTER 29807ZR NORTH RYDE.GPJ <<DrawingFile>> 11/11/2016 09:51 Produced by gINT Professional, Developed by Datgel

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **12** **1/1**

Environmental logs are not to be used for geotechnical purposes

Client: CAPITAL INSIGHT PTY LTD

Project: PROPOSED NEW BUILDING & REFURBISHMENT OF BUILDINGS W6A & W6B

Location: MACQUARIE UNIVERSITY, NORTH RYDE, NSW

Job No. E29807KR **Method:** HAND AUGER **R.L. Surface:** ≈ 66.5m

Date: 6/10/16 **Datum:** AHD

Logged/Checked by: P.D./A.K.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		PID=0.1	0			FILL: Gravelly silty clay, low plasticity, light brown, fine grained sandstone gravel, orange brown.	D			NO ODOUR/ STAINING NO ACM
	■		■		PID=0.0	0.5							
	■		■		PID=0.0	1			END OF BOREHOLE AT 1.0m				
						1.5							
						2							
						2.5							
						3							
						3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Borehole No. **13** **1/1**

Environmental logs are not to be used for geotechnical purposes

Client: CAPITAL INSIGHT PTY LTD

Project: PROPOSED NEW BUILDING & REFURBISHMENT OF BUILDINGS W6A & W6B

Location: MACQUARIE UNIVERSITY, NORTH RYDE, NSW

Job No. E29807KR **Method:** HAND AUGER **R.L. Surface:** ≈ 66.5m

Date: 6/10/16 **Datum:** AHD

Logged/Checked by: P.D./A.K.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■				PID=0.1	0			FILL: Silty clay, low plasticity, light brown, plastic fragments.	D			GRASS COVER NO ODOUR/ STAINING NO ACM
	■				PID=0.1	0.5			as above, but no plastic fragments				
	■				PID=0.0	1			END OF BOREHOLE AT 1.0m				
						1.5							
						2							
						2.5							
						3							
						3.5							

EXPLANATORY NOTES – ENVIRONMENTAL LOGS

INTRODUCTION

These notes have been provided to supplement the environmental report with regards to drilling and field logging. Not all notes are necessarily relevant to all reports. Where geotechnical borehole logs are utilised for environmental purpose, reference should also be made to the explanatory notes included in the geotechnical report. Environmental logs are not suitable for geotechnical purposes.

The ground is a product of continuing natural and manmade processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time. Environmental studies involve gathering and assimilating limited facts about these characteristics and properties in order to understand the ground on a particular site under certain conditions. These conditions are directly relevant only to the ground at the place where, and time when, the investigation was carried out.

DESCRIPTION AND CLASSIFICATION METHODS

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726, the SAA Site Investigation Code. In general, descriptions cover the following properties – soil or rock type, colour, structure, strength or density, and inclusions. Identification and classification of soil and rock involves judgement and the Company infers accuracy only to the extent that is common in current geotechnical practice.

Soil types are described according to the predominating particle size and behaviour as set out in the attached Unified Soil Classification Table qualified by the grading of other particles present (e.g. sandy clay) as set out below (note that unless stated in the report, the soil classification is based on a qualitative field assessment, not laboratory testing):

Soil Classification	Particle Size
Clay	less than 0.002mm
Silt	0.002 to 0.075mm
Sand	0.075 to 2mm
Gravel	2 to 60mm

Non-cohesive soils are classified on the basis of relative density, generally from the results of Standard Penetration Test (SPT) as below:

Relative Density	SPT 'N' Value (blows/300mm)
Very loose	less than 4
Loose	4 – 10
Medium dense	10 – 30
Dense	30 – 50
Very Dense	greater than 50

Cohesive soils are classified on the basis of strength (consistency) either by use of hand penetrometer, laboratory testing or engineering examination. The strength terms are defined as shown in the following table:

Classification	Unconfined Compressive Strength kPa
Very Soft	less than 25
Soft	25 – 50
Firm	50 – 100
Stiff	100 – 200
Very Stiff	200 – 400
Hard	Greater than 400
Friable	Strength not attainable – soil crumbles

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc. Where relevant, further information regarding rock classification is given in the text of the report. In the Sydney Basin, 'Shale' is used to describe thinly bedded to laminated siltstone.

DRILLING OR EXCAVATION METHODS

The following is a brief summary of drilling and excavation methods currently adopted by the Company, and some comments on their use and application. All except test pits and hand auger drilling require the use of a mechanical drilling rig.

Test Pits: These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the in-situ soils if it is safe to descend into the pit. The depth of penetration is limited to approximately 3m for a backhoe and up to 6m for an excavator. Limitations of test pits include problems associated with disturbance and difficulty of reinstatement; and the consequent effects on nearby structures. Care must be taken if construction is to be carried out near test pit locations to either properly re-compact the backfill during construction, or to design and construct the structure so as not to be adversely affected by poorly compacted backfill at the test pit location.

Hand Auger Drilling: A borehole of 50mm to 100mm diameter is advanced by manually operated equipment. Premature refusal of the hand augers can occur on a variety of materials such as fill, hard clay, gravel or ironstone, and does not necessarily indicate rock level.

Continuous Spiral Flight Augers: The borehole is advanced using 75mm to 115mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling and in-situ testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface by the flights or may be collected after withdrawal of the auger flights, but they can be very disturbed and layers may become mixed. Information from the auger sampling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively lower reliability due to mixing or softening of samples by groundwater, or uncertainties as to the original depth of the samples. Augering below the groundwater table is of even lesser reliability than augering above the water table.

Rock Augering: Use can be made of a Tungsten Carbide (TC) bit for auger drilling into rock to indicate rock quality and continuity by variation in drilling resistance and from examination of recovered rock fragments. This method of investigation is quick and relatively inexpensive but provides only an indication of the likely rock strength and predicted values may be in error by a strength order. Where rock strengths may have a significant impact on construction feasibility or costs, then further investigation by means of cored boreholes may be warranted.

Wash Boring: The borehole is usually advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from "feel" and rate of penetration.

Mud Stabilised Drilling: Either Wash Boring or Continuous Core Drilling can use drilling mud as a circulating fluid to stabilise the borehole. The term 'mud' encompasses a range of products ranging from bentonite to polymers such as Revert or Biogel. The mud tends to mask the cuttings and reliable identification is only possible from intermittent intact sampling (e.g. from SPT and U50 samples) or from rock coring, etc.

Continuous Core Drilling: A continuous core sample is obtained using a diamond tipped core barrel. Provided full core recovery is achieved (which is not always possible in very low strength rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation. In rocks, an NMLC triple tube core barrel, which gives a core of about 50mm diameter, is usually used with water flush. The length of core recovered is compared to the length drilled and any length not recovered is shown as CORE LOSS. The locations of losses are determined on site by the supervising engineer; where the location is uncertain, the loss is placed at the top end of the drill run.

Standard Penetration Tests: Standard Penetration Tests (SPT) are used mainly in non-cohesive soils, but can also be used in cohesive soils as a means of indicating density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, "Methods of Testing Soils for Engineering Purposes" – Test F3.1.

The test is carried out in a borehole by driving a 50mm diameter split sample tube with a tapered shoe, under the impact of a 63kg hammer with a free fall of 760mm. It is normal for the tube to be driven in three successive 150mm increments and the 'N' value is taken as the number of blows for the last 300mm. In dense sands, very hard clays or weak rock, the full 450mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form:

- In the case where full penetration is obtained with successive blow counts for each 150mm of, say, 4, 6 and 7 blows, as: N = 13 (4, 6, 7)
- In a case where the test is discontinued short of full penetration, say after 15 blows for the first 150mm and 30 blows for the next 40mm, as: N>30 (15, 30/40mm)

The results of the test can be related empirically to the engineering properties of the soil. Occasionally, the drop hammer is used to drive 50mm diameter thin walled sample tubes (U50) in clays. In such circumstances, the test results are shown on the borehole logs in brackets.

A modification to the SPT test is where the same driving system is used with a solid 60 tipped steel cone of the same diameter as the SPT hollow sampler. The solid cone can be continuously driven for some distance in soft clays or loose sands, or may be used where damage would otherwise occur to the SPT. The results of this Solid Cone Penetration Test (SCPT) are shown as "Nc" on the borehole logs, together with the number of blows per 150mm penetration.

LOGS

The borehole or test pit logs presented herein are an interpretation of the subsurface conditions, and their reliability will depend to some extent on the frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will enable the most reliable assessment, but is not always practicable or possible to justify on economic grounds. In any case, the boreholes or test pits represent only a very small sample of the total subsurface conditions.

The attached explanatory notes define the terms and symbols used in preparation of the logs.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than "straight line"

variations between the boreholes or test pits. Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations.

GROUNDWATER

Where groundwater levels are measured in boreholes, there are several potential problems:

- Although groundwater may be present, in low permeability soils it may enter the hole slowly or perhaps not at all during the time it is left open;
- A localised perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes and may not be the same at the time of construction; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must be washed out of the hole or 'reverted' chemically if water observations are to be made.

More reliable measurements can be made by installing standpipes which are read after stabilising at intervals ranging from several days to perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from perched water tables or surface water.

FILL

The presence of fill materials can often be determined only by the inclusion of foreign objects (e.g. bricks, concrete, plastic, slag/ash, steel etc) or by distinctly unusual colour, texture or fabric. Identification of the extent of fill materials will also depend on investigation methods and frequency. Where natural soils similar to those at the site are used for fill, it may be difficult with limited testing and sampling to reliably determine the extent of the fill.

The presence of fill materials is usually regarded with caution as the possible variation in density, strength and material type is much greater than with natural soil deposits. If the volume and quality of fill is of importance to a project, then frequent test pit excavations are preferable to boreholes

LABORATORY TESTING

Laboratory testing has not been undertaken to confirm the soil classifications and rocks strengths indicated on the environmental logs unless noted in the report.

SITE ANOMALIES

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, EIS should be notified immediately.

GRAPHIC LOG SYMBOLS FOR SOIL AND ROCKS

SOIL


FILL


TOPSOIL


CLAY (CL, CH)


SILT (ML, MH)


SAND (SP, SW)


GRAVEL (GP, GW)


SANDY CLAY (CL, CH)


SILTY CLAY (CL, CH)


CLAYEY SAND (SC)


SILTY SAND (SM)


GRAVELLY CLAY (CL, CH)


CLAYEY GRAVEL (GC)


SANDY SILT (ML)


PEAT AND ORGANIC SOILS

ROCK


CONGLOMERATE


SANDSTONE


SHALE


SILTSTONE, MUDSTONE, CLAYSTONE


LIMESTONE


PHYLLITE, SCHIST


TUFF


GRANITE, GABBRO


DOLERITE, DIORITE


BASALT, ANDESITE


QUARTZITE

DEFECTS AND INCLUSIONS


CLAY SEAM


SHEARED OR CRUSHED SEAM


BRECCIATED OR SHATTERED SEAM/ZONE


IRONSTONE GRAVEL


ORGANIC MATERIAL

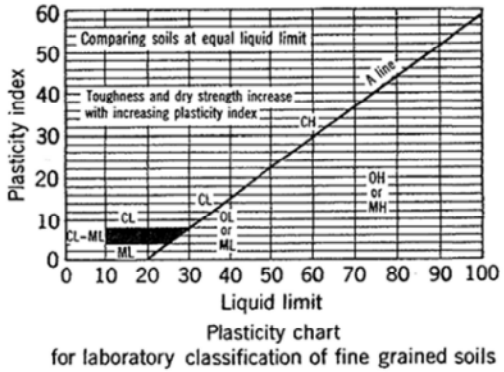
OTHER MATERIALS


CONCRETE


BITUMINOUS CONCRETE, COAL


COLLUVIUM

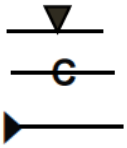
Field Identification Procedures (Excluding particles larger than 75 μm and basing fractions on estimated weights)						Group Symbols [a]	Typical Names	Information Required for Describing Soils	Laboratory Classification Criteria
Coarse-grained soils More than half of material is *larger* than 75 μm sieve size[b] (The 75 μm sieve size is about the smallest particle visible to naked eye)	Gravels More than half of coarse fraction is larger than 4 mm sieve size	Clean gravels (little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes			*GW*	Well graded gravels, gravel-sand mixtures, little or no fines	Give typical name; indicate approximate percentages of sand and gravel; maximum size; angularity, surface condition, and hardness of the coarse grains; local or geologic name and other pertinent descriptive information; and symbols in parentheses For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions and drainage characteristics Example: *Silty sand*, gravelly; about 20% hard, angular gravel particles 12 mm maximum size; rounded and subangular sand grains coarse to fine, about 15% non-plastic fines with low dry strength; well compacted and moist in place; alluvial sand; (*SM*)	Use grain size curve in identifying the fractions as given under field identification Determine percentages of gravel and sand from grain size curve Depending on percentage of fines (fraction smaller than 75 μm sieve size) coarse grained soils are classified as follows: Less than 5% *GW, GP, SW, SP* More than 12% *GM, GC, SM, SC* 5% to 12% *Borderline* cases requiring use of dual symbols $C_U = \frac{D_{60}}{D_{10}}$ Greater than 4 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting all gradation requirements for *GW* Atterberg limits below "A" line, or *PI* less than 4 — Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols Atterberg limits above "A" line, with *PI* greater than 7
			Predominantly one size or a range of sizes with some intermediate sizes missing			*GP*	Poorly graded gravels, gravel-sand mixtures, little or no fines		
		Gravels with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures see *ML* below)			*GM*	Silty gravels, poorly graded gravel-sand-silt mixtures		
			Plastic fines (for identification procedures, see *CL* below)			*GC*	Clayey gravels, poorly graded gravel-sand-clay mixtures		
	Sands More than half of coarse fraction is smaller than 4 mm sieve size	Clean sands (little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate particle sizes			*SW*	Well graded sands, gravelly sands, little or no fines		$C_U = \frac{D_{60}}{D_{10}}$ Greater than 6 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting all gradation requirements for *SW* Atterberg limits below "A" line or *PI* less than 5 — Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols Atterberg limits below "A" line with *PI* greater than 7
			Predominantly one size or a range of sizes with some intermediate sizes missing			*SP*	Poorly graded sands, gravelly sands, little or no fines		
		Sands with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures, see *ML* below)			*SM*	Silty sands, poorly graded sand-silt mixtures		
			Plastic fines (for identification procedures, see *CL* below)			*SC*	Clayey sands, poorly graded sand-clay mixtures		
Fine-grained soils More than half of material is *smaller* than 75 μm sieve size	Identification Procedures on Fraction Smaller than 380 μm Sieve Size		Dry Strength (crushing characteristics)	Dilatancy (reaction to shaking)	Toughness (consistency near plastic limit)				
	Silts and clays liquid limit less than 50		None to slight	Quick to slow	None	*ML*	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity	Give typical name; indicate degree and character of plasticity, amount and maximum size of coarse grains; colour in wet condition, odour if any, local or geologic name, and other pertinent descriptive information, and symbol in parentheses For undisturbed soils add information on structure, stratification, consistency in undisturbed and remoulded states, moisture and drainage conditions Example: *Clayey silt*, brown; slightly plastic; small percentage of fine sand; numerous vertical root holes; firm and dry in place; loess; (*ML*)	
			Medium to high	None to very slow	Medium	*CL*	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays		
			Slight to medium	Slow	Slight	*OL*	Organic silts and organic silt-clays of low plasticity		
	Silts and clays liquid limit greater than 50		Slight to medium	Slow to none	Slight to medium	*MH*	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts		
			High to very high	None	High	*CH*	Inorganic clays of high plasticity, fat clays		
			Medium to high	None to very slow	Slight to medium	*OH*	Organic clays of medium to high plasticity		
Highly Organic Soils			Readily identified by colour, odour, spongy feel and frequently by fibrous texture			*Pt*	Peat and other highly organic soils		



Plasticity chart
for laboratory classification of fine grained soils

Note: 1 Soils possessing characteristics of two groups are designated by combinations of group symbols (eg. GW-GC, well graded gravel-sand mixture with clay fines).
2 Soils with liquid limits of the order of 35 to 50 may be visually classified as being of medium plasticity.

LOG SYMBOLS

LOG COLUMN	SYMBOL	DEFINITION
Groundwater Record		Standing water level. Time delay following completion of drilling may be shown. Extent of borehole collapse shortly after drilling. Groundwater seepage into borehole or excavation noted during drilling or excavation.
Samples	ES U50 DB DS ASB ASS SAL	Soil sample taken over depth indicated, for environmental analysis. Undisturbed 50mm diameter tube sample taken over depth indicated. Bulk disturbed sample taken over depth indicated. Small disturbed bag sample taken over depth indicated. Soil sample taken over depth indicated, for asbestos screening. Soil sample taken over depth indicated, for acid sulfate soil analysis. Soil sample taken over depth indicated, for salinity analysis.
Field Tests	N = 17 4, 7, 10	Standard Penetration Test (SPT) performed between depths indicated by lines. Individual show blows per 150mm penetration. 'R' as noted below.
	N_c = 5 7 3 R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60 degree solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	VNS = 25 PID = 100	Vane shear reading in kPa of Undrained Shear Strength. Photoionisation detector reading in ppm (Soil sample heads pace test).
Moisture (Cohesive Soils) (Cohesionless)	MC > PL MC ≈ PL MC < PL D M W	Moisture content estimated to be greater than plastic limit. Moisture content estimated to be approximately equal to plastic limit. Moisture content estimated to be less than plastic limit. DRY – Runs freely through fingers. MOIST – Does not run freely but no free water visible on soil surface. WET – Free water visible on soil surface.
Strength (Consistency) Cohesive Soils	VS S F St VSt H ( )	VERY SOFT – Unconfined compressive strength less than 25kPa SOFT – Unconfined compressive strength 25-5 0kPa FIRM – Unconfined compressive strength 50-1 00kPa STIFF – Unconfined compressive strength 100- 200kPa VERY STIFF – Unconfined compressive strength 200- 400kPa HARD – Unconfined compressive strength greater than 400kPa Bracketed symbol indicates estimated consistency based o n tactile examination or other tests.
Density Index/ Relative Density (Cohesionless Soils)	VL L MD D VD ( )	**Density Index (ID) Range (%)** / **SPT ' N' Value Range (Blows/300mm)** Very Loose <15 / 0-4 Loose 15-35 / 4-10 Medium Dense 35-65 / 10-30 Dense 65-85 / 30-50 Very Dense >85 / >50 Bracketed symbol indicates estimated density based on ease of drilling or other tests.
Hand Penetrometer Readings	300 250	Numbers indicate individual test results in kPa on representative undisturbed material unless noted otherwise
Remarks	'V' bit 'TC' bit T_{60}	Hardened steel 'V' shaped bit. Tungsten carbide wing bit. Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers.

LOG SYMBOLS CONTINUED

ROCK STRENGTH

Rock strength is defined by the Point Load Strength Index (Is 50) and refers to the strength of the rock substance in the bedding. The test procedure is described by the International Journal of Rock Mechanics, Mining and Geomechanics Abstract Volume 22, No 2, 1985.

TERM	SYMBOL	Is (50) MPa	FIELD GUIDE
Extremely Low:	EL	0.03	Easily remoulded by hand to a material with soil properties.
Very Low:	VL	0.1	May be crumbled in the hand. Sandstone is "sugary" and friable.
Low:	L	0.3	A piece of core 150 mm long x 50mm dia. may be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling.
Medium Strength:	M	1	A piece of core 150 mm long x 50mm dia. can be broken by hand with difficulty. Readily scored with knife.
High:	H	3	A piece of core 150 mm long x 50mm dia. core cannot be broken by hand, can be slightly scratched or scored with knife; rock rings under hammer.
Very High:	VH	10	A piece of core 150 mm long x 50mm dia. may be broken with hand-held pick after more than one blow. Cannot be scratched with pen knife; rock rings under hammer.
Extremely High:	EH		A piece of core 150 mm long x 50mm dia. is very difficult to break with h and-held hammer . Rings when struck with a hammer.

ROCK STRENGTH

ABBREVIATION	DESCRIPTION	NOTES
Be	Bedding Plane Parting	Defect orientations measured relative to the normal to (i.e. relative to horizontal for vertical holes)
CS	Clay Seam	
J	Joint	
P	Planar	
Un	Undulating	
S	Smooth	
R	Rough	
IS	Iron stained	
XWS	Extremely Weathered Seam	
Cr	Crushed Seam	
60t	Thickness of defect in millimetres	

Appendix C: Laboratory Report/s & COC Documents

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD	EIS Job Number: E29807KR	ENVIRONMENTAL INVESTIGATION SERVICES
12 ASHLEY STREET		REAR OF 115 WICKS ROAD
CHATSWOOD NSW 2067	Date Results Required: STANDARD	MACQUARIE PARK, NSW 2113
P: (02) 99106200		P: 02-9888 5000 F: 02-9888 5001
F: (02) 99106201		Attention: Priya Dass
Attention: Aileen	Page: 1	

Location:	Buildings W6A & W6B, Macquarie University, Macquarie Park	Sample Preserved in Esky on Ice
Sampler:		Tests Required

	Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 2	Combo 3	Combo 6	Combo 6a	8 Metals	PAHs	TRH/BTEX	BTEX	Asbestos			
1	28/09/2016		BH1	0.0-0.1	G, A	0.1	Fill				✓								
2	28/09/2016		BH1	0.2-0.3		0.1	Fill												
3	28/09/2016		BH1	0.5-0.6		0	Silty Clay												
4	28/09/2016		BH2	0.0-0.1		0.3	Fill				✓								
5	28/09/2016		BH2	0.4-0.5		0.5	Silty Clay		✓										
6	28/09/2016		BH3	0.1-0.2		0.2	Fill				✓								
7	28/09/2016		BH3	0.7-0.8		0.2	Silty Clay												
8	27/09/2016		BH4	0.05-0.15		0.1	Fill				✓								
9	27/09/2016		BH4	0.4-0.5		0	Fill												
10	27/09/2016		BH4	0.9-1.0		0	Silty Clay												
11	28/09/2016		BH5	0.05-0.15		0	Fill				✓								
12	28/09/2016		BH5	0.4-0.5		0.3	Silty Clay												
13	28/09/2016		BH5	0.9-1.0		0.4	Silty Clay												
14	28/09/2016		BH6	0.1-0.2		0.2	Fill				✓								
15	28/09/2016		BH6	0.7-0.95		0.2	Sandy Clay												
16	27/09/2016		BH7	0.15-0.25		0.3	Silty Clay				✓								
17	27/09/2016		BH7	0.4-0.5		0.2	Silty Clay		✓										
18	27/09/2016		BH7	0.9-1.0		0.4	Silty Clay												
19	30/09/2016		BH8	0.1-0.2		0.3	Fill				✓								
20	30/09/2016		BH8	0.4-0.5		0.1	Sandy Clay												
21	28/09/2016		BH9	0.2-0.3		0.1	Fill				✓								
22	28/09/2016		BH9	0.5-0.6		0.1	Sandy Clay		✓										
23	28/09/2016		BH10	0.15-0.25		0	Fill				✓								
24	28/09/2016		BH10	0.9-1.0		0	Silty Clay		✓										
25	30/09/2016		BH11	0.1-0.2		0.2	Silty Clay				✓								
26	30/09/2016		BH11	0.4-0.5		0	Silty Clay												
27	6/10/2016		BH12	0.0-0.2		0.3	Fill				✓								
28	6/10/2016		BH12	0.5-0.6		0.2	Fill												
29	6/10/2016		BH12	0.9-1.0		0.2	Fill		✓										
30	6/10/2016		BH13	0.0-0.2		0.1	Fill												
31	6/10/2016		BH13	0.5-0.6		0.1	Fill				✓								
32	6/10/2016		BH13	0.9-1.0		0.1	Fill												
33	27/09/2016		DUPA							✓									
34	30/09/2016		DUPB							✓									
35	30/09/2016		DUPC							✓									
36	30/09/2016		FR												✓				
37	27/09/2016		TB												✓				
NR	27/09/2016		TS												✓				

Remarks (comments/detection limits required):	Sample Containers: G - 250mg Glass Jar A - Ziplock Asbestos Bag P - Plastic Bag

Relinquished By: Priya Dass	Date: 7/10/16	Time:	Received By:	Date:

ENVIROLAB GROUP
Environmental Sample
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 154919

Date Received: 07/10
Time Received: 16:30
Received by: N-R
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

SAMPLE RECEIPT ADVICE

Client Details	
Client	Environmental Investigation Services
Attention	Priya Dass

Sample Login Details	
Your Reference	E29807KR, Macquarie Park
Envirolab Reference	**154919**
Date Sample Received	07/10/2016
Date Instructions Received	07/10/2016
Date Results Expected to be Reported	**14/10/2016**

Sample Condition	
Samples received in appropriate condition for analysis	YES
No. of Samples Provided	1 water 36 soils
Turnaround Time Requested	Standard
Temperature on receipt (°C)	15.4
Cooling Method	Ice
Sampling Date Provided	YES

Comments
Samples will be held for 1 month for water samples and 2 months for soil samples from date of receipt of samples
missing TS

Please direct any queries to:

Aileen Hie	Jacinta Hurst
Phone: 02 9910 6200	Phone: 02 9910 6200
Fax: 02 9910 6201	Fax: 02 9910 6201
Email: ahie@envirolabservices.com.au	Email: jhurst@envirolabservices.com.au

Sample and Testing Details on following page

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

Sample Id	*vTRH(C6-C10)/BTEXN in Soil*	*svTRH (C10-C40) in Soil*	*PAHs in Soil*	*Organochlorine Pesticides in soil*	*Organophosphorus Pesticides*	*PCBs in Soil*	*Acid Extractable metals in soil*	*Asbestos ID - soils*	*BTEX in Water*	*On Hold*
BH1-0.0-0.1	✓	✓	✓	✓	✓	✓	✓	✓		
BH1-0.2-0.3										✓
BH1-0.5-0.6										✓
BH2-0.0-0.1	✓	✓	✓	✓	✓	✓	✓	✓		
BH2-0.4-0.5	✓	✓	✓				✓			
BH3-0.1-0.2	✓	✓	✓	✓	✓	✓	✓	✓		
BH3-0.7-0.8										✓
BH4-0.05-0.15	✓	✓	✓	✓	✓	✓	✓	✓		
BH4-0.4-0.5										✓
BH4-0.9-1.0										✓
BH5-0.05-0.15	✓	✓	✓	✓	✓	✓	✓	✓		
BH5-0.4-0.5										✓
BH5-0.9-1.0										✓
BH6-0.1-0.2	✓	✓	✓	✓	✓	✓	✓	✓		
BH6-0.7-0.95										✓
BH7-0.15-0.25	✓	✓	✓	✓	✓	✓	✓	✓		
BH7-0.4-0.5	✓	✓	✓				✓			
BH7-0.9-1.0										✓
BH8-0.1-0.2	✓	✓	✓	✓	✓	✓	✓	✓		
BH8-0.4-0.5										✓
BH9-0.2-0.3	✓	✓	✓	✓	✓	✓	✓	✓		
BH9-0.5-0.6	✓	✓	✓				✓			
BH10-0.15-0.25	✓	✓	✓	✓	✓	✓	✓	✓		
BH10-0.9-1.0	✓	✓	✓				✓			
BH11-0.1-0.2	✓	✓	✓	✓	✓	✓	✓	✓		
BH11-0.4-0.5										✓
BH12-0.0-0.2	✓	✓	✓	✓	✓	✓	✓	✓		
BH12-0.5-0.6										✓
BH12-0.9-1.0	✓	✓	✓				✓			
BH13-0.0-0.2										✓
BH13-0.5-0.6	✓	✓	✓	✓	✓	✓	✓	✓		
BH13-0.9-1.0										✓
DUPA	✓	✓	✓	✓	✓	✓	✓			
DUPB	✓	✓	✓	✓	✓	✓	✓			
DUPC	✓	✓	✓	✓	✓	✓	✓			
FR									✓	
TB	✓									

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12 Ashley St Chatswood NSW 2067
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email: sydney@envirolab.com.au
envirolab.com.au

Envirolab Services Pty Ltd - Sydney | ABN 37 112 535 645

CERTIFICATE OF ANALYSIS 154919

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Priya Dass

Sample log in details:

Your Reference:	**E29807KR, Macquarie Park**
No. of samples:	1 water 36 soils
Date samples received / completed instructions received	07/10/16 / 07/10/16

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	14/10/16 / 14/10/16
Date of Preliminary Report:	Not Issued

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Accredited for compliance with ISO/IEC 17025 - Testing **Tests not covered by NATA are denoted with *.**

Results Approved By:

David Springer
General Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	154919-1	154919-4	154919-5	154919-6	154919-8
Your Reference	---------- -	BH1	BH2	BH2	BH3	BH4
Depth	----------	0.0-0.1	0.0-0.1	0.4-0.5	0.1-0.2	0.05-0.15
Date Sampled		28/09/2016	28/09/2016	28/09/2016	28/09/2016	27/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	11/10/2016	11/10/2016	11/10/2016	11/10/2016	11/10/2016
TRHC6 - C9	mg/kg	<25	<25	<25	<25	<25
TRHC6 - C10	mg/kg	<25	<25	<25	<25	<25
vTPHC6 - C10 less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	83	81	83	85	81

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	154919-11	154919-14	154919-16	154919-17	154919-19
Your Reference	---------- -	BH5	BH6	BH7	BH7	BH8
Depth	----------	0.05-0.15	0.1-0.2	0.15-0.25	0.4-0.5	0.1-0.2
Date Sampled		28/09/2016	28/09/2016	27/09/2016	27/09/2016	30/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	11/10/2016	11/10/2016	11/10/2016	11/10/2016	11/10/2016
TRHC6 - C9	mg/kg	<25	<25	<25	<25	<25
TRHC6 - C10	mg/kg	<25	<25	<25	<25	<25
vTPHC6 - C10 less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	84	80	77	76	82

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	154919-21	154919-22	154919-23	154919-24	154919-25
Your Reference	----------	BH9	BH9	BH10	BH10	BH11
Depth	- ----------	0.2-0.3	0.5-0.6	0.15-0.25	0.9-1.0	0.1-0.2
Date Sampled		28/09/2016	28/09/2016	28/09/2016	28/09/2016	30/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	11/10/2016	11/10/2016	11/10/2016	11/10/2016	11/10/2016
TRHC6 - C9	mg/kg	<25	<25	<25	<25	<25
TRHC6 - C10	mg/kg	<25	<25	<25	<25	<25
vTPHC6 - C10 less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	80	77	77	80	82

vTRH(C6-C10)/BTEXN in Soil						
Our Reference:	UNITS	154919-27	154919-29	154919-31	154919-33	154919-34
Your Reference	----------	BH12	BH12	BH13	DUPA	DUPB
Depth	- ----------	0.0-0.2	0.9-1.0	0.5-0.6	-	-
Date Sampled		6/10/2016	6/10/2016	6/10/2016	28/09/2016	30/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	11/10/2016	11/10/2016	11/10/2016	11/10/2016	11/10/2016
TRHC6 - C9	mg/kg	<25	<25	<25	<25	<25
TRHC6 - C10	mg/kg	<25	<25	<25	<25	<25
vTPHC6 - C10 less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	82	81	77	83	79

vTRH(C6-C10)/BTEXN in Soil			
Our Reference:	UNITS	154919-37	154919-38
Your Reference	----------	TB	TS
	-		
Depth	----------	-	-
Date Sampled		27/09/2016	27/09/2016
Type of sample		Soil	soil
Date extracted	-	10/10/2016	10/10/2016
Date analysed	-	11/10/2016	11/10/2016
TRHC$_6$ - C$_9$	mg/kg	<25	[NA]
TRHC$_6$ - C$_{10}$	mg/kg	<25	[NA]
vTPHC$_6$ - C$_{10}$ less BTEX (F1)	mg/kg	<25	[NA]
Benzene	mg/kg	<0.2	98%
Toluene	mg/kg	<0.5	98%
Ethylbenzene	mg/kg	<1	99%
m+p-xylene	mg/kg	<2	99%
o-Xylene	mg/kg	<1	100%
naphthalene	mg/kg	<1	[NA]
Surrogate aaa-Trifluorotoluene	%	84	77

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	154919-1	154919-4	154919-5	154919-6	154919-8
Your Reference	---------- -	BH1	BH2	BH2	BH3	BH4
Depth	----------	0.0-0.1	0.0-0.1	0.4-0.5	0.1-0.2	0.05-0.15
Date Sampled		28/09/2016	28/09/2016	28/09/2016	28/09/2016	27/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	11/10/2016	11/10/2016	11/10/2016	11/10/2016	11/10/2016
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	72	72	73	70	71

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	154919-11	154919-14	154919-16	154919-17	154919-19
Your Reference	---------- -	BH5	BH6	BH7	BH7	BH8
Depth	----------	0.05-0.15	0.1-0.2	0.15-0.25	0.4-0.5	0.1-0.2
Date Sampled		28/09/2016	28/09/2016	27/09/2016	27/09/2016	30/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	11/10/2016	11/10/2016	11/10/2016	11/10/2016	11/10/2016
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	200
TRHC$_{29}$ - C$_{36}$	mg/kg	240	<100	<100	<100	710
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	230	<100	<100	<100	670
TRH>C$_{34}$-C$_{40}$	mg/kg	330	<100	<100	<100	870
Surrogate o-Terphenyl	%	74	70	71	71	75

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	154919-21	154919-22	154919-23	154919-24	154919-25
Your Reference	---------- -	BH9	BH9	BH10	BH10	BH11
Depth	----------	0.2-0.3	0.5-0.6	0.15-0.25	0.9-1.0	0.1-0.2
Date Sampled		28/09/2016	28/09/2016	28/09/2016	28/09/2016	30/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	11/10/2016	11/10/2016	11/10/2016	11/10/2016	11/10/2016
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	70	79	73	70	70

svTRH (C10-C40) in Soil						
Our Reference:	UNITS	154919-27	154919-29	154919-31	154919-33	154919-34
Your Reference	---------- -	BH12	BH12	BH13	DUPA	DUPB
Depth	----------	0.0-0.2	0.9-1.0	0.5-0.6	-	-
Date Sampled		6/10/2016	6/10/2016	6/10/2016	28/09/2016	30/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	11/10/2016	11/10/2016	11/10/2016	11/10/2016	11/10/2016
TRHC$_{10}$ - C$_{14}$	mg/kg	<50	<50	<50	<50	<50
TRHC$_{15}$ - C$_{28}$	mg/kg	<100	<100	<100	<100	<100
TRHC$_{29}$ - C$_{36}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{10}$-C$_{16}$	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{10}$ - C$_{16}$ less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH>C$_{16}$-C$_{34}$	mg/kg	<100	<100	<100	<100	<100
TRH>C$_{34}$-C$_{40}$	mg/kg	<100	<100	<100	<100	<100
Surrogate o-Terphenyl	%	71	74	71	74	69

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- - ---------- 	154919-1 BH1 0.0-0.1 28/09/2016 Soil	154919-4 BH2 0.0-0.1 28/09/2016 Soil	154919-5 BH2 0.4-0.5 28/09/2016 Soil	154919-6 BH3 0.1-0.2 28/09/2016 Soil	154919-8 BH4 0.05-0.15 27/09/2016 Soil
Date extracted	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total Positive PAHs	mg/kg	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	96	97	109	104	95

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- - ---------- 	154919-11 BH5 0.05-0.15 28/09/2016 Soil	154919-14 BH6 0.1-0.2 28/09/2016 Soil	154919-16 BH7 0.15-0.25 27/09/2016 Soil	154919-17 BH7 0.4-0.5 27/09/2016 Soil	154919-19 BH8 0.1-0.2 30/09/2016 Soil
Date extracted	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.2	<0.1	<0.1	<0.1	0.2
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total Positive PAHs	mg/kg	0.32	NIL (+)VE	NIL (+)VE	NIL (+)VE	0.17
Surrogate p-Terphenyl-d14	%	105	102	99	102	97

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ---------- - ---------- 	154919-21 BH9 0.2-0.3 28/09/2016 Soil	154919-22 BH9 0.5-0.6 28/09/2016 Soil	154919-23 BH10 0.15-0.25 28/09/2016 Soil	154919-24 BH10 0.9-1.0 28/09/2016 Soil	154919-25 BH11 0.1-0.2 30/09/2016 Soil
Date extracted	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.6	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.8	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.9	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.6	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.3	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	0.8	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.5	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.3	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.3	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	0.8	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	0.8	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	0.8	<0.5	<0.5	<0.5	<0.5
Total Positive PAHs	mg/kg	5.7	NIL (+)VE	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	95	103	104	102	99

PAHs in Soil Our Reference: Your Reference	UNITS ----------	154919-27 BH12	154919-29 BH12	154919-31 BH13	154919-33 DUPA	154919-34 DUPB
Depth	-	0.0-0.2	0.9-1.0	0.5-0.6	-	-
Date Sampled	----------	6/10/2016	6/10/2016	6/10/2016	28/09/2016	30/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	0.07	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total Positive PAHs	mg/kg	0.40	0.11	NIL (+)VE	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	98	100	100	96	95

Organochlorine Pesticides in soil						
Our Reference:	UNITS	154919-1	154919-4	154919-6	154919-8	154919-11
Your Reference	----------	BH1	BH2	BH3	BH4	BH5
Depth	- ----------	0.0-0.1	0.0-0.1	0.1-0.2	0.05-0.15	0.05-0.15
Date Sampled		28/09/2016	28/09/2016	28/09/2016	27/09/2016	28/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	11/10/2016	11/10/2016	11/10/2016	11/10/2016	12/10/2016
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	89	90	88	85	91

Organochlorine Pesticides in soil						
Our Reference:	UNITS	154919-14	154919-16	154919-19	154919-21	154919-23
Your Reference	----------	BH6	BH7	BH8	BH9	BH10
Depth	- ----------	0.1-0.2	0.15-0.25	0.1-0.2	0.2-0.3	0.15-0.25
Date Sampled		28/09/2016	27/09/2016	30/09/2016	28/09/2016	28/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	11/10/2016	11/10/2016	12/10/2016	11/10/2016	11/10/2016
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	83	89	88	85	85

Organochlorine Pesticides in soil						
Our Reference:	UNITS	154919-25	154919-27	154919-31	154919-33	154919-34
Your Reference	----------	BH11	BH12	BH13	DUPA	DUPB
Depth	- ----------	0.1-0.2	0.0-0.2	0.5-0.6	-	-
Date Sampled		30/09/2016	6/10/2016	6/10/2016	28/09/2016	30/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	11/10/2016	11/10/2016	11/10/2016	11/10/2016	11/10/2016
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	83	87	82	83	82

Organophosphorus Pesticides						
Our Reference:	UNITS	154919-1	154919-4	154919-6	154919-8	154919-11
Your Reference	---------- -	BH1	BH2	BH3	BH4	BH5
Depth	----------	0.0-0.1	0.0-0.1	0.1-0.2	0.05-0.15	0.05-0.15
Date Sampled		28/09/2016	28/09/2016	28/09/2016	27/09/2016	28/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	11/10/2016	11/10/2016	11/10/2016	11/10/2016	12/10/2016
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	89	90	88	85	91

Organophosphorus Pesticides						
Our Reference:	UNITS	154919-14	154919-16	154919-19	154919-21	154919-23
Your Reference	---------- -	BH6	BH7	BH8	BH9	BH10
Depth	----------	0.1-0.2	0.15-0.25	0.1-0.2	0.2-0.3	0.15-0.25
Date Sampled		28/09/2016	27/09/2016	30/09/2016	28/09/2016	28/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	11/10/2016	11/10/2016	12/10/2016	11/10/2016	11/10/2016
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	83	89	88	85	85

Organophosphorus Pesticides Our Reference: Your Reference	UNITS ----------	154919-25 BH11	154919-27 BH12	154919-31 BH13	154919-33 DUPA	154919-34 DUPB
Depth	----------	0.1-0.2	0.0-0.2	0.5-0.6	-	-
Date Sampled		30/09/2016	6/10/2016	6/10/2016	28/09/2016	30/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	11/10/2016	11/10/2016	11/10/2016	11/10/2016	11/10/2016
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	83	87	82	83	82

PCBs in Soil						
Our Reference:	UNITS	154919-1	154919-4	154919-6	154919-8	154919-11
Your Reference	----------	BH1	BH2	BH3	BH4	BH5
Depth	- ----------	0.0-0.1	0.0-0.1	0.1-0.2	0.05-0.15	0.05-0.15
Date Sampled		28/09/2016	28/09/2016	28/09/2016	27/09/2016	28/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	11/10/2016	11/10/2016	11/10/2016	11/10/2016	12/10/2016
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	89	90	88	85	91

PCBs in Soil						
Our Reference:	UNITS	154919-14	154919-16	154919-19	154919-21	154919-23
Your Reference	----------	BH6	BH7	BH8	BH9	BH10
Depth	- ----------	0.1-0.2	0.15-0.25	0.1-0.2	0.2-0.3	0.15-0.25
Date Sampled		28/09/2016	27/09/2016	30/09/2016	28/09/2016	28/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	11/10/2016	11/10/2016	12/10/2016	11/10/2016	11/10/2016
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	83	89	88	85	85

PCBs in Soil Our Reference: Your Reference	UNITS ----------	154919-25 BH11	154919-27 BH12	154919-31 BH13	154919-33 DUPA	154919-34 DUPB
Depth	----------	0.1-0.2	0.0-0.2	0.5-0.6	-	-
Date Sampled		30/09/2016	6/10/2016	6/10/2016	28/09/2016	30/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	11/10/2016	11/10/2016	11/10/2016	11/10/2016	11/10/2016
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	83	87	82	83	82

Acid Extractable metals in soil						
Our Reference:	UNITS	154919-1	154919-4	154919-5	154919-6	154919-8
Your Reference	----------	BH1	BH2	BH2	BH3	BH4
	-					
Depth	----------	0.0-0.1	0.0-0.1	0.4-0.5	0.1-0.2	0.05-0.15
Date Sampled		28/09/2016	28/09/2016	28/09/2016	28/09/2016	27/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Arsenic	mg/kg	11	9	7	<4	6
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	41	35	21	4	63
Copper	mg/kg	13	16	9	190	19
Lead	mg/kg	29	40	18	6	12
Mercury	mg/kg	0.1	0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	2	3	1	13	54
Zinc	mg/kg	49	57	11	36	43

Acid Extractable metals in soil						
Our Reference:	UNITS	154919-11	154919-14	154919-16	154919-17	154919-19
Your Reference	----------	BH5	BH6	BH7	BH7	BH8
	-					
Depth	----------	0.05-0.15	0.1-0.2	0.15-0.25	0.4-0.5	0.1-0.2
Date Sampled		28/09/2016	28/09/2016	27/09/2016	27/09/2016	30/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Arsenic	mg/kg	<4	<4	8	10	4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	19	18	30	34	12
Copper	mg/kg	36	67	4	<1	81
Lead	mg/kg	2	3	22	22	10
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	39	49	7	1	7
Zinc	mg/kg	29	32	36	4	30

Acid Extractable metals in soil						
Our Reference:	UNITS	154919-21	154919-22	154919-23	154919-24	154919-25
Your Reference	----------	BH9	BH9	BH10	BH10	BH11
	-					
Depth	----------	0.2-0.3	0.5-0.6	0.15-0.25	0.9-1.0	0.1-0.2
Date Sampled		28/09/2016	28/09/2016	28/09/2016	28/09/2016	30/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Arsenic	mg/kg	<4	6	10	8	8
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	29	28	77	26	21
Copper	mg/kg	71	<1	16	1	7
Lead	mg/kg	49	9	30	15	19
Mercury	mg/kg	0.1	<0.1	0.2	<0.1	<0.1
Nickel	mg/kg	61	1	29	<1	4
Zinc	mg/kg	82	1	61	4	24

Acid Extractable metals in soil						
Our Reference:	UNITS	154919-27	154919-29	154919-31	154919-33	154919-34
Your Reference	----------	BH12	BH12	BH13	DUPA	DUPB
	-					
Depth	----------	0.0-0.2	0.9-1.0	0.5-0.6	-	-
Date Sampled		6/10/2016	6/10/2016	6/10/2016	28/09/2016	30/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Arsenic	mg/kg	11	9	8	8	8
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	38	37	29	44	24
Copper	mg/kg	11	16	9	10	8
Lead	mg/kg	34	40	28	19	24
Mercury	mg/kg	0.1	0.2	<0.1	<0.1	<0.1
Nickel	mg/kg	2	3	3	23	3
Zinc	mg/kg	69	92	52	26	32

Acid Extractable metals in soil		
Our Reference:	UNITS	154919-39
Your Reference	----------	BH10 - [TRIPLICATE]
	-	
Depth	----------	0.15-0.25
Date Sampled		28/09/2016
Type of sample		Soil
Date prepared	-	10/10/2016
Date analysed	-	10/10/2016
Arsenic	mg/kg	8
Cadmium	mg/kg	<0.4
Chromium	mg/kg	91
Copper	mg/kg	23
Lead	mg/kg	26
Mercury	mg/kg	<0.1
Nickel	mg/kg	53
Zinc	mg/kg	59

Moisture						
Our Reference:	UNITS	154919-1	154919-4	154919-5	154919-6	154919-8
Your Reference	----------	BH1	BH2	BH2	BH3	BH4
	-					
Depth	----------	0.0-0.1	0.0-0.1	0.4-0.5	0.1-0.2	0.05-0.15
Date Sampled		28/09/2016	28/09/2016	28/09/2016	28/09/2016	27/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	11/10/2016	11/10/2016	11/10/2016	11/10/2016	11/10/2016
Moisture	%	18	16	16	6.4	18

Moisture						
Our Reference:	UNITS	154919-11	154919-14	154919-16	154919-17	154919-19
Your Reference	----------	BH5	BH6	BH7	BH7	BH8
	-					
Depth	----------	0.05-0.15	0.1-0.2	0.15-0.25	0.4-0.5	0.1-0.2
Date Sampled		28/09/2016	28/09/2016	27/09/2016	27/09/2016	30/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	11/10/2016	11/10/2016	11/10/2016	11/10/2016	11/10/2016
Moisture	%	3.7	12	22	20	7.4

Moisture						
Our Reference:	UNITS	154919-21	154919-22	154919-23	154919-24	154919-25
Your Reference	----------	BH9	BH9	BH10	BH10	BH11
	-					
Depth	----------	0.2-0.3	0.5-0.6	0.15-0.25	0.9-1.0	0.1-0.2
Date Sampled		28/09/2016	28/09/2016	28/09/2016	28/09/2016	30/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	11/10/2016	11/10/2016	11/10/2016	11/10/2016	11/10/2016
Moisture	%	7.9	15	20	15	12

Moisture						
Our Reference:	UNITS	154919-27	154919-29	154919-31	154919-33	154919-34
Your Reference	----------	BH12	BH12	BH13	DUPA	DUPB
	-					
Depth	----------	0.0-0.2	0.9-1.0	0.5-0.6	-	-
Date Sampled		6/10/2016	6/10/2016	6/10/2016	28/09/2016	30/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	10/10/2016	10/10/2016	10/10/2016	10/10/2016	10/10/2016
Date analysed	-	11/10/2016	11/10/2016	11/10/2016	11/10/2016	11/10/2016
Moisture	%	8.1	6.0	17	22	14

Asbestos ID - soils						
Our Reference:	UNITS	154919-1	154919-4	154919-6	154919-8	154919-11
Your Reference	---------- -	BH1	BH2	BH3	BH4	BH5
Depth	----------	0.0-0.1	0.0-0.1	0.1-0.2	0.05-0.15	0.05-0.15
Date Sampled		28/09/2016	28/09/2016	28/09/2016	27/09/2016	28/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	12/10/2016	12/10/2016	12/10/2016	12/10/2016	12/10/2016
Sample mass tested	g	Approx. 25g	Approx. 45g	Approx. 40g	Approx. 60g	Approx. 20g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown clayey soil	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils						
Our Reference:	UNITS	154919-14	154919-16	154919-19	154919-21	154919-23
Your Reference	---------- -	BH6	BH7	BH8	BH9	BH10
Depth	----------	0.1-0.2	0.15-0.25	0.1-0.2	0.2-0.3	0.15-0.25
Date Sampled		28/09/2016	27/09/2016	30/09/2016	28/09/2016	28/09/2016
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	12/10/2016	12/10/2016	12/10/2016	12/10/2016	12/10/2016
Sample mass tested	g	Approx. 65g	Approx. 40g	Approx. 35g	Approx. 20g	Approx. 40g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils				
Our Reference:	UNITS	154919-25	154919-27	154919-31
Your Reference	----------	BH11	BH12	BH13
	-			
Depth	----------	0.1-0.2	0.0-0.2	0.5-0.6
Date Sampled		30/09/2016	6/10/2016	6/10/2016
Type of sample		Soil	Soil	Soil
Date analysed	-	12/10/2016	12/10/2016	12/10/2016
Sample mass tested	g	Approx. 25g	Approx. 10g	Approx. 15g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected

BTEX in Water		
Our Reference:	UNITS	154919-36
Your Reference	----------	FR
	-	
Depth	----------	-
Date Sampled		30/09/2016
Type of sample		water
Date extracted	-	11/10/2016
Date analysed	-	11/10/2016
Benzene	µg/L	<1
Toluene	µg/L	<1
Ethylbenzene	µg/L	<1
m+p-xylene	µg/L	<2
o-xylene	µg/L	<1
Surrogate Dibromofluoromethane	%	108
Surrogate toluene-d8	%	96
Surrogate 4-BFB	%	111

Method ID	Methodology Summary
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'TEQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'TEQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'TEQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Inorg-008	Moisture content determined by heating at 105+/-5 deg C for a minimum of 12 hours.
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			10/10/2016	154919-1	10/10/2016 || 10/10/2016	LCS-10	10/10/2016
Date analysed	-			11/10/2016	154919-1	11/10/2016 || 11/10/2016	LCS-10	11/10/2016
TRHC$_{6}$ - C$_{9}$	mg/kg	25	Org-016	<25	154919-1	<25 || <25	LCS-10	91%
TRHC$_{6}$ - C$_{10}$	mg/kg	25	Org-016	<25	154919-1	<25 || <25	LCS-10	91%
Benzene	mg/kg	0.2	Org-016	<0.2	154919-1	<0.2 || <0.2	LCS-10	76%
Toluene	mg/kg	0.5	Org-016	<0.5	154919-1	<0.5 || <0.5	LCS-10	90%
Ethylbenzene	mg/kg	1	Org-016	<1	154919-1	<1 || <1	LCS-10	96%
m+p-xylene	mg/kg	2	Org-016	<2	154919-1	<2 || <2	LCS-10	97%
o-Xylene	mg/kg	1	Org-016	<1	154919-1	<1 || <1	LCS-10	98%
naphthalene	mg/kg	1	Org-014	<1	154919-1	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%		Org-016	85	154919-1	83 || 81 || RPD: 2	LCS-10	82%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			10/10/2016	154919-1	10/10/2016 || 10/10/2016	LCS-10	10/10/2016
Date analysed	-			11/10/2016	154919-1	11/10/2016 || 11/10/2016	LCS-10	11/10/2016
TRHC$_{10}$ - C$_{14}$	mg/kg	50	Org-003	<50	154919-1	<50 || <50	LCS-10	93%
TRHC$_{15}$ - C$_{28}$	mg/kg	100	Org-003	<100	154919-1	<100 || <100	LCS-10	92%
TRHC$_{29}$ - C$_{36}$	mg/kg	100	Org-003	<100	154919-1	<100 || <100	LCS-10	82%
TRH>C$_{10}$-C$_{16}$	mg/kg	50	Org-003	<50	154919-1	<50 || <50	LCS-10	93%
TRH>C$_{16}$-C$_{34}$	mg/kg	100	Org-003	<100	154919-1	<100 || <100	LCS-10	92%
TRH>C$_{34}$-C$_{40}$	mg/kg	100	Org-003	<100	154919-1	<100 || <100	LCS-10	82%
Surrogate o-Terphenyl	%		Org-003	83	154919-1	72 || 72 || RPD: 0	LCS-10	87%

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			10/10/2016	154919-1	10/10/2016 || 10/10/2016	LCS-10	10/10/2016
Date analysed	-			10/10/2016	154919-1	10/10/2016 || 10/10/2016	LCS-10	10/10/2016
Naphthalene	mg/kg	0.1	Org-012	<0.1	154919-1	<0.1 || <0.1	LCS-10	112%
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	0.1	Org-012	<0.1	154919-1	<0.1 || <0.1	LCS-10	117%
Phenanthrene	mg/kg	0.1	Org-012	<0.1	154919-1	<0.1 || <0.1	LCS-10	102%
Anthracene	mg/kg	0.1	Org-012	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	154919-1	<0.1 || <0.1	LCS-10	116%
Pyrene	mg/kg	0.1	Org-012	<0.1	154919-1	<0.1 || <0.1	LCS-10	119%
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	0.1	Org-012	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Benzo(b,j +k)fluoranthene	mg/kg	0.2	Org-012	<0.2	154919-1	<0.2 || <0.2	[NR]	[NR]

QUALITY CONTROL PAHs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	154919-1	<0.05 || <0.05	LCS-10	117%
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%		Org-012	98	154919-1	96 || 99 || RPD: 3	LCS-10	130%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			10/10/2016	154919-1	10/10/2016 || 10/10/2016	LCS-10	10/10/2016
Date analysed	-			12/10/2016	154919-1	11/10/2016 || 11/10/2016	LCS-10	11/10/2016
HCB	mg/kg	0.1	Org-005	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	154919-1	<0.1 || <0.1	LCS-10	121%
gamma-BHC	mg/kg	0.1	Org-005	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	0.1	Org-005	<0.1	154919-1	<0.1 || <0.1	LCS-10	94%
Heptachlor	mg/kg	0.1	Org-005	<0.1	154919-1	<0.1 || <0.1	LCS-10	106%
delta-BHC	mg/kg	0.1	Org-005	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	0.1	Org-005	<0.1	154919-1	<0.1 || <0.1	LCS-10	98%
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	154919-1	<0.1 || <0.1	LCS-10	99%
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	0.1	Org-005	<0.1	154919-1	<0.1 || <0.1	LCS-10	96%
Dieldrin	mg/kg	0.1	Org-005	<0.1	154919-1	<0.1 || <0.1	LCS-10	106%
Endrin	mg/kg	0.1	Org-005	<0.1	154919-1	<0.1 || <0.1	LCS-10	108%
pp-DDD	mg/kg	0.1	Org-005	<0.1	154919-1	<0.1 || <0.1	LCS-10	105%
Endosulfan II	mg/kg	0.1	Org-005	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	0.1	Org-005	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	154919-1	<0.1 || <0.1	LCS-10	104%
Methoxychlor	mg/kg	0.1	Org-005	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%		Org-005	87	154919-1	89 || 89 || RPD: 0	LCS-10	124%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			10/10/2016	154919-1	10/10/2016 || 10/10/2016	LCS-10	10/10/2016
Date analysed	-			12/10/2016	154919-1	11/10/2016 || 11/10/2016	LCS-10	11/10/2016
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	154919-1	<0.1 || <0.1	LCS-10	88%
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Diazinon	mg/kg	0.1	Org-008	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	154919-1	<0.1 || <0.1	LCS-10	107%
Dimethoate	mg/kg	0.1	Org-008	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	0.1	Org-008	<0.1	154919-1	<0.1 || <0.1	LCS-10	119%
Fenitrothion	mg/kg	0.1	Org-008	<0.1	154919-1	<0.1 || <0.1	LCS-10	104%
Malathion	mg/kg	0.1	Org-008	<0.1	154919-1	<0.1 || <0.1	LCS-10	94%
Parathion	mg/kg	0.1	Org-008	<0.1	154919-1	<0.1 || <0.1	LCS-10	117%
Ronnel	mg/kg	0.1	Org-008	<0.1	154919-1	<0.1 || <0.1	LCS-10	94%
Surrogate TCMX	%		Org-008	87	154919-1	89 || 89 || RPD: 0	LCS-10	92%

QUALITY CONTROL PCBs in Soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			10/10/2016	154919-1	10/10/2016 || 10/10/2016	LCS-10	10/10/2016
Date analysed	-			12/10/2016	154919-1	11/10/2016 || 11/10/2016	LCS-10	11/10/2016
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	154919-1	<0.1 || <0.1	LCS-10	100%
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	154919-1	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%		Org-006	87	154919-1	89 || 89 || RPD: 0	LCS-10	92%

QUALITY CONTROL Acid Extractable metals in soil	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base ll Duplicate ll %RPD	Spike Sm#	Spike % Recovery
Date prepared	-			10/10/2016	154919-1	10/10/2016 || 10/10/2016	LCS-10	10/10/2016
Date analysed	-			10/10/2016	154919-1	10/10/2016 || 10/10/2016	LCS-10	10/10/2016
Arsenic	mg/kg	4	Metals-020	<4	154919-1	11 || 11 || RPD: 0	LCS-10	122%
Cadmium	mg/kg	0.4	Metals-020	<0.4	154919-1	<0.4 || <0.4	LCS-10	115%
Chromium	mg/kg	1	Metals-020	<1	154919-1	41 || 37 || RPD: 10	LCS-10	118%
Copper	mg/kg	1	Metals-020	<1	154919-1	13 || 11 || RPD: 17	LCS-10	119%
Lead	mg/kg	1	Metals-020	<1	154919-1	29 || 26 || RPD: 11	LCS-10	113%
Mercury	mg/kg	0.1	Metals-021	<0.1	154919-1	0.1 || 0.1 || RPD: 0	LCS-10	94%
Nickel	mg/kg	1	Metals-020	<1	154919-1	2 || 2 || RPD: 0	LCS-10	110%
Zinc	mg/kg	1	Metals-020	<1	154919-1	49 || 44 || RPD: 11	LCS-10	112%

QUALITY CONTROL BTEX in Water	UNITS	PQL	METHOD	Blank
Date extracted	-			11/10/2016
Date analysed	-			11/10/2016
Benzene	µg/L	1	Org-016	<1
Toluene	µg/L	1	Org-016	<1
Ethylbenzene	µg/L	1	Org-016	<1
m+p-xylene	µg/L	2	Org-016	<2
o-xylene	µg/L	1	Org-016	<1
Surrogate Dibromofluoromethane	%		Org-016	107
Surrogate toluene-d8	%		Org-016	102
Surrogate 4-BFB	%		Org-016	93

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	154919-23	10/10/2016 || 10/10/2016	154919-4	10/10/2016
Date analysed	-	154919-23	11/10/2016 || 11/10/2016	154919-4	11/10/2016
$TRHC_6$ - C_9	mg/kg	154919-23	<25 || <25	154919-4	96%
$TRHC_6$ - C_{10}	mg/kg	154919-23	<25 || <25	154919-4	96%
Benzene	mg/kg	154919-23	<0.2 || <0.2	154919-4	78%
Toluene	mg/kg	154919-23	<0.5 || <0.5	154919-4	93%
Ethylbenzene	mg/kg	154919-23	<1 || <1	154919-4	101%
m+p-xylene	mg/kg	154919-23	<2 || <2	154919-4	103%
o-Xylene	mg/kg	154919-23	<1 || <1	154919-4	104%
naphthalene	mg/kg	154919-23	<1 || <1	[NR]	[NR]
Surrogate aaa-Trifluorotoluene	%	154919-23	77 || 77 || RPD: 0	154919-4	82%

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	154919-23	10/10/2016 || 10/10/2016	154919-4	10/10/2016
Date analysed	-	154919-23	11/10/2016 || 11/10/2016	154919-4	11/10/2016
TRHC$_{10}$ - C$_{14}$	mg/kg	154919-23	<50 || <50	154919-4	92%
TRHC$_{15}$ - C$_{28}$	mg/kg	154919-23	<100 || <100	154919-4	88%
TRHC$_{29}$ - C$_{36}$	mg/kg	154919-23	<100 || <100	154919-4	140%
TRH>C$_{10}$-C$_{16}$	mg/kg	154919-23	<50 || <50	154919-4	92%
TRH>C$_{16}$-C$_{34}$	mg/kg	154919-23	<100 || <100	154919-4	88%
TRH>C$_{34}$-C$_{40}$	mg/kg	154919-23	<100 || <100	154919-4	140%
Surrogate o-Terphenyl	%	154919-23	73 || 71 || RPD: 3	154919-4	72%
QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	154919-23	10/10/2016 || 10/10/2016	154919-4	10/10/2016
Date analysed	-	154919-23	10/10/2016 || 10/10/2016	154919-4	10/10/2016
Naphthalene	mg/kg	154919-23	<0.1 || <0.1	154919-4	103%
Acenaphthylene	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Acenaphthene	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Fluorene	mg/kg	154919-23	<0.1 || <0.1	154919-4	107%
Phenanthrene	mg/kg	154919-23	<0.1 || <0.1	154919-4	130%
Anthracene	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Fluoranthene	mg/kg	154919-23	<0.1 || <0.1	154919-4	99%
Pyrene	mg/kg	154919-23	<0.1 || <0.1	154919-4	107%
Benzo(a)anthracene	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Chrysene	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Benzo(b,j+k)fluoranthene	mg/kg	154919-23	<0.2 || <0.2	[NR]	[NR]
Benzo(a)pyrene	mg/kg	154919-23	<0.05 || <0.05	154919-4	114%
Indeno(1,2,3-c,d)pyrene	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Dibenzo(a,h)anthracene	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Benzo(g,h,i)perylene	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Surrogate p-Terphenyl-d14	%	154919-23	104 || 98 || RPD: 6	154919-4	132%

QUALITY CONTROL Organochlorine Pesticides in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	154919-23	10/10/2016 || 10/10/2016	154919-4	10/10/2016
Date analysed	-	154919-23	11/10/2016 || 11/10/2016	154919-4	11/10/2016
HCB	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
alpha-BHC	mg/kg	154919-23	<0.1 || <0.1	154919-4	119%
gamma-BHC	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
beta-BHC	mg/kg	154919-23	<0.1 || <0.1	154919-4	93%
Heptachlor	mg/kg	154919-23	<0.1 || <0.1	154919-4	104%
delta-BHC	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Aldrin	mg/kg	154919-23	<0.1 || <0.1	154919-4	97%
Heptachlor Epoxide	mg/kg	154919-23	<0.1 || <0.1	154919-4	101%
gamma-Chlordane	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
alpha-chlordane	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Endosulfan I	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
pp-DDE	mg/kg	154919-23	<0.1 || <0.1	154919-4	99%
Dieldrin	mg/kg	154919-23	<0.1 || <0.1	154919-4	107%
Endrin	mg/kg	154919-23	<0.1 || <0.1	154919-4	111%
pp-DDD	mg/kg	154919-23	<0.1 || <0.1	154919-4	110%
Endosulfan II	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
pp-DDT	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Endrin Aldehyde	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Endosulfan Sulphate	mg/kg	154919-23	<0.1 || <0.1	154919-4	119%
Methoxychlor	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Surrogate TCMX	%	154919-23	85 || 84 || RPD: 1	154919-4	116%

QUALITY CONTROL Organophosphorus Pesticides	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	154919-23	10/10/2016 || 10/10/2016	154919-4	10/10/2016
Date analysed	-	154919-23	11/10/2016 || 11/10/2016	154919-4	11/10/2016
Azinphos-methyl (Guthion)	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Bromophos-ethyl	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Chlorpyriphos	mg/kg	154919-23	<0.1 || <0.1	154919-4	80%
Chlorpyriphos-methyl	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Diazinon	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Dichlorvos	mg/kg	154919-23	<0.1 || <0.1	154919-4	76%
Dimethoate	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Ethion	mg/kg	154919-23	<0.1 || <0.1	154919-4	106%
Fenitrothion	mg/kg	154919-23	<0.1 || <0.1	154919-4	97%
Malathion	mg/kg	154919-23	<0.1 || <0.1	154919-4	87%
Parathion	mg/kg	154919-23	<0.1 || <0.1	154919-4	107%
Ronnel	mg/kg	154919-23	<0.1 || <0.1	154919-4	93%
Surrogate TCMX	%	154919-23	85 || 84 || RPD: 1	154919-4	85%
QUALITY CONTROL PCBs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	154919-23	10/10/2016 || 10/10/2016	154919-4	10/10/2016
Date analysed	-	154919-23	11/10/2016 || 11/10/2016	154919-4	11/10/2016
Aroclor 1016	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Aroclor 1221	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Aroclor 1232	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Aroclor 1242	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Aroclor 1248	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Aroclor 1254	mg/kg	154919-23	<0.1 || <0.1	154919-4	100%
Aroclor 1260	mg/kg	154919-23	<0.1 || <0.1	[NR]	[NR]
Surrogate TCLMX	%	154919-23	85 || 84 || RPD: 1	154919-4	85%
QUALITY CONTROL Acid Extractable metals in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date prepared	-	154919-23	10/10/2016 || 10/10/2016	154919-4	10/10/2016
Date analysed	-	154919-23	10/10/2016 || 10/10/2016	154919-4	10/10/2016
Arsenic	mg/kg	154919-23	10 || 8 || RPD: 22	154919-4	101%
Cadmium	mg/kg	154919-23	<0.4 || <0.4	154919-4	103%
Chromium	mg/kg	154919-23	77 || 94 || RPD: 20	154919-4	104%
Copper	mg/kg	154919-23	16 || 23 || RPD: 36	154919-4	112%
Lead	mg/kg	154919-23	30 || 21 || RPD: 35	154919-4	92%
Mercury	mg/kg	154919-23	0.2 || 0.1 || RPD: 67	154919-4	88%
Nickel	mg/kg	154919-23	29 || 51 || RPD: 55	154919-4	99%
Zinc	mg/kg	154919-23	61 || 62 || RPD: 2	154919-4	86%

QUALITY CONTROL vTRH(C6-C10)/BTEXN in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date extracted	-	154919-33	10/10/2016 || 10/10/2016
Date analysed	-	154919-33	11/10/2016 || 11/10/2016
TRHC$_6$ - C$_9$	mg/kg	154919-33	<25 || <25
TRHC$_6$ - C$_{10}$	mg/kg	154919-33	<25 || <25
Benzene	mg/kg	154919-33	<0.2 || <0.2
Toluene	mg/kg	154919-33	<0.5 || <0.5
Ethylbenzene	mg/kg	154919-33	<1 || <1
m+p-xylene	mg/kg	154919-33	<2 || <2
o-Xylene	mg/kg	154919-33	<1 || <1
naphthalene	mg/kg	154919-33	<1 || <1
Surrogate aaa-Trifluorotoluene	%	154919-33	83 || 109 || RPD: 27

QUALITY CONTROL svTRH (C10-C40) in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date extracted	-	154919-33	10/10/2016 || 10/10/2016
Date analysed	-	154919-33	11/10/2016 || 12/10/2016
TRHC$_{10}$ - C$_{14}$	mg/kg	154919-33	<50 || <50
TRHC$_{15}$ - C$_{28}$	mg/kg	154919-33	<100 || <100
TRHC$_{29}$ - C$_{36}$	mg/kg	154919-33	<100 || <100
TRH>C$_{10}$-C$_{16}$	mg/kg	154919-33	<50 || <50
TRH>C$_{16}$-C$_{34}$	mg/kg	154919-33	<100 || <100
TRH>C$_{34}$-C$_{40}$	mg/kg	154919-33	<100 || <100
Surrogate o-Terphenyl	%	154919-33	74 || 80 || RPD: 8

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Date extracted	-	154919-33	10/10/2016 || 11/10/2016
Date analysed	-	154919-33	10/10/2016 || 11/10/2016
Naphthalene	mg/kg	154919-33	<0.1 || <0.1
Acenaphthylene	mg/kg	154919-33	<0.1 || <0.1
Acenaphthene	mg/kg	154919-33	<0.1 || <0.1
Fluorene	mg/kg	154919-33	<0.1 || <0.1
Phenanthrene	mg/kg	154919-33	<0.1 || <0.1
Anthracene	mg/kg	154919-33	<0.1 || <0.1
Fluoranthene	mg/kg	154919-33	<0.1 || <0.1
Pyrene	mg/kg	154919-33	<0.1 || <0.1
Benzo(a)anthracene	mg/kg	154919-33	<0.1 || <0.1
Chrysene	mg/kg	154919-33	<0.1 || <0.1
Benzo(b,j+k)fluoranthene	mg/kg	154919-33	<0.2 || <0.2
Benzo(a)pyrene	mg/kg	154919-33	<0.05 || <0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	154919-33	<0.1 || <0.1
Dibenzo(a,h)anthracene	mg/kg	154919-33	<0.1 || <0.1

QUALITY CONTROL PAHs in Soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD
Benzo(g,h,i)perylene	mg/kg	154919-33	<0.1 || <0.1
Surrogate p-Terphenyl-d14	%	154919-33	96 || 123 || RPD: 25

QUALITY CONTROL BTEX in Water	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Spike % Recovery
Date extracted	-	[NT]	[NT]	LCS-W1	11/10/2016
Date analysed	-	[NT]	[NT]	LCS-W1	11/10/2016
Benzene	µg/L	[NT]	[NT]	LCS-W1	95%
Toluene	µg/L	[NT]	[NT]	LCS-W1	100%
Ethylbenzene	µg/L	[NT]	[NT]	LCS-W1	97%
m+p-xylene	µg/L	[NT]	[NT]	LCS-W1	102%
o-xylene	µg/L	[NT]	[NT]	LCS-W1	102%
Surrogate Dibromofluoromethane	%	[NT]	[NT]	LCS-W1	106%
Surrogate toluene-d8	%	[NT]	[NT]	LCS-W1	113%
Surrogate 4-BFB	%	[NT]	[NT]	LCS-W1	110%

Report Comments:

Acid Extractable Metals in Soil: The laboratory RPD acceptance criteria has been exceeded for 154919-23 for Ni. Therefore a triplicate result has been issued as laboratory sample number 154919-39.

Asbestos: Excessive sample volume was provided for asbestos analysis.
A portion of the supplied sample was sub-sampled according to Envirolab procedures.
We cannot guarantee that this sub-sample is indicative of the entire sample. Envirolab recommends supplying 40-50g (50mL) of sample in its own container as per AS4964-2004.
Note: Samples 154919-6,11,14,16,19,25,27,31 were sub-sampled from bags provided by the client.

Asbestos ID was analysed by Approved Identifier: Matt Mansfield
Asbestos ID was authorised by Approved Signatory: Matt Mansfield

INS: Insufficient sample for this test
NR: Test not required
<: Less than
PQL: Practical Quantitation Limit
RPD: Relative Percent Difference
>: Greater than
NT: Not tested
NA: Test not required
LCS: Laboratory Control Sample

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Aileen Hie

From: Priya Dass <PDass@jkgroup.net.au>
Sent: Monday, 17 October 2016 3:56 PM
To: Nancy Zhang
Cc: Aileen Hie
Subject: RE: Results for Registration 154919 E29807KR, Macquarie Park

Hi,

Could I have TCLP analysis done for Nickel on the following samples from this lab batch:

8 BH4 0.05-0.15
14 BH6 0.1-0.2
21 BH9 0.2-0.3

Thanks,

Priya.

Envirolab Ref: 154919A
DJe: 24/10/16
Std TIA.

Regards,

Priya Dass
Senior Environmental Scientist
PDass@jkgroup.net.au
www.jkgroup.net.au

Environmental Investigation Services
CONSULTING ENVIRONMENTAL ENGINEERS AND SCIENTISTS
PO Box 976, North Ryde BC NSW 1670
115 Wicks Rd, Macquarie Park NSW 2113
T: +612 9888 5000 F: +612 9888 5001

-----Original Message-----
From: Nancy Zhang [mailto:NZhang@envirolab.com.au]
Sent: Friday, 14 October 2016 1:44 PM
To: Priya Dass <PDass@jkgroup.net.au>
Subject: Results for Registration 154919 E29807KR, Macquarie Park

Please refer to attached for:
a copy of the Certificate of Analysis
a copy of the COC
an excel file containing the results

Please note that a hard copy will not be posted.

Enquiries should be made directly to:
sydney@envirolab.com.au

Regards

Envirolab Services
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
www.envirolabservices.com.au

12 Ashley Street, Chatswood, NSW 2067
tel: +61 2 9910 6200

email: sydney@envirolab.com.au
envirolab.com.au

Envirolab Services Pty Ltd - Sydney | ABN 37 112 535 645

CERTIFICATE OF ANALYSIS 154919-A

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Priya Dass

Sample log in details:

Your Reference:	**E29807KR, Macquarie Park**
No. of samples:	Additional Testing on 3 Soils
Date samples received / completed instructions received	07/10/16 / 17/10/16

Analysis Details:

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details:

Date results requested by: / Issue Date:	24/10/16 / 20/10/16
Date of Preliminary Report:	Not Issued

NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025 - Testing **Tests not covered by NATA are denoted with *.**

Results Approved By:

David Springer
General Manager

ACCREDITED FOR TECHNICAL COMPETENCE

Metals in TCLP USEPA1311				
Our Reference:	UNITS	154919-A-8	154919-A-14	154919-A-21
Your Reference	----------	BH4	BH6	BH9
	-			
Depth	----------	0.05-0.15	0.1-0.2	0.2-0.3
Date Sampled		27/09/2016	28/09/2016	28/09/2016
Type of sample		Soil	Soil	Soil
Date extracted	-	18/10/2016	18/10/2016	18/10/2016
Date analysed	-	18/10/2016	18/10/2016	18/10/2016
pH of soil for fluid# determ.	pH units	6.8	9.1	9.1
pH of soil TCLP (after HCl)	pH units	1.6	1.6	1.7
Extraction fluid used	-	1	1	1
pH of final Leachate	pH units	5.0	5.0	5.3
Nickel in TCLP	mg/L	<0.02	0.06	0.04

Method ID	Methodology Summary
Inorg-004	Toxicity Characteristic Leaching Procedure (TCLP) using in house method INORG-004.
EXTRACT.7	Toxicity Characteristic Leaching Procedure (TCLP).
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.

QUALITY CONTROL Metals in TCLP USEPA1311	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base II Duplicate II %RPD	Spike Sm#	Spike % Recovery
Date extracted	-			18/10/2016	154919-A-8	18/10/2016 || 18/10/2016	LCS-W1	18/10/2016
Date analysed	-			18/10/2016	154919-A-8	18/10/2016 || 18/10/2016	LCS-W1	18/10/2016
Nickel in TCLP	mg/L	0.02	Metals-020 ICP-AES	<0.02	154919-A-8	<0.02 || <0.02	LCS-W1	111%

Report Comments:

Asbestos ID was analysed by Approved Identifier:	Not applicable for this job
Asbestos ID was authorised by Approved Signatory:	Not applicable for this job

INS: Insufficient sample for this test	PQL: Practical Quantitation Limit	NT: Not tested
NR: Test not required	RPD: Relative Percent Difference	NA: Test not required
<: Less than	>: Greater than	LCS: Laboratory Control Sample

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Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

SAMPLE AND CHAIN OF CUSTODY FORM

TO:
ENVIROLAB SERVICES PTY LTD
12 ASHLEY STREET
CHATSWOOD NSW 2067
P: (02) 99106200
F: (02) 99106201

Attention: Aileen

EIS Job Number: E29807KR
Date Results Required: STANDARD
Page: 1

FROM: EIS
ENVIRONMENTAL INVESTIGATION SERVICES
REAR OF 115 WICKS ROAD
MACQUARIE PARK, NSW 2113
P: 02-9888 5000 F: 02-9888 5001
Attention: Priya Dass

Location: Buildings W6A & W6B, Macquarie University, Macquarie Park
Sampler:

Sample Preserved in Esky on Ice

Tests Required

	Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo 2	Combo 3	Combo 6	Combo 6a	8 Metals	PAHs	TRH/BTEX	BTEX	Asbestos			
1	28/09/2016		BH1	0.0-0.1	G, A	0.1	Fill				✓								
2	28/09/2016		BH1	0.2-0.3		0.1	Fill												
3	28/09/2016		BH1	0.5-0.6		0	Silty Clay												
4	28/09/2016		BH2	0.0-0.1		0.3	Fill				✓								
5	28/09/2016		BH2	0.4-0.5		0.5	Silty Clay		✓										
6	28/09/2016		BH3	0.1-0.2		0.2	Fill				✓								
7	28/09/2016		BH3	0.7-0.8		0.2	Silty Clay												
8	27/09/2016		BH4	0.05-0.15		0.1	Fill				✓								
9	27/09/2016		BH4	0.4-0.5		0	Fill												
10	27/09/2016		BH4	0.9-1.0		0	Silty Clay												
11	28/09/2016		BH5	0.05-0.15		0	Fill				✓								
12	28/09/2016		BH5	0.4-0.5		0.3	Silty Clay												
13	28/09/2016		BH5	0.9-1.0		0.4	Silty Clay												
14	28/09/2016		BH6	0.1-0.2		0.2	Fill				✓								
15	28/09/2016		BH6	0.7-0.95		0.2	Sandy Clay												
16	27/09/2016		BH7	0.15-0.25		0.3	Silty Clay				✓								
17	27/09/2016		BH7	0.4-0.5		0.2	Silty Clay		✓										
18	27/09/2016		BH7	0.9-1.0		0.4	Silty Clay												
19	30/09/2016		BH8	0.1-0.2		0.3	Fill				✓								
20	30/09/2016		BH8	0.4-0.5		0.1	Sandy Clay												
21	28/09/2016		BH9	0.2-0.3		0.1	Fill				✓								
22	28/09/2016		BH9	0.5-0.6		0.1	Sandy Clay		✓										
23	28/09/2016		BH10	0.15-0.25		0	Fill				✓								
24	28/09/2016		BH10	0.9-1.0		0	Silty Clay		✓										
25	30/09/2016		BH11	0.1-0.2		0.2	Silty Clay				✓								
26	30/09/2016		BH11	0.4-0.5		0	Silty Clay												
27	6/10/2016		BH12	0.0-0.2		0.3	Fill				✓								
28	6/10/2016		BH12	0.5-0.6		0.2	Fill												
29	6/10/2016		BH12	0.9-1.0		0.2	Fill		✓										
30	6/10/2016		BH13	0.0-0.2		0.1	Fill												
31	6/10/2016		BH13	0.5-0.6		0.1	Fill				✓								
32	6/10/2016		BH13	0.9-1.0		0.1	Fill												
33	27/09/2016		DUPA							✓									
34	30/09/2016		DUPB							✓									
35	30/09/2016		DUPC							✓									
36	30/09/2016		FR												✓				
37	27/09/2016		TB												✓				
38	27/09/2016		TS												✓				

Remarks (comments/detection limits required):

Sample Containers:
G - 250mg Glass Jar
A - Ziplock Asbestos Bag
P - Plastic Bag

Relinquished By: Priya Dass	Date: 7/10/16	Time: 5:30	Received By:	Date: 12/10/16

James Craddock
12.10.2016 12.30
ELS SYD

SGS EHS Alexandria Laboratory
SE158009 COC
Received: 12-Oct-2016

ENVIROLAB GROUP
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 154919
Date Received: 07/10
Time Received: 16:30
Received by: N.R
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

-SGS.

SAMPLE RECEIPT ADVICE

SE158009

CLIENT DETAILS

Contact	Priya Dass
Client	Jeffery & Katauskas Pty Ltd
Address	Rear 115 Wicks Road MACQUARIE PARK NSW 2113
Telephone	(02) 9888 5000
Facsimile	(02) 9888 5004
Email	pdass@jkgroup.net.au
Project	**E29807KR W6A&B Macquarie University**
Order Number	**E29807KR**
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	Wed 12/10/2016
Report Due	Wed 19/10/2016
SGS Reference	**SE158009**

SUBMISSION DETAILS

This is to confirm that 1 sample was received on Wednesday 12/10/2016. Results are expected to be ready by Wednesday 19/10/2016. Please quote SGS reference SE158009 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Sample counts by matrix	1 Soil	Type of documentation received	COC
Date documentation received	12/10/2016	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	7.6°C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes	Number of eskies/boxes received	

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

SE158009

CLIENT DETAILS

Client Jeffery & Katauskas Pty Ltd

Project E29807KR W6A&B Macquarie University

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 Metals in Soil/Waste	TRH (Total Recoverable Hydrocarbons) in Soil	VOC's in Soil	Volatile Petroleum Hydrocarbons in Soil
001	DUPC	28	13	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

SE158009

CLIENT DETAILS

Client Jeffery & Katauskas Pty Ltd

Project E29807KR W6A&B Macquarie University

SUMMARY OF ANALYSIS

No.	Sample ID	Mercury in Soil	Moisture Content
001	DUPC	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		LABORATORY DETAILS	
Contact	Priya Dass	Manager	Huong Crawford
Client	Jeffery & Katauskas Pty Ltd	Laboratory	SGS Alexandria Environmental
Address	Rear 115 Wicks Road MACQUARIE PARK NSW 2113	Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	(02) 9888 5000	Telephone	+61 2 8594 0400
Facsimile	(02) 9888 5004	Facsimile	+61 2 8594 0499
Email	pdass@jkgroup.net.au	Email	au.environmental.sydney@sgs.com
Project	**E29807KR W6A&B Macquarie University**	SGS Reference	**SE158009 R0**
Order Number	**E29807KR**	Date Received	12 Oct 2016
Samples	1	Date Reported	19 Oct 2016

COMMENTS

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

SIGNATORIES

Andy Sutton
Senior Organic Chemist

Dong Liang
Metals/Inorganics Team Leader

Kamrul Ahsan
Senior Chemist

Ly Kim Ha
Organic Section Head

Parameter	Units	LOR	Sample Number: SE158009.001 Sample Matrix: Soil Sample Date: 30 Sep 2016 Sample Name: DUPC
VOC's in Soil Method: AN433 Tested: 13/10/2016			
Monocyclic Aromatic Hydrocarbons			
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
Polycyclic VOCs			
Naphthalene	mg/kg	0.1	<0.1
Surrogates			
Dibromofluoromethane (Surrogate)	%	-	**78**
d4-1,2-dichloroethane (Surrogate)	%	-	**82**
d8-toluene (Surrogate)	%	-	**73**
Bromofluorobenzene (Surrogate)	%	-	**116**
Totals			
Total Xylenes*	mg/kg	0.3	<0.3
Total BTEX	mg/kg	0.6	<0.6
Volatile Petroleum Hydrocarbons in Soil Method: AN433 Tested: 13/10/2016			
TRH C6-C10	mg/kg	25	<25
TRH C6-C9	mg/kg	20	<20
Surrogates			
Dibromofluoromethane (Surrogate)	%	-	**78**
d4-1,2-dichloroethane (Surrogate)	%	-	**82**
d8-toluene (Surrogate)	%	-	**73**
Bromofluorobenzene (Surrogate)	%	-	**116**

Parameter	Units	LOR	Sample Number: SE158009.001 Sample Matrix: Soil Sample Date: 30 Sep 2016 Sample Name: DUPC
Volatile Petroleum Hydrocarbons in Soil Method: AN433 Tested: 13/10/2016 (continued)			
VPH F Bands			
Benzene (F0)	mg/kg	0.1	<0.1
TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25
TRH (Total Recoverable Hydrocarbons) in Soil Method: AN403 Tested: 14/10/2016			
TRH C10-C14	mg/kg	20	<20
TRH C15-C28	mg/kg	45	**210**
TRH C29-C36	mg/kg	45	**560**
TRH C37-C40	mg/kg	100	**190**
TRH C10-C36 Total	mg/kg	110	**770**
TRH C10-C40 Total	mg/kg	210	**960**
TRH F Bands			
TRH >C10-C16 (F2)	mg/kg	25	<25
TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	<25
TRH >C16-C34 (F3)	mg/kg	90	**530**
TRH >C34-C40 (F4)	mg/kg	120	**430**
PAH (Polynuclear Aromatic Hydrocarbons) in Soil Method: AN420 Tested: 14/10/2016			
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

Parameter	Units	LOR	Sample Number: SE158009.001 Sample Matrix: Soil Sample Date: 30 Sep 2016 Sample Name: DUPC
PAH (Polynuclear Aromatic Hydrocarbons) in Soil Method: AN420 Tested: 14/10/2016 (continued)			
Surrogates			
d5-nitrobenzene (Surrogate)	%	-	**74**
2-fluorobiphenyl (Surrogate)	%	-	**86**
d14-p-terphenyl (Surrogate)	%	-	**90**
OC Pesticides in Soil Method: AN400/AN420 Tested: 14/10/2016			
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
o,p'-DDE	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
trans-Nonachlor	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
o,p'-DDD	mg/kg	0.1	<0.1
o,p'-DDT	mg/kg	0.1	<0.1
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)	%	-	**82**

Parameter	Units	LOR	Sample Number: SE158009.001 Sample Matrix: Soil Sample Date: 30 Sep 2016 Sample Name: DUPC
OP Pesticides in Soil Method: AN400/AN420 Tested: 14/10/2016			
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)	%	-	**86**
d14-p-terphenyl (Surrogate)	%	-	**90**
PCBs in Soil Method: AN400/AN420 Tested: 14/10/2016			
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)	%	-	**82**

Parameter	Units	LOR	Sample Number: SE158009.001 Sample Matrix: Soil Sample Date: 30 Sep 2016 Sample Name: DUPC
Total Recoverable Metals in Soil/Waste Solids/Materials by ICPOES Method: AN040/AN320 Tested: 17/10/2016			
Arsenic, As	mg/kg	3	<3
Cadmium, Cd	mg/kg	0.3	<0.3
Chromium, Cr	mg/kg	0.3	**6.7**
Copper, Cu	mg/kg	0.5	**130**
Lead, Pb	mg/kg	1	**9**
Nickel, Ni	mg/kg	0.5	**6.6**
Zinc, Zn	mg/kg	0.5	**36**
Mercury in Soil Method: AN312 Tested: 17/10/2016			
Mercury	mg/kg	0.05	<0.05
Moisture Content Method: AN002 Tested: 13/10/2016			
% Moisture	%w/w	0.5	**3.6**

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

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

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Mercury	LB111802	mg/kg	0.05	<0.05	0%	109%	104%

Moisture Content **Method: ME-(AU)-[ENV]AN002**

Parameter	QC Reference	Units	LOR	DUP %RPD
% Moisture	LB111632	%w/w	0.5	8 - 15%

OC Pesticides in Soil **Method: ME-(AU)-[ENV]AN400/AN420**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Hexachlorobenzene (HCB)	LB111680	mg/kg	0.1	<0.1	0%	NA
Alpha BHC	LB111680	mg/kg	0.1	<0.1	0%	NA
Lindane	LB111680	mg/kg	0.1	<0.1	0%	NA
Heptachlor	LB111680	mg/kg	0.1	<0.1	0%	118%
Aldrin	LB111680	mg/kg	0.1	<0.1	0%	109%
Beta BHC	LB111680	mg/kg	0.1	<0.1	0%	NA
Delta BHC	LB111680	mg/kg	0.1	<0.1	0%	114%
Heptachlor epoxide	LB111680	mg/kg	0.1	<0.1	0%	NA
o,p'-DDE	LB111680	mg/kg	0.1	<0.1	0%	NA
Alpha Endosulfan	LB111680	mg/kg	0.2	<0.2	0%	NA
Gamma Chlordane	LB111680	mg/kg	0.1	<0.1	0%	NA
Alpha Chlordane	LB111680	mg/kg	0.1	<0.1	0%	NA
trans-Nonachlor	LB111680	mg/kg	0.1	<0.1	0%	NA
p,p'-DDE	LB111680	mg/kg	0.1	<0.1	0%	NA
Dieldrin	LB111680	mg/kg	0.2	<0.2	0%	116%
Endrin	LB111680	mg/kg	0.2	<0.2	0%	123%
o,p'-DDD	LB111680	mg/kg	0.1	<0.1	0%	NA
o,p'-DDT	LB111680	mg/kg	0.1	<0.1	0%	NA
Beta Endosulfan	LB111680	mg/kg	0.2	<0.2	0%	NA
p,p'-DDD	LB111680	mg/kg	0.1	<0.1	0%	NA
p,p'-DDT	LB111680	mg/kg	0.1	<0.1	0%	125%
Endosulfan sulphate	LB111680	mg/kg	0.1	<0.1	0%	NA
Endrin Aldehyde	LB111680	mg/kg	0.1	<0.1	0%	NA
Methoxychlor	LB111680	mg/kg	0.1	<0.1	0%	NA
Endrin Ketone	LB111680	mg/kg	0.1	<0.1	0%	NA
Isodrin	LB111680	mg/kg	0.1	<0.1	0%	NA
Mirex	LB111680	mg/kg	0.1	<0.1	0%	NA

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Tetrachloro-m-xylene (TCMX) (Surrogate)	LB111680	%	-	127%	2%	121%

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

OP Pesticides in Soil Method: ME-(AU)-[ENV]AN400/AN420

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Dichlorvos	LB111680	mg/kg	0.5	<0.5	93%
Dimethoate	LB111680	mg/kg	0.5	<0.5	NA
Diazinon (Dimpylate)	LB111680	mg/kg	0.5	<0.5	111%
Fenitrothion	LB111680	mg/kg	0.2	<0.2	NA
Malathion	LB111680	mg/kg	0.2	<0.2	NA
Chlorpyrifos (Chlorpyrifos Ethyl)	LB111680	mg/kg	0.2	<0.2	89%
Parathion-ethyl (Parathion)	LB111680	mg/kg	0.2	<0.2	NA
Bromophos Ethyl	LB111680	mg/kg	0.2	<0.2	NA
Methidathion	LB111680	mg/kg	0.5	<0.5	NA
Ethion	LB111680	mg/kg	0.2	<0.2	91%
Azinphos-methyl (Guthion)	LB111680	mg/kg	0.2	<0.2	NA

Surrogates

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
2-fluorobiphenyl (Surrogate)	LB111680	%	-	92%	92%
d14-p-terphenyl (Surrogate)	LB111680	%	-	102%	96%

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

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Naphthalene	LB111680	mg/kg	0.1	<0.1	97%
2-methylnaphthalene	LB111680	mg/kg	0.1	<0.1	NA
1-methylnaphthalene	LB111680	mg/kg	0.1	<0.1	NA
Acenaphthylene	LB111680	mg/kg	0.1	<0.1	99%
Acenaphthene	LB111680	mg/kg	0.1	<0.1	95%
Fluorene	LB111680	mg/kg	0.1	<0.1	NA
Phenanthrene	LB111680	mg/kg	0.1	<0.1	94%
Anthracene	LB111680	mg/kg	0.1	<0.1	90%
Fluoranthene	LB111680	mg/kg	0.1	<0.1	89%
Pyrene	LB111680	mg/kg	0.1	<0.1	89%
Benzo(a)anthracene	LB111680	mg/kg	0.1	<0.1	NA
Chrysene	LB111680	mg/kg	0.1	<0.1	NA
Benzo(b&j)fluoranthene	LB111680	mg/kg	0.1	<0.1	NA
Benzo(k)fluoranthene	LB111680	mg/kg	0.1	<0.1	NA
Benzo(a)pyrene	LB111680	mg/kg	0.1	<0.1	106%
Indeno(1,2,3-cd)pyrene	LB111680	mg/kg	0.1	<0.1	NA
Dibenzo(ah)anthracene	LB111680	mg/kg	0.1	<0.1	NA
Benzo(ghi)perylene	LB111680	mg/kg	0.1	<0.1	NA
Carcinogenic PAHs, BaP TEQ <LOR=0	LB111680	TEQ	0.2	<0.2	NA
Carcinogenic PAHs, BaP TEQ <LOR=LOR	LB111680	TEQ (mg/kg)	0.3	<0.3	NA
Carcinogenic PAHs, BaP TEQ <LOR=LOR/2	LB111680	TEQ (mg/kg)	0.2	<0.2	NA
Total PAH (18)	LB111680	mg/kg	0.8	<0.8	NA
Total PAH (NEPM/WHO 16)	LB111680	mg/kg	0.8	<0.8	

Surrogates

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
d5-nitrobenzene (Surrogate)	LB111680	%	-	84%	88%
2-fluorobiphenyl (Surrogate)	LB111680	%	-	84%	86%
d14-p-terphenyl (Surrogate)	LB111680	%	-	92%	98%

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

PCBs in Soil Method: ME-(AU)-[ENV]AN400/AN420

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Arochlor 1016	LB111680	mg/kg	0.2	<0.2	0%	NA
Arochlor 1221	LB111680	mg/kg	0.2	<0.2	0%	NA
Arochlor 1232	LB111680	mg/kg	0.2	<0.2	0%	NA
Arochlor 1242	LB111680	mg/kg	0.2	<0.2	0%	NA
Arochlor 1248	LB111680	mg/kg	0.2	<0.2	0%	NA
Arochlor 1254	LB111680	mg/kg	0.2	<0.2	0%	NA
Arochlor 1260	LB111680	mg/kg	0.2	<0.2	0%	104%
Arochlor 1262	LB111680	mg/kg	0.2	<0.2	0%	NA
Arochlor 1268	LB111680	mg/kg	0.2	<0.2	0%	NA
Total PCBs (Arochlors)	LB111680	mg/kg	1	<1	0%	NA

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Tetrachloro-m-xylene (TCMX) (Surrogate)	LB111680	%	-	127%	2%	117%

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

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Arsenic, As	LB111787	mg/kg	3	<3	7 - 32%	95%	86%
Cadmium, Cd	LB111787	mg/kg	0.3	<0.3	0%	96%	89%
Chromium, Cr	LB111787	mg/kg	0.3	<0.3	2 - 17%	97%	126%
Copper, Cu	LB111787	mg/kg	0.5	<0.5	11 - 13%	95%	76%
Lead, Pb	LB111787	mg/kg	1	<1	4 - 7%	97%	97%
Nickel, Ni	LB111787	mg/kg	0.5	<0.5	2 - 6%	99%	92%
Zinc, Zn	LB111787	mg/kg	0.5	<0.5	1 - 4%	97%	116%

TRH (Total Recoverable Hydrocarbons) in Soil Method: ME-(AU)-[ENV]AN403

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
TRH C10-C14	LB111680	mg/kg	20	<20	0%	103%	120%
TRH C15-C28	LB111680	mg/kg	45	<45	0 - 7%	90%	45%
TRH C29-C36	LB111680	mg/kg	45	<45	0 - 24%	93%	73%
TRH C37-C40	LB111680	mg/kg	100	<100	0%	NA	NA
TRH C10-C36 Total	LB111680	mg/kg	110	<110	0 - 13%	NA	NA
TRH C10-C40 Total	LB111680	mg/kg	210	<210	0%	NA	NA

TRH F Bands

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
TRH >C10-C16 (F2)	LB111680	mg/kg	25	<25	0%	98%	115%
TRH >C10-C16 (F2) - Naphthalene	LB111680	mg/kg	25	<25	0%	NA	NA
TRH >C16-C34 (F3)	LB111680	mg/kg	90	<90	0 - 11%	88%	20%
TRH >C34-C40 (F4)	LB111680	mg/kg	120	<120	0%	95%	NA

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

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

Monocyclic Aromatic Hydrocarbons

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Benzene	LB111611	mg/kg	0.1	<0.1	0%	62%	81%
Toluene	LB111611	mg/kg	0.1	<0.1	0%	61%	71%
Ethylbenzene	LB111611	mg/kg	0.1	<0.1	0%	62%	61%
m/p-xylene	LB111611	mg/kg	0.2	<0.2	0%	74%	73%
o-xylene	LB111611	mg/kg	0.1	<0.1	0%	67%	67%

Polycyclic VOCs

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Naphthalene	LB111611	mg/kg	0.1	<0.1	0%	NA	NA

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Dibromofluoromethane (Surrogate)	LB111611	%	-	83%	0 - 8%	79%	74%
d4-1,2-dichloroethane (Surrogate)	LB111611	%	-	84%	5%	84%	79%
d8-toluene (Surrogate)	LB111611	%	-	77%	4 - 5%	78%	73%
Bromofluorobenzene (Surrogate)	LB111611	%	-	114%	0 - 4%	118%	119%

Totals

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Xylenes*	LB111611	mg/kg	0.3	<0.3	0%	NA	NA
Total BTEX	LB111611	mg/kg	0.6	<0.6	0%	NA	NA

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

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
TRH C6-C10	LB111611	mg/kg	25	<25	0%	82%	83%
TRH C6-C9	LB111611	mg/kg	20	<20	0%	69%	70%

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Dibromofluoromethane (Surrogate)	LB111611	%	-	83%	0 - 8%	79%	74%
d4-1,2-dichloroethane (Surrogate)	LB111611	%	-	84%	5%	84%	79%
d8-toluene (Surrogate)	LB111611	%	-	77%	4 - 5%	78%	73%
Bromofluorobenzene (Surrogate)	LB111611	%	-	114%	0 - 4%	118%	119%

VPH F Bands

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Benzene (F0)	LB111611	mg/kg	0.1	<0.1	0%	NA	NA
TRH C6-C10 minus BTEX (F1)	LB111611	mg/kg	25	<25	0%	118%	111%

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	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.
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.
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
AN400	OC and OP Pesticides by GC-ECD: The determination of organochlorine (OC) and organophosphorus (OP) pesticides and polychlorinated biphenyls (PCBs) in soils, sludges and groundwater. (Based on USEPA methods 3510, 3550, 8140 and 8080.)
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

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
		QFL	QC result is below the lower tolerance
**	Indicative data, theoretical holding time exceeded.	-	The sample was not analysed for this analyte
		NVL	Not Validated

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 calcuated 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

SE158009 R0

CLIENT DETAILS

Contact	Priya Dass
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Project	**E29807KR W6A&B Macquarie University**
Order Number	**E29807KR**
Samples	1

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
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Telephone	+61 2 8594 0400
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SGS Reference	**SE158009 R0**
Date Received	12 Oct 2016
Date Reported	19 Oct 2016

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:

Matrix Spike	TRH (Total Recoverable Hydrocarbons) in Soil	2 items

SAMPLE SUMMARY

Sample counts by matrix	1 Soil	Type of documentation received	COC
Date documentation received	12/10/2016	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	7.6°C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes	Number of eskies/boxes received	

HOLDING TIME SUMMARY

SE158009 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
DUPC	SE158009.001	LB111802	30 Sep 2016	12 Oct 2016	28 Oct 2016	17 Oct 2016	28 Oct 2016	19 Oct 2016

Moisture Content

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
DUPC	SE158009.001	LB111632	30 Sep 2016	12 Oct 2016	14 Oct 2016	14 Oct 2016	19 Oct 2016	19 Oct 2016

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
DUPC	SE158009.001	LB111680	30 Sep 2016	12 Oct 2016	14 Oct 2016	14 Oct 2016	23 Nov 2016	19 Oct 2016

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
DUPC	SE158009.001	LB111680	30 Sep 2016	12 Oct 2016	14 Oct 2016	14 Oct 2016	23 Nov 2016	19 Oct 2016

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
DUPC	SE158009.001	LB111680	30 Sep 2016	12 Oct 2016	14 Oct 2016	14 Oct 2016	23 Nov 2016	19 Oct 2016

PCBs in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
DUPC	SE158009.001	LB111680	30 Sep 2016	12 Oct 2016	14 Oct 2016	14 Oct 2016	23 Nov 2016	19 Oct 2016

Total Recoverable Metals 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
DUPC	SE158009.001	LB111787	30 Sep 2016	12 Oct 2016	29 Mar 2017	17 Oct 2016	29 Mar 2017	19 Oct 2016

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
DUPC	SE158009.001	LB111680	30 Sep 2016	12 Oct 2016	14 Oct 2016	14 Oct 2016	23 Nov 2016	19 Oct 2016

VOC's in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
DUPC	SE158009.001	LB111611	30 Sep 2016	12 Oct 2016	14 Oct 2016	13 Oct 2016	22 Nov 2016	17 Oct 2016

Volatile Petroleum Hydrocarbons in Soil

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

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
DUPC	SE158009.001	LB111611	30 Sep 2016	12 Oct 2016	14 Oct 2016	13 Oct 2016	22 Nov 2016	17 Oct 2016

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]AN400/AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Tetrachloro-m-xylene (TCMX) (Surrogate)	DUPC	SE158009.001	%	60 - 130%	82

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
2-fluorobiphenyl (Surrogate)	DUPC	SE158009.001	%	60 - 130%	86
d14-p-terphenyl (Surrogate)	DUPC	SE158009.001	%	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)	DUPC	SE158009.001	%	70 - 130%	86
d14-p-terphenyl (Surrogate)	DUPC	SE158009.001	%	70 - 130%	90
d5-nitrobenzene (Surrogate)	DUPC	SE158009.001	%	70 - 130%	74

PCBs in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Tetrachloro-m-xylene (TCMX) (Surrogate)	DUPC	SE158009.001	%	60 - 130%	82

VOC's in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	DUPC	SE158009.001	%	60 - 130%	116
d4-1,2-dichloroethane (Surrogate)	DUPC	SE158009.001	%	60 - 130%	82
d8-toluene (Surrogate)	DUPC	SE158009.001	%	60 - 130%	73
Dibromofluoromethane (Surrogate)	DUPC	SE158009.001	%	60 - 130%	78

Volatile Petroleum Hydrocarbons in Soil

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

Parameter	Sample Name	Sample Number	Units	Criteria	Recovery %
Bromofluorobenzene (Surrogate)	DUPC	SE158009.001	%	60 - 130%	116
d4-1,2-dichloroethane (Surrogate)	DUPC	SE158009.001	%	60 - 130%	82
d8-toluene (Surrogate)	DUPC	SE158009.001	%	60 - 130%	73
Dibromofluoromethane (Surrogate)	DUPC	SE158009.001	%	60 - 130%	78

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
LB111802.001	Mercury	mg/kg	0.05	<0.05

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Sample Number		Parameter	Units	LOR	Result
LB111680.001		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)	%	-	127

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Sample Number		Parameter	Units	LOR	Result
LB111680.001		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)	%	-	92
		d14-p-terphenyl (Surrogate)	%	-	102

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

Sample Number	Parameter	Units	LOR	Result
LB111680.001	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
LB111680.001		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)	%	-	84
		2-fluorobiphenyl (Surrogate)	%	-	84
		d14-p-terphenyl (Surrogate)	%	-	92

PCBs in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Sample Number		Parameter	Units	LOR	Result
LB111680.001		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)	%	-	127

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

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

Sample Number		Parameter	Units	LOR	Result
LB111787.001		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
LB111680.001		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
LB111611.001	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)	%	-	83
		d4-1,2-dichloroethane (Surrogate)	%	-	84
		d8-toluene (Surrogate)	%	-	77
		Bromofluorobenzene (Surrogate)	%	-	114
	Totals	Total BTEX	mg/kg	0.6	<0.6

Volatile Petroleum Hydrocarbons in Soil

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

Sample Number		Parameter	Units	LOR	Result
LB111611.001		TRH C6-C9	mg/kg	20	<20
	Surrogates	Dibromofluoromethane (Surrogate)	%	-	83
		d4-1,2-dichloroethane (Surrogate)	%	-	84
		d8-toluene (Surrogate)	%	-	77

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 %
SE157993.010	LB111802.014	Mercury	mg/kg	0.05	0.00558733980	0.0063695796	200	0
SE158103.003	LB111802.024	Mercury	mg/kg	0.05	<0.05	<0.05	200	0

Moisture Content

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE158008.010	LB111632.011	% Moisture	%w/w	0.5	5.14950166115	.5831265508	49	8
SE158008.020	LB111632.022	% Moisture	%w/w	0.5	6.17283950615	.3019145802	47	15
SE158008.030	LB111632.033	% Moisture	%w/w	0.5	4.17177914114	.9937578027	52	18
SE158011.002	LB111632.044	% Moisture	%w/w	0.5	22.0543806648	7.038216560	35	26

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE158034.011	LB111680.032		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
		Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.122	0.12	30	2

PCBs in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE158034.011	LB111680.031		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	-	0.122	0.12	30	2

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

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

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE158008.036	LB111787.014	Arsenic, As	mg/kg	3	5.20183344604	.8334169431	50	7
		Cadmium, Cd	mg/kg	0.3	0.1557234762	0.1448818504	200	0
		Chromium, Cr	mg/kg	0.3	7.13847713227	.0242021044	37	2
		Copper, Cu	mg/kg	0.5	33.9706928748	0.5238912067	32	11

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 Metals in Soil/Waste Solids/Materials by ICPOES (continued)

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE158008.036	LB111787.014		Lead, Pb	mg/kg	1	6.186934785	46.6635254348	46	7
			Nickel, Ni	mg/kg	0.5	6.854160146	87.2498716949	37	6
			Zinc, Zn	mg/kg	0.5	47.76861215	798.3863229281	34	1
SE158080.001	LB111787.024		Arsenic, As	mg/kg	3	2.400280679	63.3169818862	65	32
			Cadmium, Cd	mg/kg	0.3	0.111324916	00.1240934994	200	0
			Chromium, Cr	mg/kg	0.3	8.682939965	110.3054859561	35	17
			Copper, Cu	mg/kg	0.5	2.539851653	02.8968958619	48	13
			Lead, Pb	mg/kg	1	12.12064436	192.6304912312	38	4
			Nickel, Ni	mg/kg	0.5	2.089964410	32.1237392368	54	2
			Zinc, Zn	mg/kg	0.5	9.978407468	410.3994916045	50	4

TRH (Total Recoverable Hydrocarbons) in Soil

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE158033.003	LB111680.032		TRH C10-C14	mg/kg	20	0	0	200	0
			TRH C15-C28	mg/kg	45	103	110	72	7
			TRH C29-C36	mg/kg	45	51	65	108	24
			TRH C37-C40	mg/kg	100	0	0	200	0
			TRH C10-C36 Total	mg/kg	110	154	175	97	13
			TRH C10-C40 Total	mg/kg	210	154	175	158	0
		TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	0	0	200	0
			TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	-0.03	0	200	0
			TRH >C16-C34 (F3)	mg/kg	90	151	169	86	11
			TRH >C34-C40 (F4)	mg/kg	120	0	0	200	0
SE158034.011	LB111680.034		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

VOC's in Soil

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE158008.008	LB111611.014	Monocyclic	Benzene	mg/kg	0.1	0	0	200	0
		Aromatic	Toluene	mg/kg	0.1	0.01	0.01	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	0.03	0.03	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.95	4.93	50	0
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.88	4.63	50	5
			d8-toluene (Surrogate)	mg/kg	-	3.73	3.91	50	5
			Bromofluorobenzene (Surrogate)	mg/kg	-	5.95	5.71	50	4
		Totals	Total Xylenes*	mg/kg	0.3	0	0	200	0
			Total BTEX	mg/kg	0.6	0.01	0.01	200	0
SE158009.001	LB111611.025	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	-	3.9	3.6	50	8
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.1	3.9	50	5
			d8-toluene (Surrogate)	mg/kg	-	3.7	3.5	50	4
			Bromofluorobenzene (Surrogate)	mg/kg	-	5.8	5.8	50	0
		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.

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

Original	Duplicate		Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE158008.008	LB111611.014		TRH C6-C10	mg/kg	25	0.19	0.17	200	0
			TRH C6-C9	mg/kg	20	0	0	200	0
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	4.95	4.93	30	0
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.88	4.63	30	5
			d8-toluene (Surrogate)	mg/kg	-	3.73	3.91	30	5
			Bromofluorobenzene (Surrogate)	mg/kg	-	5.95	5.71	30	4
		VPH F Bands	Benzene (F0)	mg/kg	0.1	0	0	200	0
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	0.18	0.16	200	0
SE158009.001	LB111611.025		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	-	3.9	3.6	30	8
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.1	3.9	30	5
			d8-toluene (Surrogate)	mg/kg	-	3.7	3.5	30	4
			Bromofluorobenzene (Surrogate)	mg/kg	-	5.8	5.8	30	0
		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 %
LB111802.002	Mercury	mg/kg	0.05	0.22	0.2	70 - 130	109

OC Pesticides in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB111680.002		Heptachlor	mg/kg	0.1	0.2	0.2	60 - 140	118
		Aldrin	mg/kg	0.1	0.2	0.2	60 - 140	109
		Delta BHC	mg/kg	0.1	0.2	0.2	60 - 140	114
		Dieldrin	mg/kg	0.2	0.2	0.2	60 - 140	116
		Endrin	mg/kg	0.2	0.2	0.2	60 - 140	123
		p,p'-DDT	mg/kg	0.1	0.2	0.2	60 - 140	125
	Surrogates	Tetrachloro-m-xylene (TCMX) (Surrogate)	mg/kg	-	0.18	0.15	40 - 130	121

OP Pesticides in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB111680.002		Dichlorvos	mg/kg	0.5	1.9	2	60 - 140	93
		Diazinon (Dimpylate)	mg/kg	0.5	2.2	2	60 - 140	111
		Chlorpyrifos (Chlorpyrifos Ethyl)	mg/kg	0.2	1.8	2	60 - 140	89
		Ethion	mg/kg	0.2	1.8	2	60 - 140	91
	Surrogates	2-fluorobiphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	92
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	96

PAH (Polynuclear Aromatic Hydrocarbons) in Soil

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB111680.002		Naphthalene	mg/kg	0.1	3.9	4	60 - 140	97
		Acenaphthylene	mg/kg	0.1	3.9	4	60 - 140	99
		Acenaphthene	mg/kg	0.1	3.8	4	60 - 140	95
		Phenanthrene	mg/kg	0.1	3.8	4	60 - 140	94
		Anthracene	mg/kg	0.1	3.6	4	60 - 140	90
		Fluoranthene	mg/kg	0.1	3.6	4	60 - 140	89
		Pyrene	mg/kg	0.1	3.6	4	60 - 140	89
		Benzo(a)pyrene	mg/kg	0.1	4.3	4	60 - 140	106
	Surrogates	d5-nitrobenzene (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	88
		2-fluorobiphenyl (Surrogate)	mg/kg	-	0.4	0.5	40 - 130	86
		d14-p-terphenyl (Surrogate)	mg/kg	-	0.5	0.5	40 - 130	98

PCBs in Soil

Method: ME-(AU)-[ENV]AN400/AN420

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB111680.002	Arochlor 1260	mg/kg	0.2	0.4	0.4	60 - 140	104

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

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

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB111787.002	Arsenic, As	mg/kg	3	48	50	80 - 120	95
	Cadmium, Cd	mg/kg	0.3	48	50	80 - 120	96
	Chromium, Cr	mg/kg	0.3	49	50	80 - 120	97
	Copper, Cu	mg/kg	0.5	47	50	80 - 120	95
	Lead, Pb	mg/kg	1	48	50	80 - 120	97
	Nickel, Ni	mg/kg	0.5	50	50	80 - 120	99
	Zinc, Zn	mg/kg	0.5	48	50	80 - 120	97

TRH (Total Recoverable Hydrocarbons) in Soil

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB111680.002		TRH C10-C14	mg/kg	20	41	40	60 - 140	103
		TRH C15-C28	mg/kg	45	<45	40	60 - 140	90
		TRH C29-C36	mg/kg	45	<45	40	60 - 140	93
	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	95

VOC's in Soil

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

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.

VOC's in Soil (continued)

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB111611.002	Monocyclic	Benzene	mg/kg	0.1	1.8	2.9	60 - 140	62
	Aromatic	Toluene	mg/kg	0.1	1.8	2.9	60 - 140	61
		Ethylbenzene	mg/kg	0.1	1.8	2.9	60 - 140	62
		m/p-xylene	mg/kg	0.2	4.3	5.8	60 - 140	74
		o-xylene	mg/kg	0.1	2.0	2.9	60 - 140	67
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.9	5	60 - 140	79
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.2	5	60 - 140	84
		d8-toluene (Surrogate)	mg/kg	-	3.9	5	60 - 140	78
		Bromofluorobenzene (Surrogate)	mg/kg	-	5.9	5	60 - 140	118

Volatile Petroleum Hydrocarbons in Soil

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

Sample Number		Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB111611.002		TRH C6-C10	mg/kg	25	<25	24.65	60 - 140	82
		TRH C6-C9	mg/kg	20	<20	23.2	60 - 140	69
	Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.9	5	60 - 140	79
		d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.2	5	60 - 140	84
		d8-toluene (Surrogate)	mg/kg	-	3.9	5	60 - 140	78
		Bromofluorobenzene (Surrogate)	mg/kg	-	5.9	5	60 - 140	118
	VPH F Bands	TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	7.25	60 - 140	118

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%
SE157993.001	LB111802.004	Mercury	mg/kg	0.05	0.22	0.01733561255	0.2	104

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

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

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE158008.027	LB111787.004	Arsenic, As	mg/kg	3	47	3.75020611294	50	86
		Cadmium, Cd	mg/kg	0.3	45	0.36133805893	50	89
		Chromium, Cr	mg/kg	0.3	83	19.84531400624	50	126
		Copper, Cu	mg/kg	0.5	98	39.7336026452[illegible]	50	76
		Lead, Pb	mg/kg	1	90	41.5402717387[illegible]	50	97
		Nickel, Ni	mg/kg	0.5	52	5.61310740119	50	92
		Zinc, Zn	mg/kg	0.5	110	55.90574891634	50	116

TRH (Total Recoverable Hydrocarbons) in Soil

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

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE158033.001	LB111680.031		TRH C10-C14	mg/kg	20	48	0	40	120
			TRH C15-C28	mg/kg	45	210	195	40	45 Ⓢ
			TRH C29-C36	mg/kg	45	130	99	40	73
			TRH C37-C40	mg/kg	100	<100	0	-	-
			TRH C10-C36 Total	mg/kg	110	390	294	-	-
			TRH C10-C40 Total	mg/kg	210	390	294	-	-
		TRH F Bands	TRH >C10-C16 (F2)	mg/kg	25	51	5	40	115
			TRH >C10-C16 (F2) - Naphthalene	mg/kg	25	51	4.94	-	-
			TRH >C16-C34 (F3)	mg/kg	90	290	277	40	20 Ⓢ
			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%
SE158008.001	LB111611.026	Monocyclic Aromatic	Benzene	mg/kg	0.1	2.4	0	2.9	81
			Toluene	mg/kg	0.1	2.1	0.01	2.9	71
			Ethylbenzene	mg/kg	0.1	1.8	0.01	2.9	61
			m/p-xylene	mg/kg	0.2	4.2	0.01	5.8	73
			o-xylene	mg/kg	0.1	2.0	0.01	2.9	67
		Polycyclic	Naphthalene	mg/kg	0.1	0.2	0.04	-	-
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.7	4.76	-	74
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.0	5.1	-	79
			d8-toluene (Surrogate)	mg/kg	-	3.6	4.24	-	73
			Bromofluorobenzene (Surrogate)	mg/kg	-	5.9	5.73	-	119
		Totals	Total Xylenes*	mg/kg	0.3	6.2	0.02	-	-
			Total BTEX	mg/kg	0.6	12	0.04	-	-

Volatile Petroleum Hydrocarbons in Soil

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

QC Sample	Sample Number		Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE158008.001	LB111611.026		TRH C6-C10	mg/kg	25	<25	0.27	24.65	83
			TRH C6-C9	mg/kg	20	<20	0.09	23.2	70
		Surrogates	Dibromofluoromethane (Surrogate)	mg/kg	-	3.7	4.76	-	74
			d4-1,2-dichloroethane (Surrogate)	mg/kg	-	4.0	5.1	-	79
			d8-toluene (Surrogate)	mg/kg	-	3.6	4.24	-	73
			Bromofluorobenzene (Surrogate)	mg/kg	-	5.9	5.73	-	119
		VPH F Bands	Benzene (F0)	mg/kg	0.1	2.4	0	-	-
			TRH C6-C10 minus BTEX (F1)	mg/kg	25	<25	0.23	7.25	111

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 tthe performance of this service.
-	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.

Appendix D: Report Explanatory Notes

STANDARD SAMPLING PROCEDURE (SSP)

These protocols specify the basic procedures to be used when sampling soils or groundwater for environmental site assessments undertaken by EIS.

The purpose of these protocols is to provide standard methods for: sampling, decontamination procedures for sampling equipment, sample preservation, sample storage and sample handling. Deviations from these procedures must be recorded.

Soil Sampling

- Prepare a borehole/test pit log or made a note of the sample description for stockpiles.
- Layout sampling equipment on clean plastic sheeting to prevent direct contact with ground surface. The work area should be at a distance from the drill rig/excavator such that the machine can operate in a safe manner.
- Ensure all sampling equipment has been decontaminated prior to use.
- Remove any surface debris from the immediate area of the sampling location.
- Collect samples and place in glass jar with a Teflon seal. This should be undertaken as quickly as possible to prevent the loss of any volatiles. If possible, fill the glass jars completely.
- Collect samples for asbestos analysis and place in a zip-lock plastic bag.
- Label the sampling containers with the EIS job number, sample location (eg. BH1), sampling depth interval and date. If more than one sample container is used, this should also be indicated (eg. 2 = Sample jar 1 of 2 jars).
- Photoionisation detector (PID) screening of volatile organic compounds (VOCs) should be undertaken on samples using the soil sample headspace method. Headspace measurements are taken following equilibration of the headspace gasses in partly filled zip-lock plastic bags. PID headspace data is recorded on the borehole/test pit log and the chain of custody forms.
- Record the lithology of the sample and sample depth on the borehole/test pit log generally in accordance with AS1726-1993[14].
- Store the sample in a sample container cooled with ice or chill packs. On completion of the sampling the sample container should be delivered to the lab immediately or stored in the refrigerator prior to delivery to the lab. All samples are preserved in accordance with the standards outlined in the report.
- Check for the presence of groundwater after completion of each borehole using an electronic dip metre or water whistle. Boreholes should be left open until the end of fieldwork. All groundwater levels in the boreholes should be rechecked on the completion of the fieldwork.
- Backfill the boreholes/test pits with the excavation cuttings or clean sand prior to leaving the site.

Decontamination Procedures for Soil Sampling Equipment

- All sampling equipment should be decontaminated between every sampling location. This excludes single use PVC tubing used for push tubes etc. Equipment and materials required for the decontamination include:
  - Phosphate free detergent (Decon 90);
  - Potable water;
  - Stiff brushes; and
  - Plastic sheets.

[14] Standards Australia, (1993), *Geotechnical Site Investigations.* (AS1726-1993)

- Ensure the decontamination materials are clean prior to proceeding with the decontamination.
- Fill both buckets with clean potable water and add phosphate free detergent to one bucket.
- In the bucket containing the detergent, scrub the sampling equipment until all the material attached to the equipment has been removed.
- Rinse sampling equipment in the bucket containing potable water.
- Place cleaned equipment on clean plastic sheets.

If all materials are not removed by this procedure, high-pressure water cleaning is recommended. If any equipment is not completely decontaminated by both these processes, then the equipment should not be used until it has been thoroughly cleaned.

Groundwater Sampling

Groundwater samples are more sensitive to contamination than soil samples and therefore adhesion to this protocol is particularly important to obtain reliable, reproducible results. The recommendations detailed in AS/NZS 5667.1:1998 are considered to form a minimum standard.

The basis of this protocol is to maintain the security of the borehole and obtain accurate and representative groundwater samples. The following procedure should be used for collection of groundwater samples from previously installed groundwater monitoring wells.

- After monitoring well installation, at least three bore volumes should be pumped from the monitoring wells (well development) to remove any water introduced during the drilling process and/or the water that is disturbed during installation of the monitoring well. This should be completed prior to purging and sampling.
- Groundwater monitoring wells should then be left to recharge for at least three days before purging and sampling. Prior to purging or sampling, the condition of each well should observed and any anomalies recorded on the field data sheets. The following information should be noted: the condition of the well, noting any signs of damage, tampering or complete destruction; the condition and operation of the well lock; the condition of the protective casing and the cement footing (raised or cracked); and, the presence of water between protective casing and well.
- Take the groundwater level from the collar of the piezometer/monitoring well using an electronic dip meter. The collar level should be taken (if required) during the site visit using a dumpy level and staff.
- Purging and sampling of piezometers/monitoring wells is done on the same site visit when using micro-purge (or other low flow) techniques.
- Layout and organize all equipment associated with groundwater sampling in a location where they will not interfere with the sampling procedure and will not pose a risk of contaminating samples. Equipment generally required includes:
  - Micropore filtration system or Stericup single-use filters (for heavy metals samples);
  - Filter paper for Micropore filtration system; Bucket with volume increments;
  - Sample containers: teflon bottles with 1 ml nitric acid, 75mL glass vials with 1 mL hydrochloric acid, 1 L amber glass bottles;
  - Bucket with volume increments;
  - Flow cell;
  - pH/EC/Eh/T meters;
  - Plastic drums used for transportation of purged water;
  - Esky and ice;
  - Nitrile gloves;
  - Distilled water (for cleaning);
  - Electronic dip meter;

- Low flow pump pack and associated tubing; and
- Groundwater sampling forms.

- If single-use stericup filtration is not used, clean the Micropore filtration system thoroughly with distilled water prior to use and between each sample. Filter paper should be changed between samples. 0.45um filter paper should be placed below the glass fibre filter paper in the filtration system.
- Ensure all non-disposable sampling equipment is decontaminated or that new disposable equipment is available prior to any work commencing at a new location. The procedure for decontamination of groundwater equipment is outlined at the end of this section.
- Disposable gloves should be used whenever samples are taken to protect the sampler and to assist in avoidance of contamination.
- Groundwater samples are obtained from the monitoring wells using low flow/micro-purge sampling equipment to reduce the disturbance of the water column and loss of volatiles.
- During pumping to purge the well, the pH, temperature, conductivity, dissolved oxygen, redox potential and groundwater levels are monitored (where possible) using calibrated field instruments to assess the development of steady state conditions. Steady state conditions are generally considered to have been achieved when the difference in the pH measurements was less than 0.2 units and the difference in conductivity was less than 10%.
- All measurements are recorded on specific data sheets.
- Once steady state conditions are considered to have been achieved, groundwater samples are obtained directly from the pump tubing and placed in appropriate glass bottles, BTEX vials or plastic bottles.
- All samples are preserved in accordance with water sampling requirements detailed in the NEPM 2013 and placed in an insulated container with ice. Groundwater samples are preserved by immediate storage in an insulated sample container with ice as outlined in the report text.
- Record the sample on the appropriate log in accordance with AS1726:1993. At the end of each water sampling complete a chain of custody form.

Decontamination Procedures for Groundwater Sampling Equipment

- All equipment associated with the groundwater sampling procedure (other than single-use items) should be decontaminated between every sampling location.
- The following equipment and materials are required for the decontamination procedure:
  - Phosphate free detergent;
  - Potable water;
  - Distilled water; and
  - Plastic Sheets or bulk bags (plastic bags).
- Fill one bucket with clean potable water and phosphate free detergent, and one bucket with distilled water.
- Flush potable water and detergent through pump head. Wash sampling equipment and pump head using brushes in the bucket containing detergent until all materials attached to the equipment are removed.
- Flush pump head with distilled water.
- Change water and detergent solution after each sampling location.
- Rinse sampling equipment in the bucket containing distilled water.
- Place cleaned equipment on clean plastic sheets.
- If all materials are not removed by this procedure that equipment should not be used until it has been thoroughly cleaned

QA/QC DEFINITIONS

The QA/QC terms used in this report are defined below. The definitions are in accordance with US EPA publication SW-846, entitled *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (1994[15]) methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (H. Keith 1991[16]).

Practical Quantitation Limit (PQL), Limit of Reporting (LOR) & Estimated Quantitation Limit (EQL)

These terms all refer to the concentration above which results can be expressed with a minimum 95% confidence level. The laboratory reporting limits are generally set at ten times the standard deviation for the Method Detection limit (MDL) for each specific analyte. For the purposes of this report the LOR, PQL, and EQL are considered to be equivalent.

When assessing laboratory data it should be borne in mind that values at or near the PQL have two important limitations.

"The uncertainty of the measurement value can approach, and even equal, the reported value. Secondly, confirmation of the analytes reported is virtually impossible unless identification uses highly selective methods. These issues diminish when reliably measurable amounts of analytes are present. Accordingly, legal and regulatory actions should be limited to data at or above the reliable detection limit" Keith 1991.

Precision

The degree to which data generated from repeated measurements differ from one another due to random errors. Precision is measured using the standard deviation or Relative Percent Difference (RPD). Acceptable targets for precision in this report will be less than 50% RPD for concentrations greater than ten times the PQL, less than 75% RPD for concentrations between five and ten times the PQL and less than 100% RPD for concentrations that are less than five times the PQL.

Accuracy

Accuracy is a measure of the agreement between an experimental result and the true value of the parameter being measured. The assessment of accuracy for an analysis can be achieved through the analysis of known reference materials or assessed by the analysis of surrogates, field blanks, trip spikes and matrix spikes.

The proximity of an averaged result to the true value, where all random errors have been statistically removed. Accuracy is measured by percent recovery. Acceptable limits for accuracy generally lie between 70% to 130% recoveries. Certain laboratory methods may allow for values that lie outside these limits.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is primarily dependent upon the design and implementation of the sampling program. Representativeness of the data is partially ensured by the avoidance of contamination, adherence to sample handing and analysis protocols and use of proper chain-of-custody and documentation procedures.

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[15] US EPA, (1994), *SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* (US EPA SW-846)

[16] Keith., H, (1991), *Environmental Sampling and Analysis, A Practical Guide.*

Completeness

Completeness is a measure of the number of valid measurements in a data set compared to the total number of measurements made and overall performance against DQIs. The following information is assessed for completeness:

- Chain-of-custody forms; Sample receipt form;
- All sample results reported; All blank data reported;
- All laboratory duplicate and RPDs calculated;
- All surrogate spike data reported;
- All matrix spike and lab control spike (LCS) data reported and RPDs calculated;
- Spike recovery acceptable limits reported; and
- NATA stamp on reports.

Comparability

Comparability is the evaluation of the similarity of conditions (eg. sample depth, sample homogeneity) under which separate sets of data are produced. Data comparability checks include a bias assessment that may arise from the following sources:

- Collection and analysis of samples by different personnel; Use of different techniques;
- Collection and analysis by the same personnel using the same methods but at different times; and
- Spatial and temporal changes (due to environmental dynamics).

Blanks

The purpose of laboratory and field blanks is to check for artifacts and interferences that may arise during sampling and analysis.

Matrix Spikes

Samples are spiked with laboratory grade standards to detect interactive effects between the sample matrix and the analytes being measured. Matrix Spikes are reported as a percent recovery and are prepared for 1 in every 20 samples. Sample batches that contain less than 20 samples may be reported with a Matrix Spike from another batch. The percent recovery is calculated using the formula below. Acceptable recovery limits are 70% to 130%.

$$\frac{\text{(Spike Sample Result – Sample Result) x 100}}{\text{Concentration of Spike Added}}$$

Surrogate Spikes

Samples are spiked with a known concentration of compounds that are chemically related to the analyte being investigated but unlikely to be detected in the environment. The purpose of the Surrogate Spikes is to check the accuracy of the analytical technique. Surrogate Spikes are reported as percent recovery.

Duplicates

Laboratory duplicates measure precision, expressed as Relative Percent Difference. Duplicates are prepared from a single field sample and analysed as two separate extraction procedures in the laboratory. The RPD is calculated using the formula where D1 is the sample concentration and D2 is the duplicate sample concentration:

$$\frac{(D1 - D2) \times 100}{\{(D1 + D2)/2\}}$$

Appendix E: Field Work Documents

JOB NO: E29807KR
LOCATION: Macquarie University, Macquarie Park

EIS

PID FIELD CALIBRATION FORM

Make: MiniRAE	Model: 2000	Unit: 1	Date of last factory calibration:
Date of calibration: 27/09/16		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration:	100.0 ppm
Measured reading: 99.9 ppm		Error in measured reading: ±	ppm
Make: MiniRAE	Model: 2000	Unit: 1	Date of last factory calibration:
Date of calibration: 28/09/16		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration:	100.0 ppm
Measured reading: 99.8 ppm		Error in measured reading: ±	ppm
Make: MiniRAE	Model: 2000	Unit: 1	Date of last factory calibration:
Date of calibration: 30/09/16		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration:	100.0 ppm
Measured reading: 100 ppm		Error in measured reading: ±	ppm
Make: MiniRAE	Model: 2000	Unit: 1	Date of last factory calibration:
Date of calibration: 6/10/16		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration:	100.0 ppm
Measured reading: 99.9 ppm		Error in measured reading: ±	ppm
Make: MiniRAE	Model: 2000	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration:	100.0 ppm
Measured reading: ppm		Error in measured reading: ±	ppm
Make: MiniRAE	Model: 2000	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration:	100.0 ppm
Measured reading: ppm		Error in measured reading: ±	ppm
Make: MiniRAE	Model: 2000	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration:	100.0 ppm
Measured reading: ppm		Error in measured reading: ±	ppm