

North Rocks Park Precinct Masterplan



Prince Henry Community Centre, Randwick



Prince Henry Community Centre, Randwick

Non programmed space/Foyer

Hall



Surry Hills Library



Glenn Street Community Hub, Northern beaches



The Morgan Cafe, NYC

Flexible meeting rooms

Cafe



City of Sydney Town Hall House Cafe



Community Centre, Camden



Docklands library, Melbourne

Learning Lab

Out of School Hour Care

Offices/Admin



Community Centre, Camden



Community Centre, Camden



Docklands library, Melbourne

Leisure programmed space



Sydney Botanic Garden Restaurant



Mount Tomah Botanic Garden education centre



Glenn Street Community Hub, Northern beaches

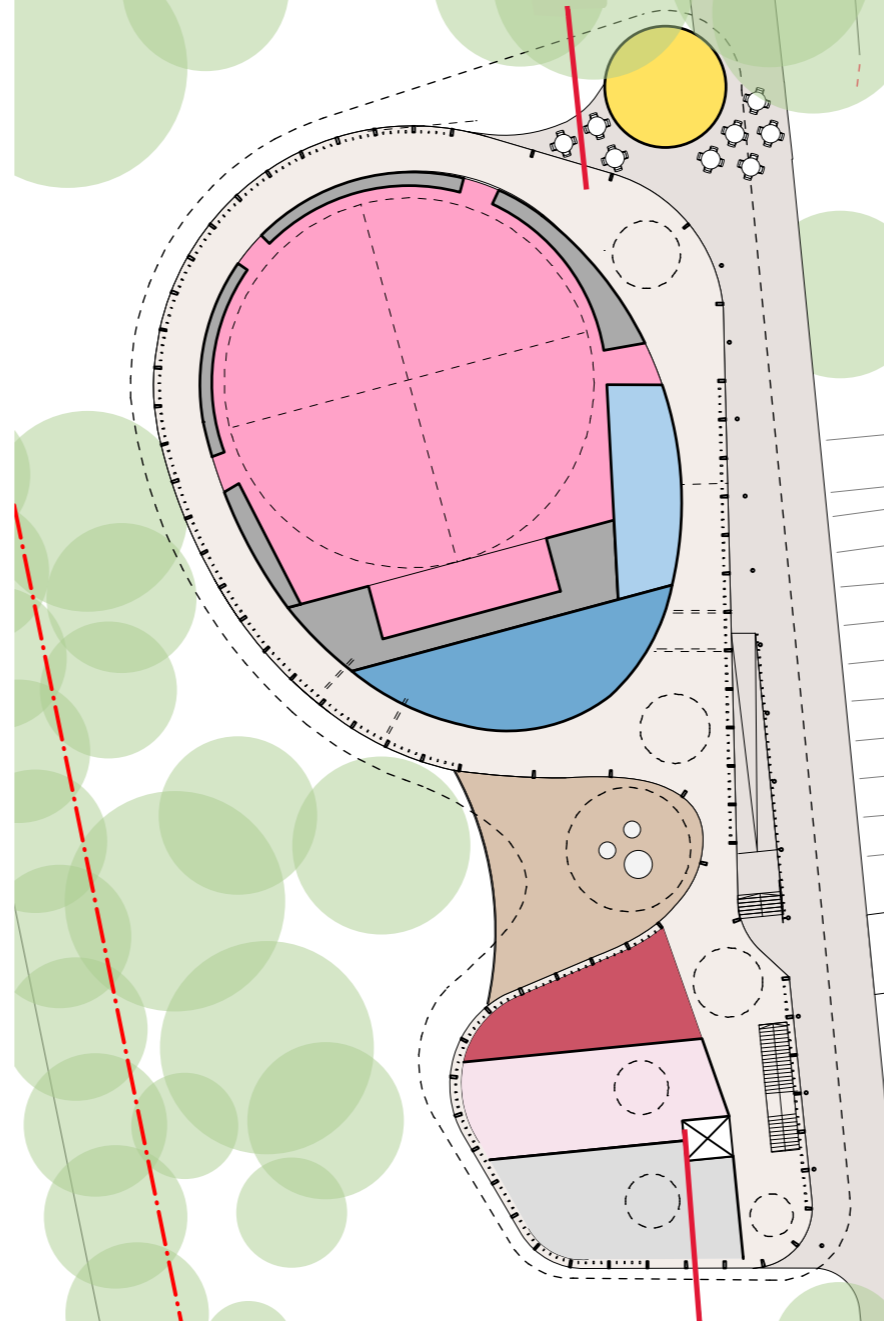
Outdoor Area

New Storage

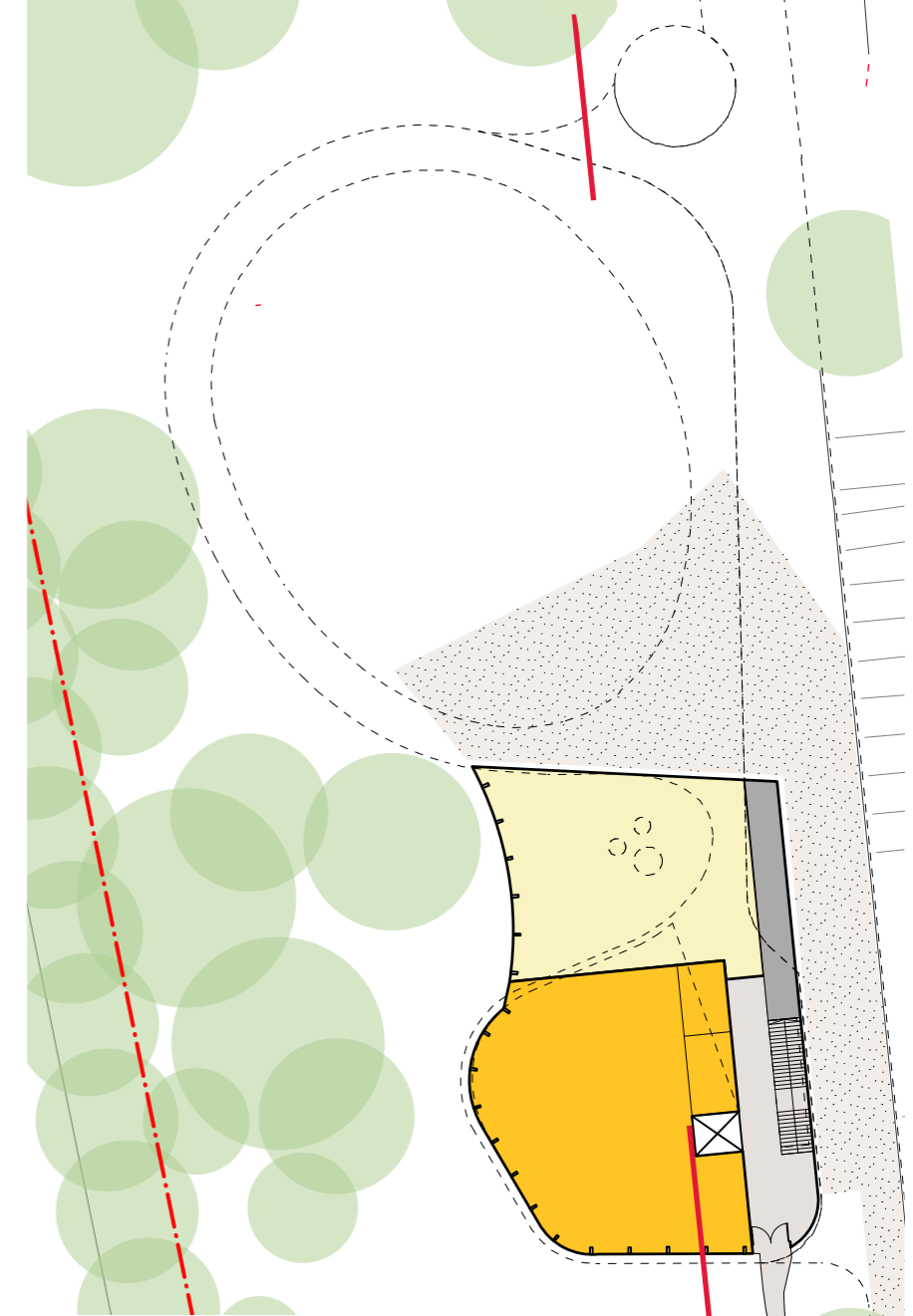
Commercial Kitchen

Amenities

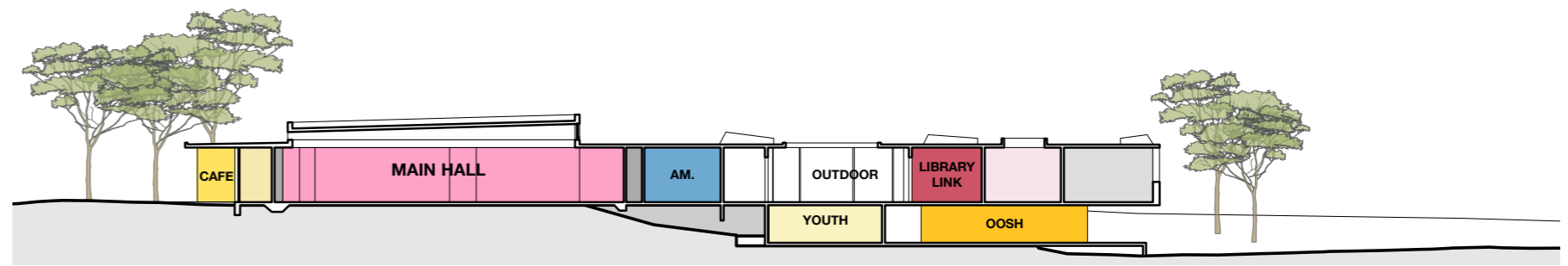
NRP Community Centre Building



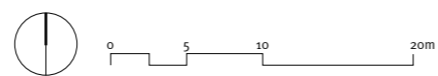
Ground Floor Plan



Lower Floor Plan



Section A



Scale 1:500 @ A3

North Rocks Park Precinct Masterplan NRP Sport Clubs & Amenities

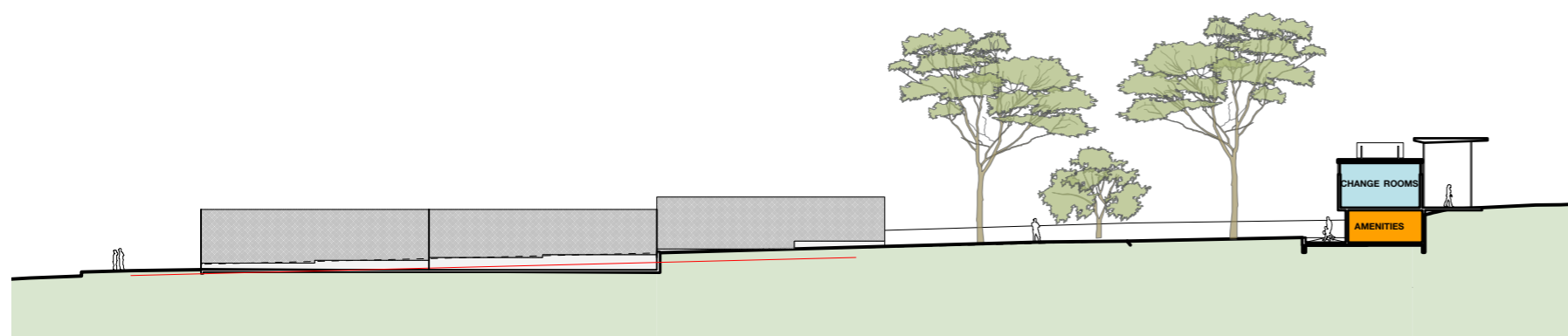
- Tennis Club
- Tennis Club dedicated toilets
- Public Amenities
- Change rooms & Referee room
- Kiosk
- Soccer Club
- Sports facilities storage /
/ Council maintenance facilities & break room



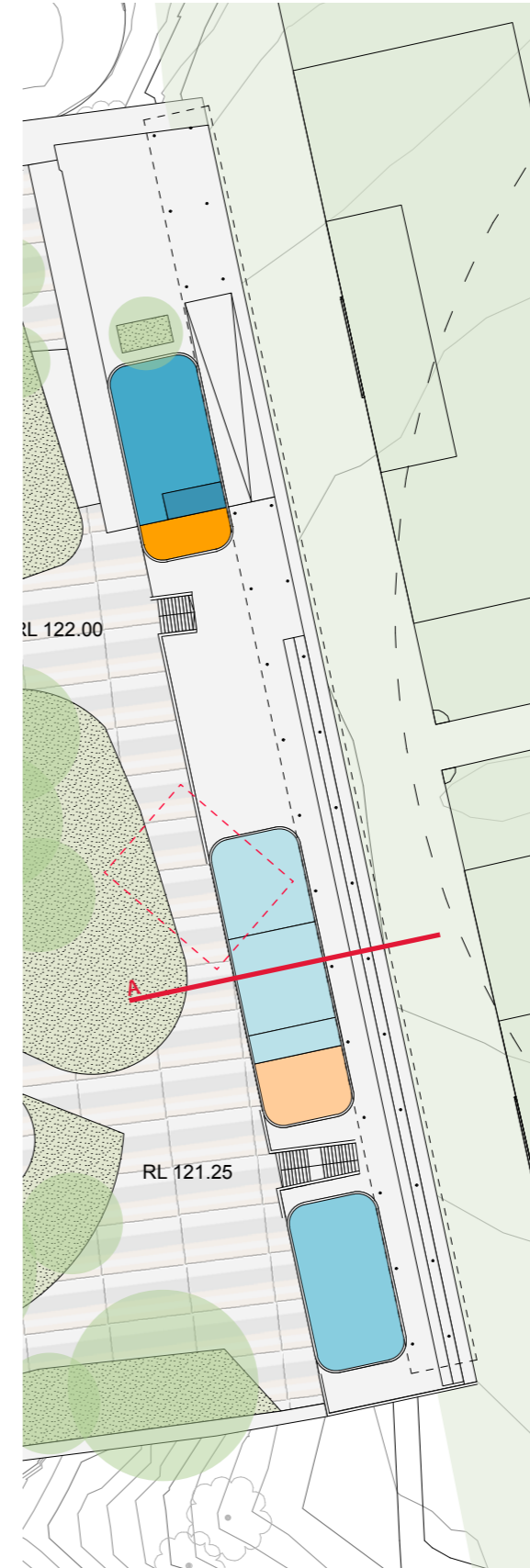
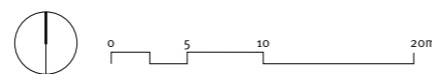
Katterberg Linear Sportclub, Belgium



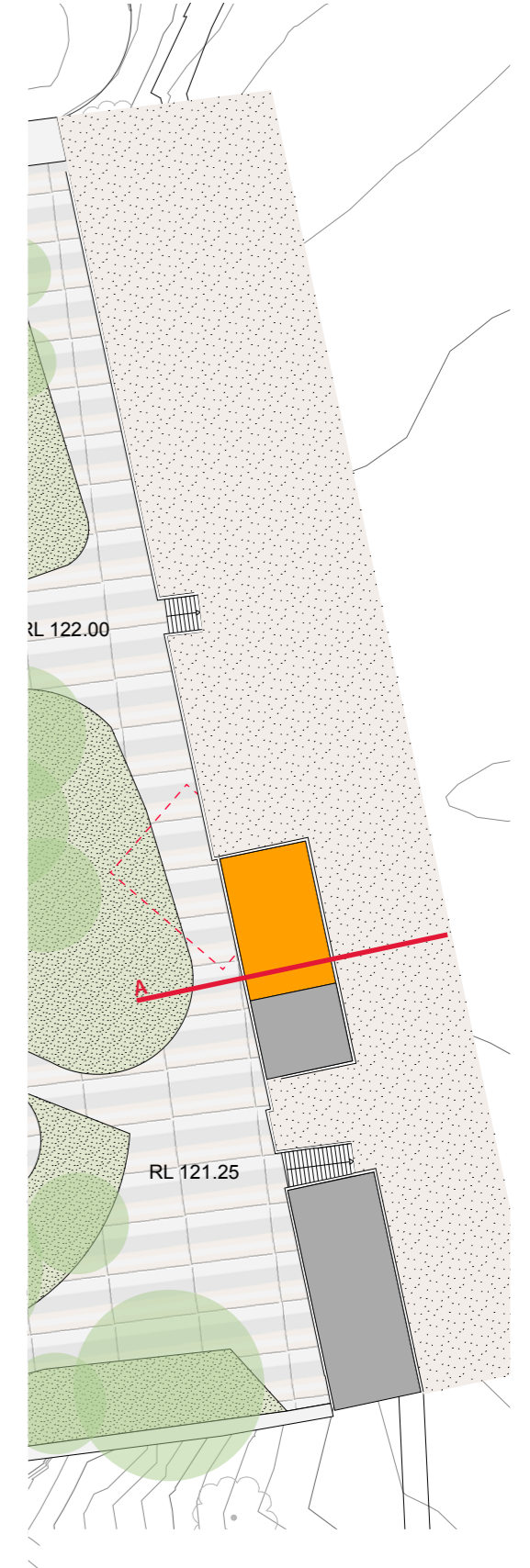
Rushcutters Bay Tennis Club



Section A



Ground Floor Plan



Lower Floor Plan

| Scale 1:500 @ A3

North Rocks Park Precinct Masterplan

Recreation & Blue Gum High Forest



Bungarbee Superpark Picnic area, Sydney

Picnic



Braithwaite Park nature play area, Mount Hawthorn

Playground



Sydney Park Playground, Sydney



Fremantle Skatepark, Perth



Fremantle Skatepark, Perth

Skate Area



Don Lucas Reserve, Cronulla



Glenmore Ridge, Glenmore park

Exercise stations



Victoria Park, Sydney

Basketball/Netball



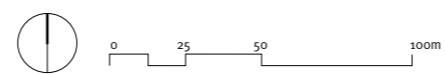
Odea Reserve off leash area, Camperdown

Off leash area



Blue Gum High Forest, Sydney Basin

BGHF (Bio-Banking area)



Scale 1:2500 @ A3

North Rocks Park Precinct Masterplan Preliminary Order of Costs

North Rocks Park	\$29,550,378.00
John Wearn Reserve	\$5,118,384.00
North Rocks Park Precinct Total	\$34,668,762.00

North Rocks Park Precinct proposed Stage 1 Works **\$2,207,748.00**

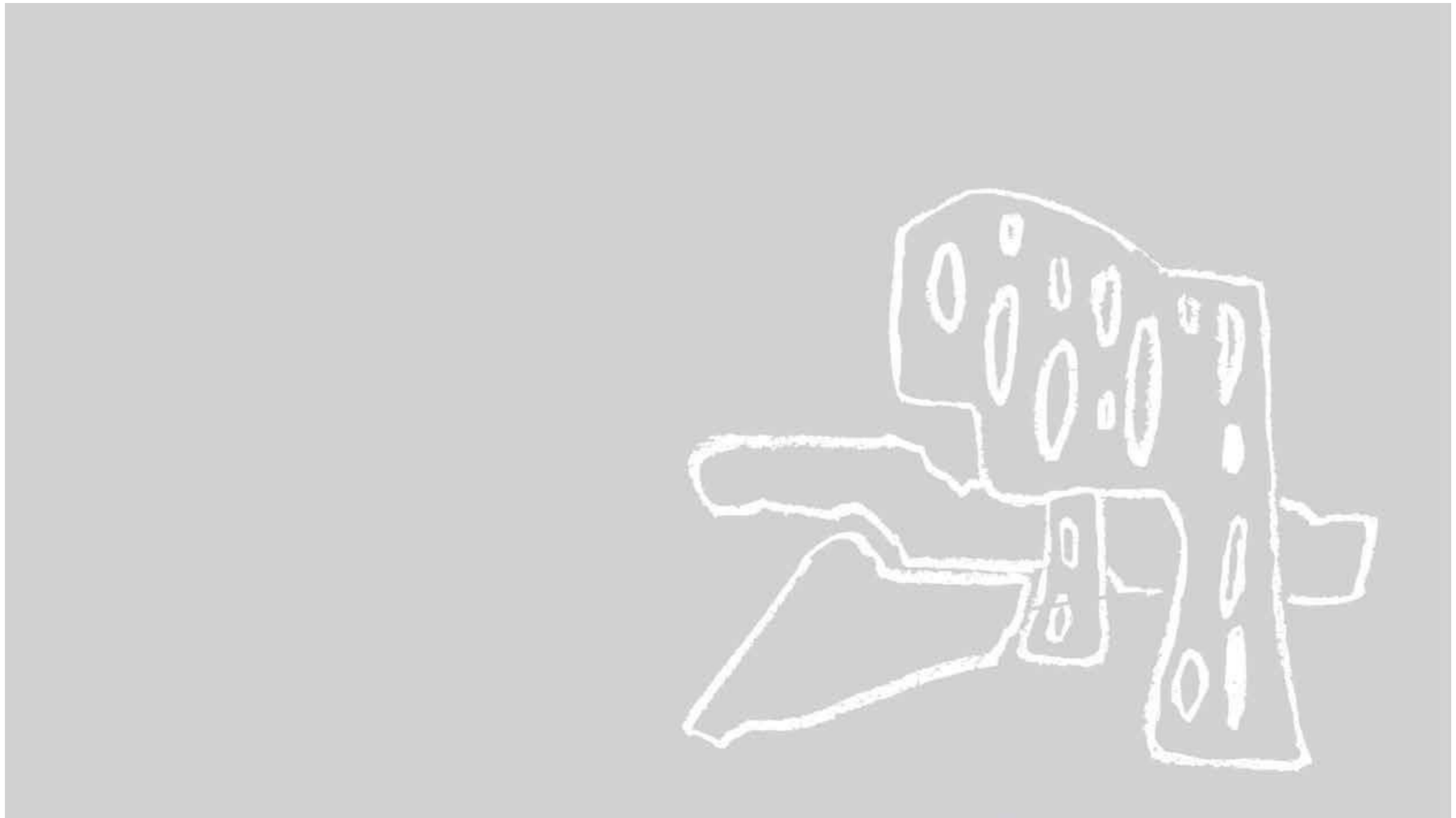
Proposed Stage 1 Works includes localized demolitions, upgrade to sports fields lighting, basketball/netball full court, refurbished existing shed, amenities building, skate area, fitness station, off-leash area and landscaping. No allowance for design or project management costs.

Note: All figures quoted exclude GST.
Order of Costs provided in full Appendix 11

North Rocks Park Precinct Masterplan Stage 1 Works within approved budget









ENVIRONMENTAL INVESTIGATION SERVICES

REPORT

TO

JMD DESIGN PTY LTD

ON

**PRELIMINARY DESKTOP CONTAMINATION
ASSESSMENT**

FOR

PROPOSED MASTER PLAN

AT

NORTH ROCKS PARKS PRECINCT, CARLINGFORD, NSW

1 AUGUST 2017

REF: E30690Krptrev1



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EXECUTIVE SUMMARY

JMD Design Pty Ltd ('the client') commissioned Environmental Investigation Services (EIS)¹ to undertake a Preliminary Desktop Contamination Assessment (ESA) for the proposed master plan at North Rocks Park Precinct, Carlingford, NSW.

Based on the information provided to EIS by JMD Design Pty Ltd, we understand that a new master plan is proposed. The design of this plan will require stakeholder consultation.

The primary aims of the assessment were to identify past or present potentially contaminating activities at the site and identify the potential for site contamination and assess the need for further investigation.

The scope of work included a 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 and the preparation of the report.

Based on the scope of work undertaken for this assessment, EIS identified the following potential contamination sources/AEC: Fill material; historical agriculture use; hazardous building material.

Considering the above, and based on a qualitative assessment of various lines of evidence as discussed throughout this report, EIS are of the opinion that there is a moderate potential for site contamination.

Based on the scope of work undertaken for the assessment, EIS are of the opinion that the historical land uses and potential sources of contamination identified are unlikely to preclude the proposed development. However, once the final design has been prepared a targeted Stage 2 intrusive investigation should be undertaken to characterise the site contamination conditions. If demolition of the existing buildings is required hazardous building materials survey should be undertaken prior to demolition.

The conclusions and recommendations should be read in conjunction with the limitations presented in the body of the report.

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

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Important Information About The Site Assessment Report

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Figure 1: Site Location Plan

Figure 2: Site Features Plan

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Appendix A: Site Information

ABBREVIATIONS

Asbestos Containing Material	ACM
Area of Environmental Concern	AEC
Australian Height Datum	AHD
Acid Sulfate Soil	ASS
Above-Ground Storage Tank	AST
Below Ground Level	BGL
Bureau of Meteorology	BOM
Benzene, Toluene, Ethylbenzene, Xylene	BTEX
Cation Exchange Capacity	CEC
Contaminant(s) of Potential Concern	CoPC
Contaminated Land Management	CLM
Conceptual Site Model	CSM
Environmental Investigation Services	EIS
Environmental Protection Authority	EPA
Environmental Site Assessment	ESA
International Organisation of Standardisation	ISO
Local Government Authority	LGA
Metres Below Ground Level	mBGL
National Association of Testing Authorities	NATA
National Environmental Protection Measure	NEPM
Non-Aqueous Phase Liquid	NAPL
Organochlorine Pesticides	OCP
Organophosphate Pesticides	OPP
Polycyclic Aromatic Hydrocarbons	PAH
Remediation Action Plan	RAP
Sampling, Analysis and Quality Plan	SAQP
Site Audit Statement	SAS
Site Audit Report	SAR
Semi-Volatile Organic Compounds	sVOC
Standing Water Level	SWL
Total Recoverable Hydrocarbons	TRH
United States Environmental Protection Agency	USEPA
Underground Storage Tank	UST
Volatile Organic Compounds	VOC
Work Health and Safety	WHS

1 INTRODUCTION

JMD Design ('the client') commissioned Environmental Investigation Services (EIS)² to undertake a Preliminary Desktop Contamination Assessment (ESA) for the proposed master plan at North Rocks Park Precinct, Carlingford, NSW. The site location is shown on Figure 1 and the assessment was confined to the site boundaries as shown on Figure 2. For the purpose of this report 'the site' comprises two areas. Section A refers to the area the west of Farnell Avenue and Section B refers to the area to the east of Farnell Avenue as shown on Figure 2.

1.1 Proposed Development Details

Based on the information provided to EIS by JMD Design Pty Ltd, we understand that a new master plan is proposed. The design of this plan will require stakeholder consultation.

1.2 Aim and Objectives

The primary aims of the assessment were to identify past or present potentially contaminating activities at the site, identify the potential for site contamination and assess the need for further investigation. The assessment objectives were to:

- Identify areas of environmental concern and potential contaminants of concern;
- Identify the potential for site contamination; and
- Assess the need for further investigation.

1.3 Scope of Work

The assessment was undertaken generally in accordance with an EIS proposal (Ref: EP45114K) of 8/6/2017 and written acceptance from the client of 10/7/2017. 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; and
- Preparation of an ESA report presenting the results of the assessment, including a CSM.

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) ³

² Environmental consulting division of Jeffery & Katauskas Pty Ltd (J&K)

³ NSW Government Legislation, (1997). *Contaminated Land Management Act 1997*. (referred to as CLM Act 1997)

Guidelines/Regulations/Documents

State Environmental Planning Policy No.55 – Remediation of Land (1998)⁴

Managing Land Contamination, Planning Guidelines SEPP55 – Remediation of Land (1998)⁵

Guidelines for Consultants Reporting on Contaminated Sites (2011)⁶

Guidelines for the NSW Site Auditor Scheme, 2nd Edition (2006)⁷

National Environmental Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)⁸

⁴ NSW Government, (1998). *State Environmental Planning Policy No. 55 – Remediation of Land*. (referred to as SEPP55)

⁵ Department of Urban Affairs and Planning, and Environment Protection Authority, (1998). *Managing Land Contamination, Planning Guidelines SEPP55 – Remediation of Land*. (SEPP55 Planning Guidelines)

⁶ NSW Office of Environment and Heritage (OEH), (2011). *Guidelines for Consultants Reporting on Contaminated Sites*. (referred to as Reporting Guidelines 2011)

⁷ NSW DEC, (2006). *Guidelines for the NSW Site Auditor Scheme, 2nd ed.* (referred to as Site Auditor Guidelines 2006)

⁸ 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:	Off North Roads Road and Farnell Avenue, Carlingford, NSW
Current Land Use:	Crown Land, Public Recreation & Council Land, Bushland and Park
Proposed Land Use:	Crown Land, Public Recreation & Council Land, Bushland and Park
Local Government Authority (LGA):	Parramatta City Council
Approximate Site Area (ha):	9.8
RL (AHD in m) (approx.):	123-97
Geographical Location (decimal degrees) (approx.):	Latitude: -33.771077 Longitude: 151.038050

2.2 **Site Location and Regional Setting**

The site is located in a predominantly residential area of Carlingford. The site is located to the south of North Rocks Road.

2.3 **Topography**

The regional topography is characterised by a south facing hillside. Parts of the site appear to have been levelled to account for the slope and accommodate the existing development. North Rocks Road forms the north boundary of the site and appears to be located along a ridgeline.

2.4 **Site Inspection**

A walkover inspection of the site was undertaken by EIS on 21/7/2017. The inspection was limited to accessible areas of the site and immediate surrounds. An internal inspection of buildings was not undertaken. A summary of the other inspection findings are outlined in the following subsections:

2.4.1 Buildings, Structures and Roads

Section A

North Rocks childcare centre was located in the north-eastern area of Section A. The child care centre was a one storey brick building with a fenced off outside play area with exposed soils. An asphaltic

concrete (AC) carpark was located adjacent to the west of the child care centre. The pavements appeared to be in moderate condition (cracking was observed in the AC).

To the south of the child care was John Wearn Reserve. The reserve was a large outdoor park with various council facilities which included: children's play equipment, landscaped areas, swings, skate park, basketball court and cycle track. Power lines ran through the center of the site in a north to south direction.

Section B

Don Moore community centre was located in the north-western area of Section B. Facilities to the east of the community centre included: children's play equipment, multiple tennis courts, North Rocks senior citizens centre, cricket nets and various sports club houses. At the time of the inspection a construction site had been established in the western section of Section B. A construction worker informed EIS the building was for a new child care centre. Power lines ran through the eastern area of Section B in a north to south direction.

2.4.2 Boundary Conditions, Soil Stability and Erosion

Section A

A predominantly metal fence extended along the western boundary. Manildra Avenue and the boundary fence of various residential properties defined to southern boundary. The eastern and northern boundaries were defined by Farnell Avenue and Balaka Drive, respectively. There were no obvious signs of instability or soil erosion in this section of the site.

Section B

To the north of the construction site surface sandy soils were exposed. Given the gradient there is the potential for instability or soil erosion. The north-east section of the site was occupied by a large sporting field with bare patches of grass observed. To the south of the field was an engineered retaining wall which appeared to support a large volume of fill soil.

2.4.3 Visible or Olfactory Indicators of Contamination

Section A

No visible or olfactory indicators of contamination were observed in this section of the site.

Section B

Multiple fragments of fibre cement (suspected of containing asbestos) were observed on the ground surface adjacent to the east of the community centre (see Figure 2). No other visible or olfactory indicators of contamination were observed.

2.4.4 Presence of Drums/Chemicals, Waste and Fill Material

Section A

Surface fill material with various gravels (ironstone, brick and concrete) were identified at the ground surface in the northern section of the site. Sandy soil (possibly fill) was observed at the surface throughout the garden beds, along with wood chip fragments.

Section B

To the south and the east of the sporting field retaining walls were observed. The southern retaining wall appeared to support a large volume of fill.

A small fill stockpile was observed in the north-west section of the site. No visible or olfactory indicators of contamination were observed in the stockpile.

2.4.5 Drainage and Services

Section A and B

Storm water and sewage services were observed in the southern area of Section A. Surface water would most likely infiltrate the grassed and landscaped areas on the site. Excesses surface water would most likely drain into the stormwater system on the site or adjacent roads to the south.

2.4.6 Sensitive Environments

Section A and B

Sensitive environments such as wetlands, ponds, creeks or extensive areas of natural vegetation were not identified on site or in the immediate surrounds.

2.4.7 Landscaped Areas and Visible Signs of Plant Stress

Section A and B

All vegetation at the site appeared to be healthy and no obvious vegetation stress (e.g. die back, dead or dying vegetation etc) was observed.

2.5 Surrounding Land Use

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

- North – residential properties (Section A), residential properties, car wash café and a cemetery (Section B).
- South – residential properties.
- East – residential properties.
- West – residential properties.

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 predominantly underlain by Ashfield Shale of the Wianamatta Group, which typically consists of black to dark grey shale and laminite. The southern area of Section A is underlain by Hawkesbury Sandstone, which typically consists of medium to coarse grained quartz sandstone with minor shale and laminite lenses.

3.2 JK / EIS Jobs Database

No environmental or geotechnical projects were encountered within a search area of 400m from the site.

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 Salinity

The site is located within the area of Western Sydney included in the Salinity Potential Map. Based upon interpretation from the geological formations and soil groups presented on the map, the site is located in a region of low/moderate to high salinity potential.

The moderate classification is attributed to scattered areas of scalding and indicator vegetation, in areas where concentrations have not been mapped. Saline areas may occur in this zone, which have not been identified or may occur if risk factors change adversely.

3.5 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 21 registered bores within the report buffer of 2,000m. In summary:

- The nearest registered bore was located approximately 430m from the site. This was utilised for monitoring purposes;
- The majority of the bores were registered for monitoring purposes;
- There were no nearby bores (i.e. within 1,547m) registered for domestic or irrigation uses; and
- The drillers log information from the closest registered bores typically identified fill and/or clay soil to depths of 1.0-5.0m, underlain by sandstone or shale bedrock. Standing water levels (SWLs) in the bores ranged from 1.67mBGL to 90.0mBGL.

The information reviewed for this assessment indicated that the subsurface conditions at the site are likely to consist of residual soils overlying relatively shallow bedrock. The potential for viable groundwater abstraction and use of groundwater under these conditions is considered to be low. Considering the local topography and surrounding land features, EIS would generally expect groundwater to flow towards the south.

3.6 Receiving Water Bodies

Surface water bodies were not identified in the immediate vicinity of the site. The closest surface water body is Hunts Creek located approximately 550m to the south of the site. Given the distance this waterbody is unlikely 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	<p>Small scale agricultural uses (possibly market gardens) were evident in Section A. A residential property was observed in the western area of Section A.</p> <p>Section B appeared to be predominately covered by trees. A cricket pitch was observed in the north-east section of the site. Small scale agricultural uses (possibly market gardens) were evident in eastern section of Section B. A building appeared to adjacent to the west of the cricket pitch.</p>
1956	The site and immediate surrounds appeared to be generally similar the 1943 aerial photograph.
1964	The site and immediate surrounds appeared to be generally similar the 1956 aerial photograph.
1965	The site and immediate surrounds appeared to be generally similar the 1964 aerial photograph. However, the cricket pitch appeared to be in process of being disturbed/filled. Various buildings appeared to have been constructed in the north west area of Section B.
1970	The density of housing in the surrounding area had increased. Development had increased in Section B. What appeared to be recreation facilities were under construction in the west area of Section B.
1982	<p>The construction of tennis courts, car park and a community center generally consistent in layout with the existing (2017) configuration appeared to have been completed in the west area of Section B. New roads appeared to have been constructed in the eastern area of Section B.</p> <p>The previous road in the northern section of Section A appeared to have been removed. The former residential property appeared to have been demolished.</p>
1991	<p>A new building appeared to have been built in the north eastern area of Section A, possibly a childcare centre.</p> <p>Two new buildings appeared to have been constructed in the south-west corner of Section B.</p>
2003	The site and immediate surrounds appeared to be generally similar the 1991 aerial photograph. Section A appeared to have been upgraded with paths and other small structures, generally consistent with the existing 2017 configuration.

Year	Details
2009	The site and immediate surrounds appeared to be generally similar to the 2003 aerial photograph. Section B appeared to have been redeveloped with some new buildings and the overall site layout appeared similar to the existing (2017) layout. A new retaining wall appeared to have been constructed to the south of the cricket field.
2014	The site and immediate surrounds appeared to be generally similar the 1956 aerial photograph.

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 (1997⁹).

The search included the site area and surrounding areas in the report buffer of 1,000m. The search indicated the following:

- There were no records for the site under Section 58 or 60 of the CLM Act 1997. A 7-eleven service station located approximately 550m to the west (i.e. cross-gradient) of the site was listed as under assessment; and
- There were no records for licenced activities at the site under the POEO Act 1997. Current and historical licenses were identified for 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:

- A building suppliers business was registered at the south-west corner of Section B between 1970 and 1986; and
- There were various motor mechanics businesses registered within the report buffer during the 1970s and 1990s. These were located over 275m down-gradient of the site.

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

⁹ NSW Government Legislation, (1997). *Protection of the Environment Operations Act 1997*. (referred to as POEO Act 1997)

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

- There were no local or state heritage items at the site or in the immediate surrounds; and
- Wet Sclerophyll forests were recorded across the southern area of Section B.

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
1943-1970	Agricultural (market gardening)
1965	Filling may have occurred in Section B or prior to this date.
1970-2016	Recreational park and sports fields.
1991	Childcare center appeared to have been constructed in Section A.

4.5 Integrity of Site History Information

The majority of the site history information was obtained from government organisations as outlined in 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
<p><u>Fill material</u> - 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.</p> <p>In particular the playing fields in Section B may have been constructed over fill placed there in the 1960s.</p>	<p>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.</p> <p>As the nature of the fill material is unknown hazardous ground gases should also be considered.</p>
<p><u>Historical agricultural use</u> – The site appears to have been used for grazing and market garden purposes. This could have resulted in contamination across the site via use of machinery, application of pesticides and building/demolition of various structures. Old asbestos irrigation pipes may also be present for irrigation purposes.</p>	<p>Heavy metals, TRH, PAHs, OCPs, PCBs and asbestos</p>
<p><u>Hazardous Building Material</u> – 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. A building supply business was located in the south-west corner of Section B</p>	<p>Asbestos, lead and PCBs</p>
<p><u>Off-site sources</u> – A car wash was located to the north of section B.</p>	<p>TRH/BTEXN.</p>

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

<p>Potential mechanism for contamination</p>	<p>Potential mechanisms for contamination include:</p> <ul style="list-style-type: none"> • 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); • Hazardous building materials – ‘top-down’ (e.g. demolition resulting in surficial impacts in unpaved areas); and • Off-site land uses – ‘top-down’, spill or sub-surface release. Impacts to the site could occur via migration of contaminated groundwater.
<p>Affected media</p>	<p>Soil/soil gas and groundwater have been identified as potentially affected media.</p>
<p>Receptor identification</p>	<p>Human receptors include site occupants/users, construction workers and intrusive maintenance workers. Off-site human receptors include adjacent land users.</p> <p>Ecological receptors include terrestrial organisms and plants within unpaved areas.</p>
<p>Potential Exposure pathways</p>	<p>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.</p> <p>Potential exposure pathways for ecological receptors include primary contact and ingestion.</p>

6 CONCLUSIONS

6.1 Contamination Sources/AEC and Potential for Site Contamination

Based on the scope of work undertaken for this assessment, EIS identified the following potential contamination sources/AEC: Fill material; historical agriculture use and hazardous building material.

If there is putrescible material present in any area of deep filling hazardous ground gases will need to be included as a CoPC.

Considering the above, and based on a qualitative assessment of various lines of evidence as discussed throughout this report, EIS are of the opinion that there is a moderate potential for site contamination.

6.2 Conclusions and Recommendations

Based on the scope of work undertaken for the assessment, EIS are of the opinion that the historical land uses and potential sources of contamination identified are unlikely to preclude the proposed development. However, once the final design has been prepared a targeted Stage 2 intrusive investigation should be undertaken to characterise the site contamination conditions. If demolition of the existing buildings is required a hazardous building materials survey should be undertaken prior to demolition.

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

7 **LIMITATIONS**

The following limitation apply to this assessment:

- 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 assessment; 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;
- The 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.

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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



NOTES:
 Figure has been recreated from UBD on disc (version 7.1) and Google SixMaps
 Figure is not to scale. UBD Map ref: 171 Q16 & Q16, 172 A15 & 172 A16
 This plan should be read in conjunction with
 the EIS report.

EIS
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SITE LOCATION PLAN
 North Rocks Park Precinct, Carlingford,
 NSW

PROJECT ID: E30690K

F1



Multiple Fibre Cement Fragments (FCFs)

Childrens Play Equipment

Stockpile

Don Moore Community Centre

Tennis courts

Retaining wall
(large volume of fill retained)

AC Car Park

Construction site

Water storage tanks

AC Car Park

North Rocks Childcare Centre

SITE
(Section B)

ROBBIE CRESCENT

Childrens Play Equipment

Skate Park

PARKLAND ROAD

METCALF AVENUE

Swings

Basketball Court

HIBISCUS AVENUE

SITE
(Section A)



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

- - - - - Approximate site boundary



SS

Surface Sample (SS) - Fibre Cement Fragment (FCF)

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SAMPLE LOCATION PLAN

North Rocks Park Precinct, Carlingford, NSW

PROJECT ID: E30690K

F2

REPORT APPENDICES

Appendix A: Site Information

Selected Site Photos

Section A



Section B



Lotsearch Environmental Risk and Planning Report

Lotsearch



Environmental Risk and Planning Report

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

Report Date: 12 Jul 2017 17:27:47

Disclaimer:

The purpose of this report is to provide an overview of some of the site history, environmental risk and planning information available, affecting an individual address or geographical area in which the property is located. It is not a substitute for an on-site inspection or review of other available reports and records. It is not intended to be, and should not be taken to be, a rating or assessment of the desirability or market value of the property or its features. You should obtain independent advice before you make any decision based on the information within the report. The detailed terms applicable to use of this report are set out at the end of this report.

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Location Confidences

Where Lotsearch has had to georeference features from supplied addresses, a location confidence has been assigned to the data record. This indicates a confidence to the positional accuracy of the feature. Where applicable, a code is given under the field heading “LC” or “LocConf”. These codes lookup to the following location confidences:

LC Code	Location Confidence
1	Georeferenced to the site location / premise or part of site
2	Georeferenced with the confidence of the general/approximate area
3	Georeferenced to the road or rail
4	Georeferenced to the road intersection
5	Feature is a buffered point
6	Land adjacent to Georeferenced Site
7	Georeferenced to a network of features

Dataset Listing

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

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	Dataset Buffer (m)	No. Features Onsite	No. Features within 100m	No. Features within Buffer
Cadastre Boundaries	Land and Property Information	12/07/2017	12/07/2017	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	22/06/2017	13/06/2017	Monthly	1000	0	0	1
Contaminated Land: Records of Notice	Environment Protection Authority	22/06/2017	22/06/2017	Monthly	1000	0	0	0
Former Gasworks	Environment Protection Authority	22/06/2017	16/01/2017	Monthly	1000	0	0	0
National Waste Management Site Database	Geoscience Australia	07/03/2017	15/11/2012	Quarterly	1000	0	0	0
EPA PFAS Investigation Program	Environment Protection Authority	22/06/2017	22/06/2017	Monthly	2000	0	0	0
EPA Other Sites with Contamination Issues	Environment Protection Authority	22/06/2017	22/06/2017	Quarterly	1000	0	0	0
Licensed Activities under the POEO Act 1997	Environment Protection Authority	13/06/2017	13/06/2017	Monthly	1000	0	0	1
Delicensed POEO Activities still Regulated by the EPA	Environment Protection Authority	13/06/2017	13/06/2017	Monthly	1000	0	0	0
Former POEO Licensed Activities now revoked or surrendered	Environment Protection Authority	13/06/2017	13/06/2017	Monthly	1000	0	0	4
UPSS Environmentally Sensitive Zones	Department of Environment, Climate Change and Water (NSW)	14/04/2015	12/01/2010	As required	1000	0	0	0
UBD Business to Business Directory 1991 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business to Business Directory 1991 (Road & Area Matches)	Hardie Grant			Not required	150	-	1	1
UBD Business to Business Directory 1986 (Premise & Intersection Matches)	Hardie Grant			Not required	150	1	1	1
UBD Business to Business Directory 1986 (Road & Area Matches)	Hardie Grant			Not required	150	-	1	1
UBD Business Directory 1982 (Premise & Intersection Matches)	Hardie Grant			Not required	150	1	1	1
UBD Business Directory 1982 (Road & Area Matches)	Hardie Grant			Not required	150	-	2	2
UBD Business Directory 1978 (Premise & Intersection Matches)	Hardie Grant			Not required	150	1	1	1
UBD Business Directory 1978 (Road & Area Matches)	Hardie Grant			Not required	150	-	1	1
UBD Business Directory 1975 (Premise & Intersection Matches)	Hardie Grant			Not required	150	1	1	1
UBD Business Directory 1975 (Road & Area Matches)	Hardie Grant			Not required	150	-	0	0
UBD Business Directory 1970 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business Directory 1970 (Road & Area Matches)	Hardie Grant			Not required	150	-	1	1
UBD Business Directory 1965 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business Directory 1965 (Road & Area Matches)	Hardie Grant			Not required	150	-	0	0
UBD Business Directory 1950 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business Directory 1950 (Road & Area Matches)	Hardie Grant			Not required	150	-	3	3
UBD Business Directory Drycleaners & Motor Garages/Service Stations (Premise & Intersection Matches)	Hardie Grant			Not required	1000	0	0	24
UBD Business Directory Drycleaners & Motor Garages/Service Stations (Road & Area Matches)	Hardie Grant			Not required	1000	-	5	55
Points of Interest	Land and Property Information	01/02/2017	01/02/2017	Annually	1000	7	8	42

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	Dataset Buffer (m)	No. Features Onsite	No. Features within 100m	No. Features within Buffer
Tanks (Areas)	Land and Property Information	01/02/2017	01/02/2017	Annually	1000	0	0	0
Tanks (Points)	Land and Property Information	01/02/2017	01/02/2017	Annually	1000	0	0	1
Major Easements	Land and Property Information	01/02/2017	01/02/2017	As required	1000	2	3	23
State Forest	Land and Property Information	01/02/2017	29/06/2016	As required	1000	0	0	0
NSW National Parks and Wildlife Service Reserves	NSW Office of Environment and Heritage	01/02/2017	31/12/2016	Annually	1000	0	0	0
Hydrogeology Map of Australia	Commonwealth of Australia (Geoscience Australia)	08/10/2014	17/03/2000	As required	1000	1	1	1
Groundwater Boreholes	NSW Department of Primary Industries - Office of Water / Water Administration Ministerial Corporation; Commonwealth of Australia (Bureau of Meteorology) 2015	21/03/2016	01/12/2015	Annually	2000	0	0	21
Geological Units 1:100,000	NSW Department of Industry, Resources & Energy	20/08/2014		None planned	1000	2	-	2
Geological Structures 1:100,000	NSW Department of Industry, Resources & Energy	20/08/2014		None planned	1000	0	-	0
Naturally Occurring Asbestos Potential	NSW Department of Industry, Resources & Energy	04/12/2015	24/09/2015	Unknown	1000	0	0	0
Soil Landscapes	NSW Office of Environment and Heritage	12/08/2014		None planned	1000	2	-	4
Standard Local Environmental Plan Acid Sulfate Soils	NSW Planning and Environment	07/10/2016	07/10/2016	As required	500	0	-	-
Dryland Salinity - National Assessment	National Land and Water Resources Audit	18/07/2014	12/05/2013	None planned	1000	0	0	0
Dryland Salinity Potential of Western Sydney	NSW Office of Environment and Heritage	12/05/2017	01/01/2002	None planned	1000	2	2	2
Mining Subsidence Districts	Land and Property Information	05/07/2017	01/07/2017	As required	1000	0	0	0
SEPP 14 - Coastal Wetlands	NSW Planning and Environment	17/12/2015	24/10/2008	Annually	1000	0	0	0
SEPP 26 - Littoral Rainforest	NSW Planning and Environment	17/12/2015	05/02/1988	Annually	1000	0	0	0
SEPP 71 - Coastal Protection	NSW Planning and Environment	17/12/2015	01/08/2003	Annually	1000	0	0	0
SEPP Major Developments 2005	NSW Planning and Environment	09/03/2013	25/05/2005	Under Review	1000	0	0	0
SEPP Strategic Land Use Areas	NSW Planning and Environment	06/07/2016	28/01/2014	Annually	1000	0	0	0
Local Environmental Plan - Land Zoning	NSW Planning and Environment	30/06/2017	23/06/2017	Quarterly	1000	2	4	48
Local Environmental Plan - Minimum Subdivision Lot Size	NSW Planning and Environment	30/06/2017	23/06/2017	Quarterly	0	1	-	-
Local Environmental Plan - Height of Building	NSW Planning and Environment	30/06/2017	23/06/2017	Quarterly	0	1	-	-
Local Environmental Plan - Floor Space Ratio	NSW Planning and Environment	30/06/2017	23/06/2017	Quarterly	0	0	-	-
Local Environmental Plan - Land Application	NSW Planning and Environment	30/06/2017	13/04/2017	Quarterly	0	1	-	-
Local Environmental Plan - Land Reservation Acquisition	NSW Planning and Environment	30/06/2017	23/06/2017	Quarterly	0	0	-	-
State Heritage Items	NSW Office of Environment and Heritage	20/04/2017	30/09/2016	Quarterly	1000	0	0	0
Local Heritage Items	NSW Planning and Environment	30/06/2017	16/06/2017	Monthly	1000	0	1	3
Bush Fire Prone Land	NSW Rural Fire Service	28/03/2017	17/02/2017	Quarterly	1000	0	0	2
Native Vegetation of the Sydney Metropolitan Area	NSW Office of Environment and Heritage	01/03/2017	16/12/2016	As required	1000	5	5	10
RAMSAR Wetlands	Commonwealth of Australia Department of the Environment	08/10/2014	24/06/2011	As required	1000	0	0	0
ATLAS of NSW Wildlife	NSW Office of Environment and Heritage	12/07/2017	12/07/2017	Daily	10000	-	-	-

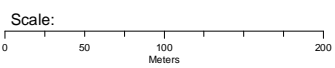
Aerial Imagery 2015

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Legend

- Site Boundary
- Buffer 150m



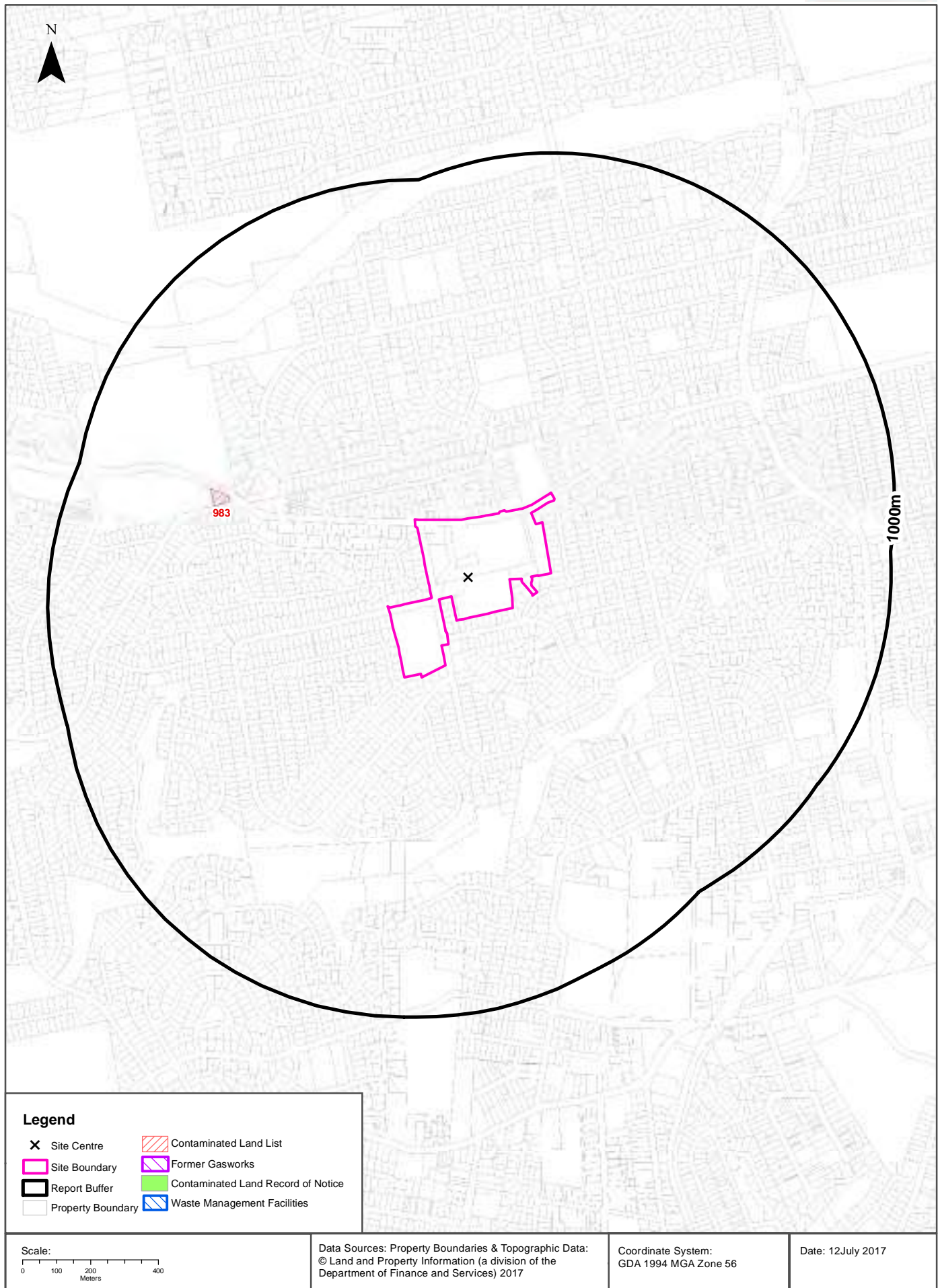
Data Sources: Aerial Imagery © 2017 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11 July 2017

Contaminated Land & Waste Management Facilities

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Contaminated Land & Waste Management Facilities

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

List of NSW contaminated sites notified to EPA

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

Map Id	Site	Address	Suburb	Activity	Management Class	Status	Location Confidence	Dist (m)	Direction
983	7-Eleven Service Station	340 North Rocks Road	North Rocks	Service Station	Under assessment	Current EPA List	Premise Match	550m	West

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
 © State of New South Wales through the Environment Protection Authority

Contaminated Land & Waste Management Facilities

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

Contaminated Land: Records of Notice

Record of Notices within the dataset buffer:

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

Contaminated Land Records of Notice Data Source: Environment Protection Authority
© State of New South Wales through the 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 dataset buffer:

Map Id	Location	Council	Further Info	Location Confidence	Distance	Direction
N/A	No records in buffer					

Former Gasworks Data Source: Environment Protection Authority
© State of New South Wales through the Environment Protection Authority

National Waste Management Site Database

Sites on the National Waste Management Site Database within the dataset buffer:

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

Waste Management Facilities Data Source: Australian Government Geoscience Australia
Creative Commons 3.0 © Commonwealth of Australia <http://creativecommons.org/licenses/by/3.0/au/deed.en>

EPA PFAS Investigation Program

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

EPA PFAS Investigation Program

Sites that are part of the EPA PFAS investigation program, within the dataset buffer:

Id	Site	Address	Location Confidence	Distance	Direction
N/A	No records in buffer				

EPA PFAS Investigation Program: Environment Protection Authority
© State of New South Wales through the Environment Protection Authority

EPA Other Sites with Contamination Issues

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

EPA Other Sites with Contamination Issues

This dataset contains other sites identified on the EPA website as having contamination issues. This dataset currently includes:

- James Hardie asbestos manufacturing and waste disposal sites
- Radiological investigation sites in Hunter's Hill

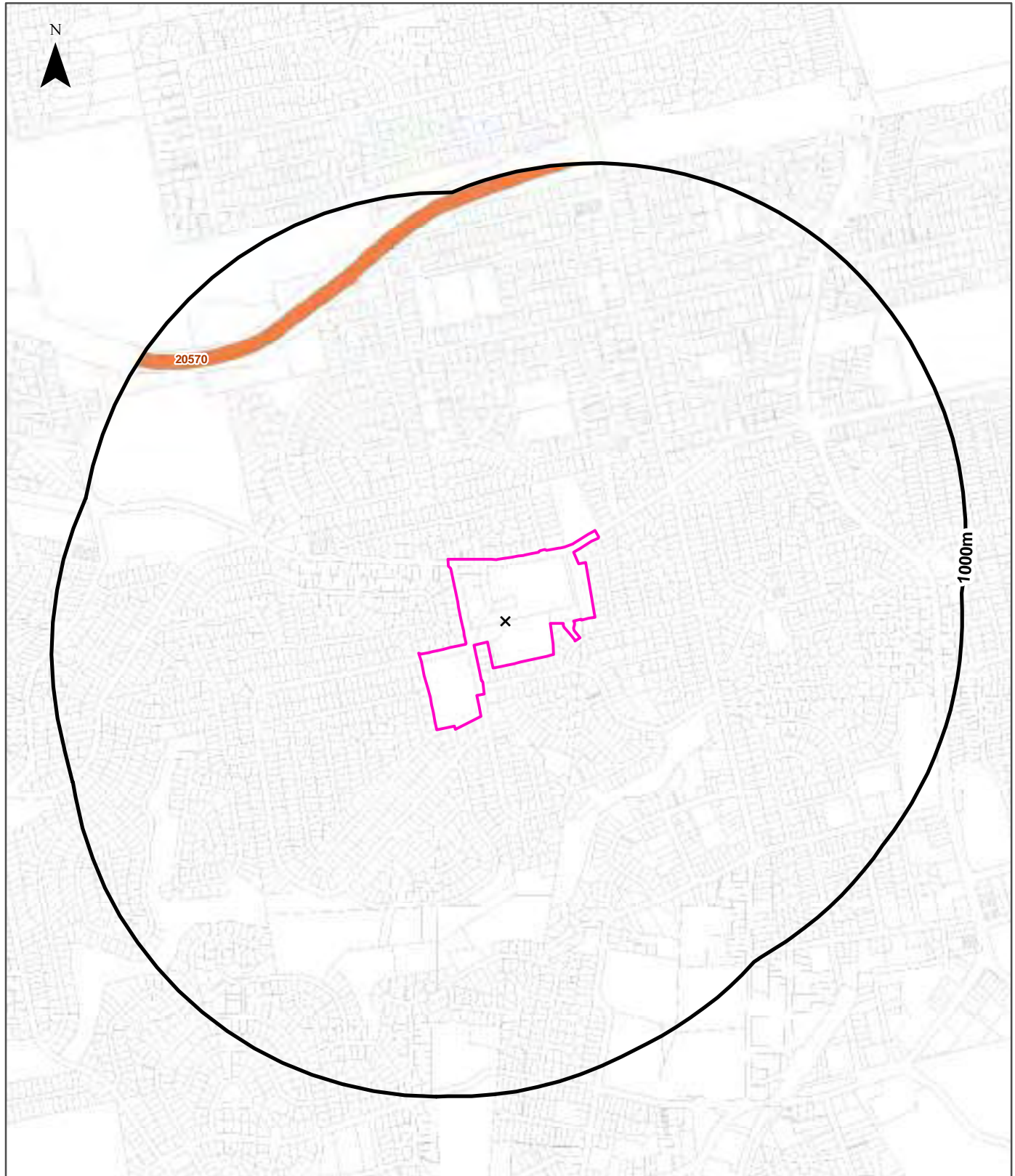
Sites within the dataset buffer:

Site Id	Site Name	Site Address	Dataset	Comments	Location Confidence	Distance	Direction
N/A	No records in buffer						

EPA Other Sites with Contamination Issues: Environment Protection Authority
© State of New South Wales through the Environment Protection Authority

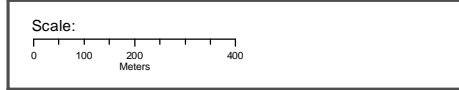
Current EPA Licensed Activities

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Legend

- X Site Centre
- Site Boundary
- Report Buffer
- Property Boundary
- Current Licensed Activities under POEO Act
- Current Licences related to Other Activities incl. Application of Herbicides to Waterways
- Current Licences related to Irrigated Agriculture



Data Sources: Property Boundaries & Topographic Data:
 © Land and Property Information (a division of the
 Department of Finance and Services) 2017

Coordinate System:
 GDA 1994 MGA Zone 56

Date: 12 July 2017

EPA Activities

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

Licensed Activities under the POEO Act 1997

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

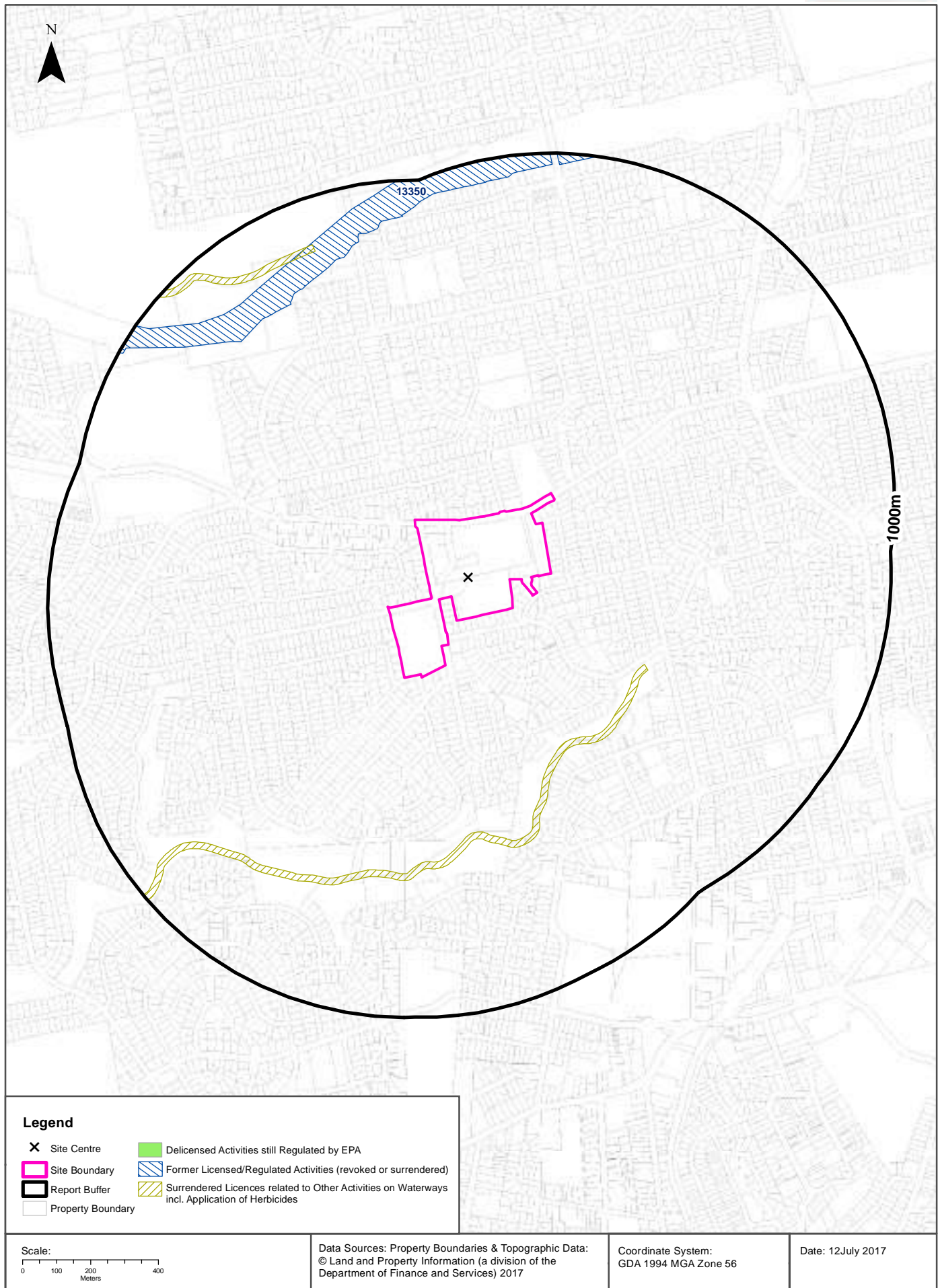
EPL	Organisation	Name	Address	Suburb	Activity	Loc Conf	Distance	Direction
20570	LENLEASE ENGINEERING PTY LIMITED	NorthConnex Project	BETWEEN WINDSOR ROAD, BAULKHAM HILLS and M2 MOTORWAY, PENNANT HILLS AND M1 MOTORWAY., WAHROONGA, NSW 2076	WAHROONGA	Road construction	3	758m	North

POEO Licence Data Source: Environment Protection Authority

© State of New South Wales through the Environment Protection Authority

Delicensed & Former Licensed EPA Activities

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



EPA Activities

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

Delicensed Activities still regulated by the EPA

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

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

Delicensed Activities Data Source: Environment Protection Authority

© State of New South Wales through the Environment Protection Authority

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

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

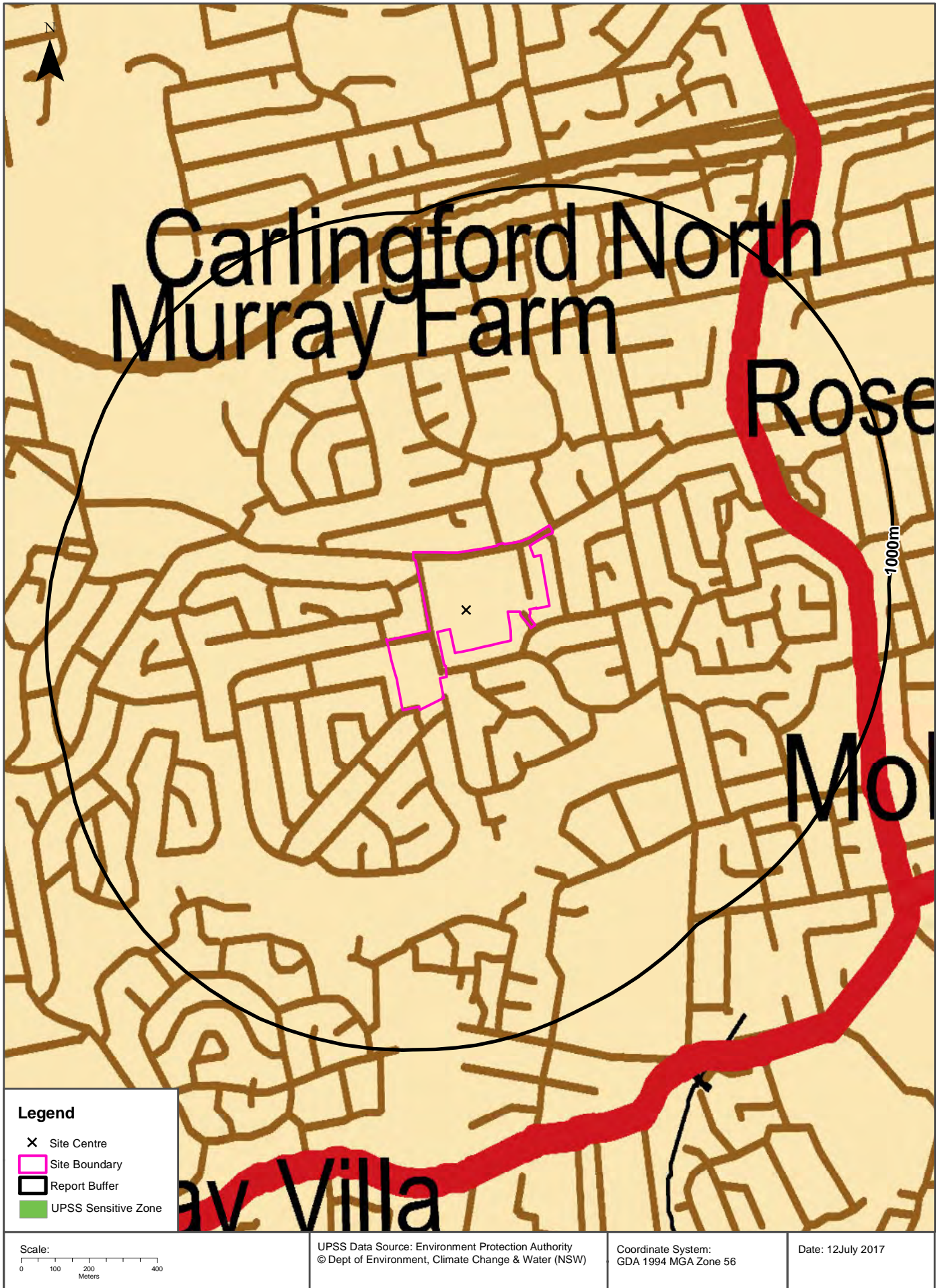
Licence No	Organisation	Location	Status	Issued Date	Activity	Loc Conf	Distance	Direction
4653	LUHRMANN ENVIRONMENT MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW	Surrendered		Other Activities / Non Scheduled Activity - Application of Herbicides	7	373m	-
4838	Robert Orchard	Various Waterways throughout New South Wales - SYDNEY NSW 2000	Surrendered		Other Activities / Non Scheduled Activity - Application of Herbicides	7	373m	-
6630	SYDNEY WEED & PEST MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW - PROSPECT, NSW, 2148	Surrendered		Other Activities / Non Scheduled Activity - Application of Herbicides	7	373m	-
13350	CPB CONTRACTORS PTY LIMITED	M2 Motorway, Windsor Road, BAULKHAM HILLS, NSW 2153	Surrendered	23/12/2010	Road construction	3	732m	North

Former Licensed Activities Data Source: Environment Protection Authority

© State of New South Wales through the Environment Protection Authority

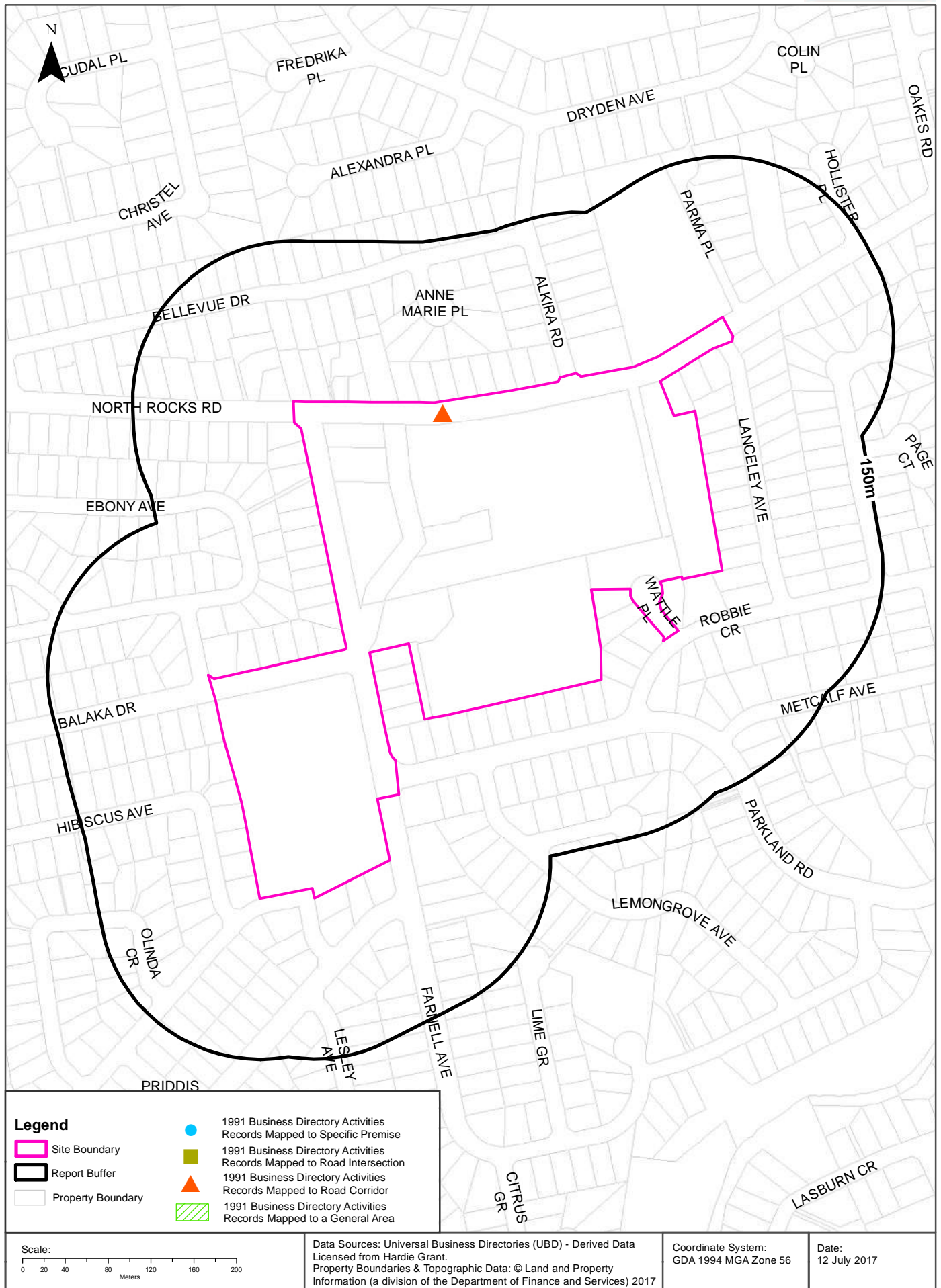
UPSS Sensitive Zones

Leeds Street, Rhodes, NSW 2138



1991 Historical Business Directory Records

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Historical Business Directories

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

1991 Business to Business Directory Records Premise or Road Intersection Matches

Records from the 1991 UBD Business to Business Directory, mapped to a premise or road intersection, within the dataset buffer:

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

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

1991 Business to Business Directory Records Road or Area Matches

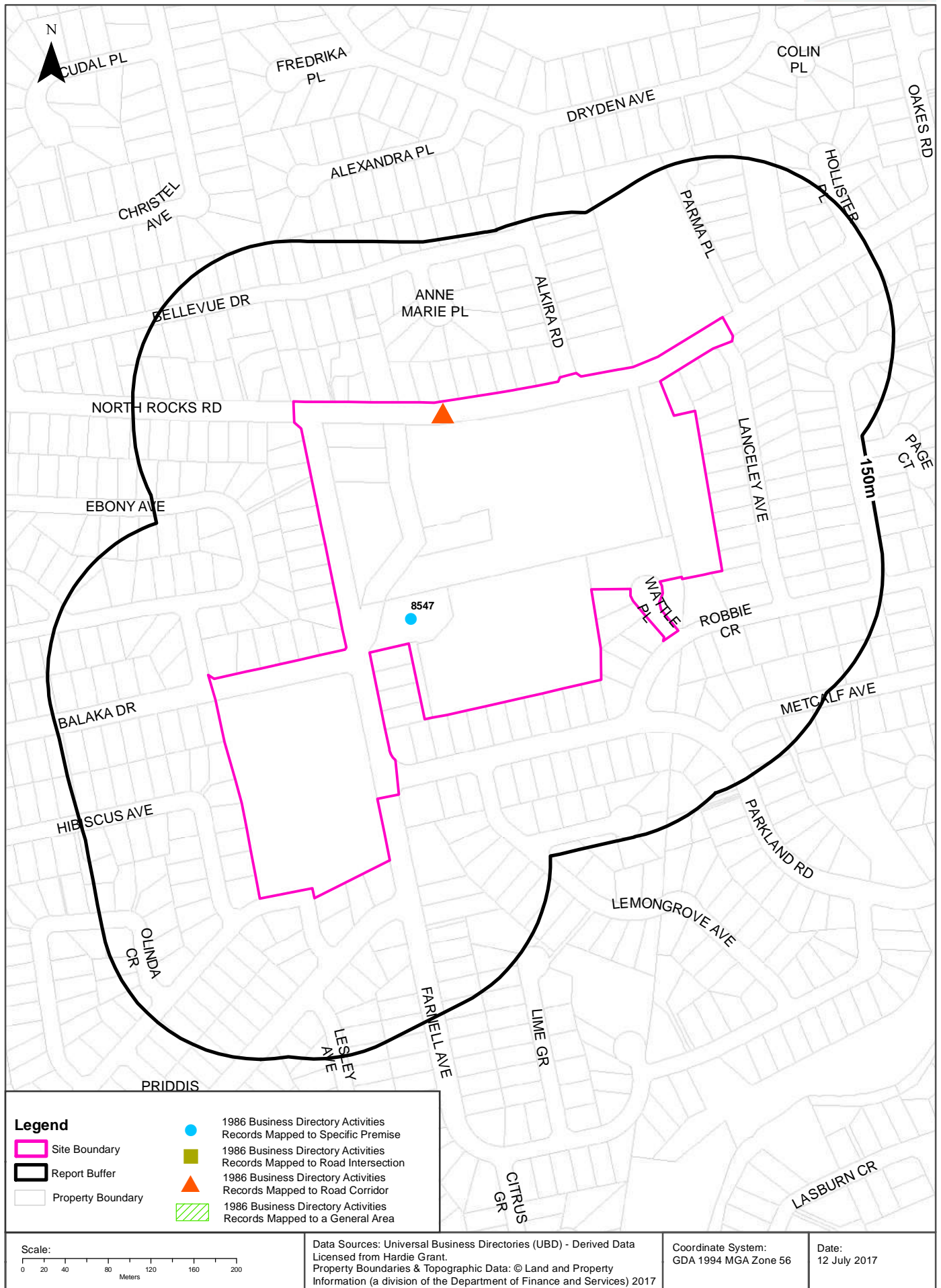
Records from the 1991 UBD Business to Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Business Activity	Organisation	Address	Ref No.	Location Confidence	Distance to Road Corridor or Area
Motor Garages & Service Stations	Ampol Carlingford Service Station	North Rocks Rd., Carlingford	53466	Road Match	0m

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

1986 Historical Business Directory Records

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Historical Business Directories

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

1986 Business to Business Directory Records Premise or Road Intersection Matches

Records from the 1986 UBD Business to Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Feature Point	Direction
BUILDERS SUPPLIERS.	Deltec Pty. Ltd., 4 Farnell Ave., Carlingford.	8547	Premise Match	0m	Onsite

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

1986 Business to Business Directory Records Road or Area Matches

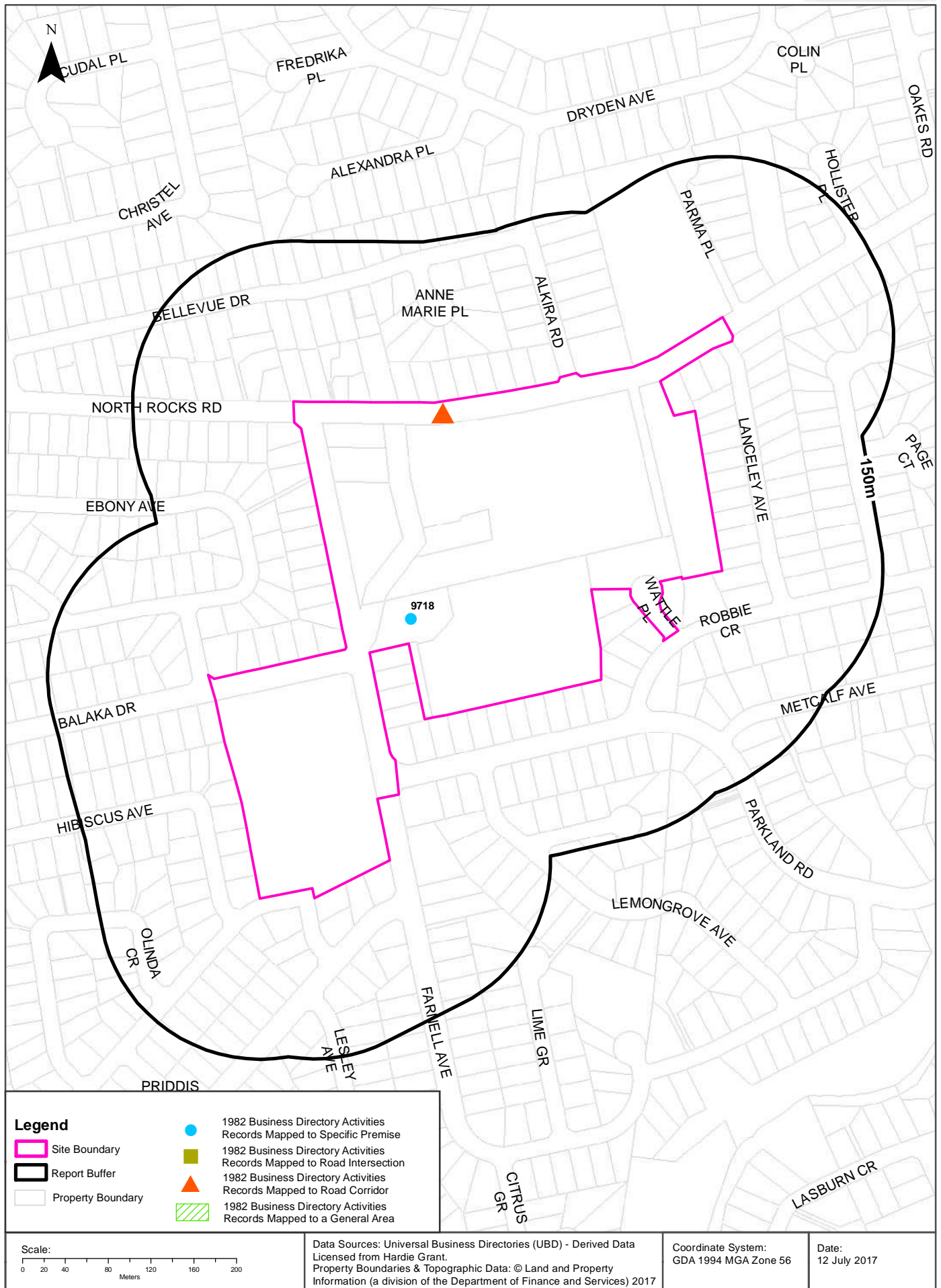
Records from the 1986 UBD Business to Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
MOTOR GARAGES & SERVICE STATIONS.	Ampol Service Station, North Rocks Rd., Carlingford.	63948	Road Match	0m

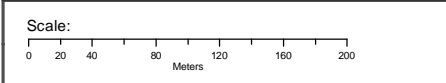
Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

1982 Historical Business Directory Records

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Legend	
	Site Boundary
	Report Buffer
	Property Boundary
	1982 Business Directory Activities Records Mapped to Specific Premise
	1982 Business Directory Activities Records Mapped to Road Intersection
	1982 Business Directory Activities Records Mapped to Road Corridor
	1982 Business Directory Activities Records Mapped to a General Area



Data Sources: Universal Business Directories (UBD) - Derived Data
 Licensed from Hardie Grant.
 Property Boundaries & Topographic Data: © Land and Property
 Information (a division of the Department of Finance and Services) 2017

Coordinate System:
 GDA 1994 MGA Zone 56

Date:
 12 July 2017

Historical Business Directories

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

1982 Business Directory Records Premise or Road Intersection Matches

Records from the 1982 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Feature Point	Direction
BUILDERS SUPPLIERS. (B7060)	Deltec Pty. Ltd., 4 Farnell Ave., Carlingford. 2118.	9718	Premise Match	0m	Onsite

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

1982 Business Directory Records Road or Area Matches

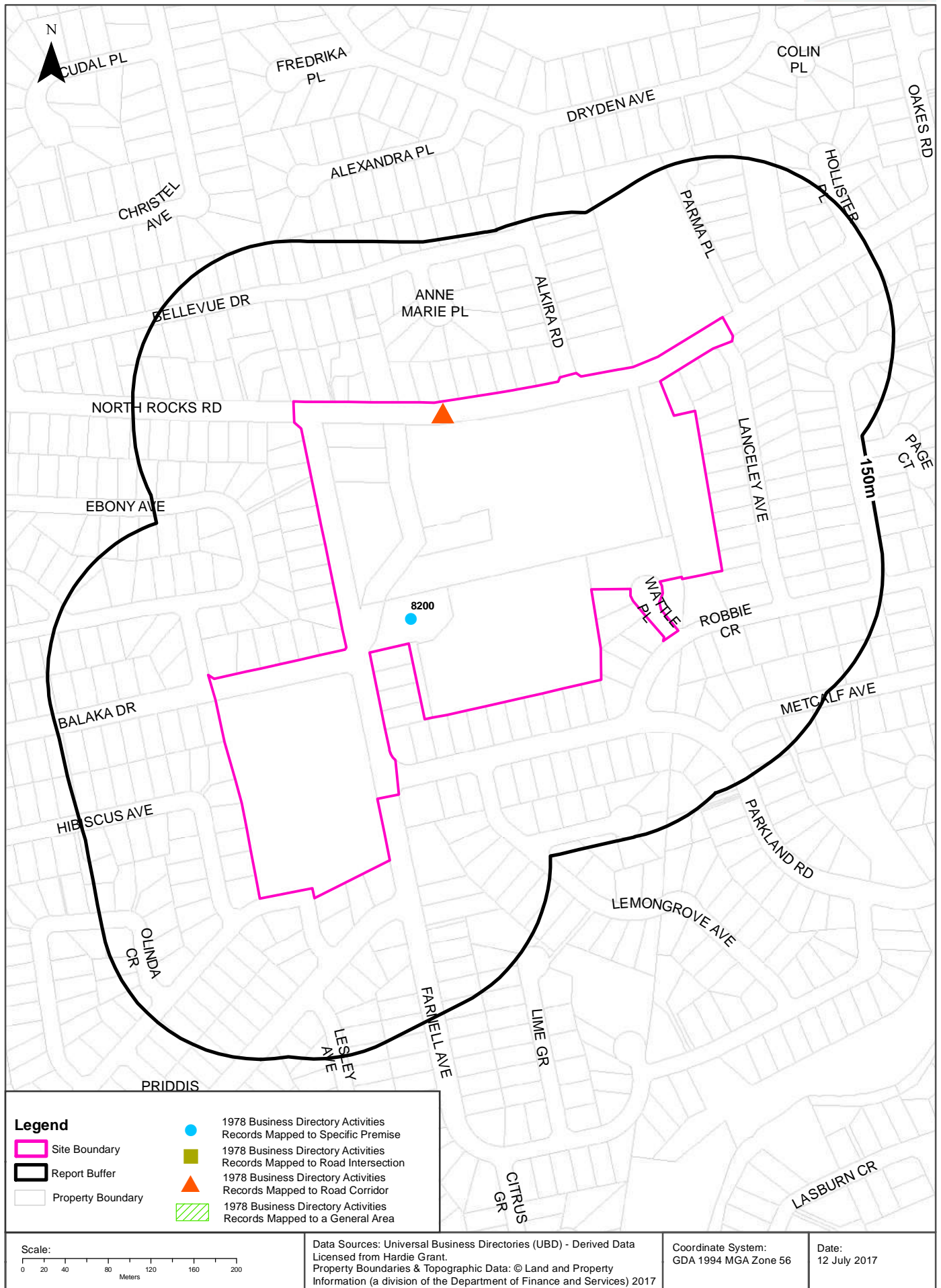
Records from the 1982 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS. (M6860)	Ampol Service Station, North Rocks Rd., Carlingford. 2118.	56028	Road Match	0m
SUPERMARKETS. (S7785)	Jewel Food Stores, North Rocks Rd., Carlingford. 2118.	77568	Road Match	0m

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

1978 Historical Business Directory Records

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Historical Business Directories

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

1978 Business Directory Records Premise or Road Intersection Matches

Records from the 1978 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Feature Point	Direction
BUILDERS SUPPLIERS.	Deltec Pty. Ltd., 4 Famel Ave., Carlingford.	8200	Premise Match	0m	Onsite

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

1978 Business Directory Records Road or Area Matches

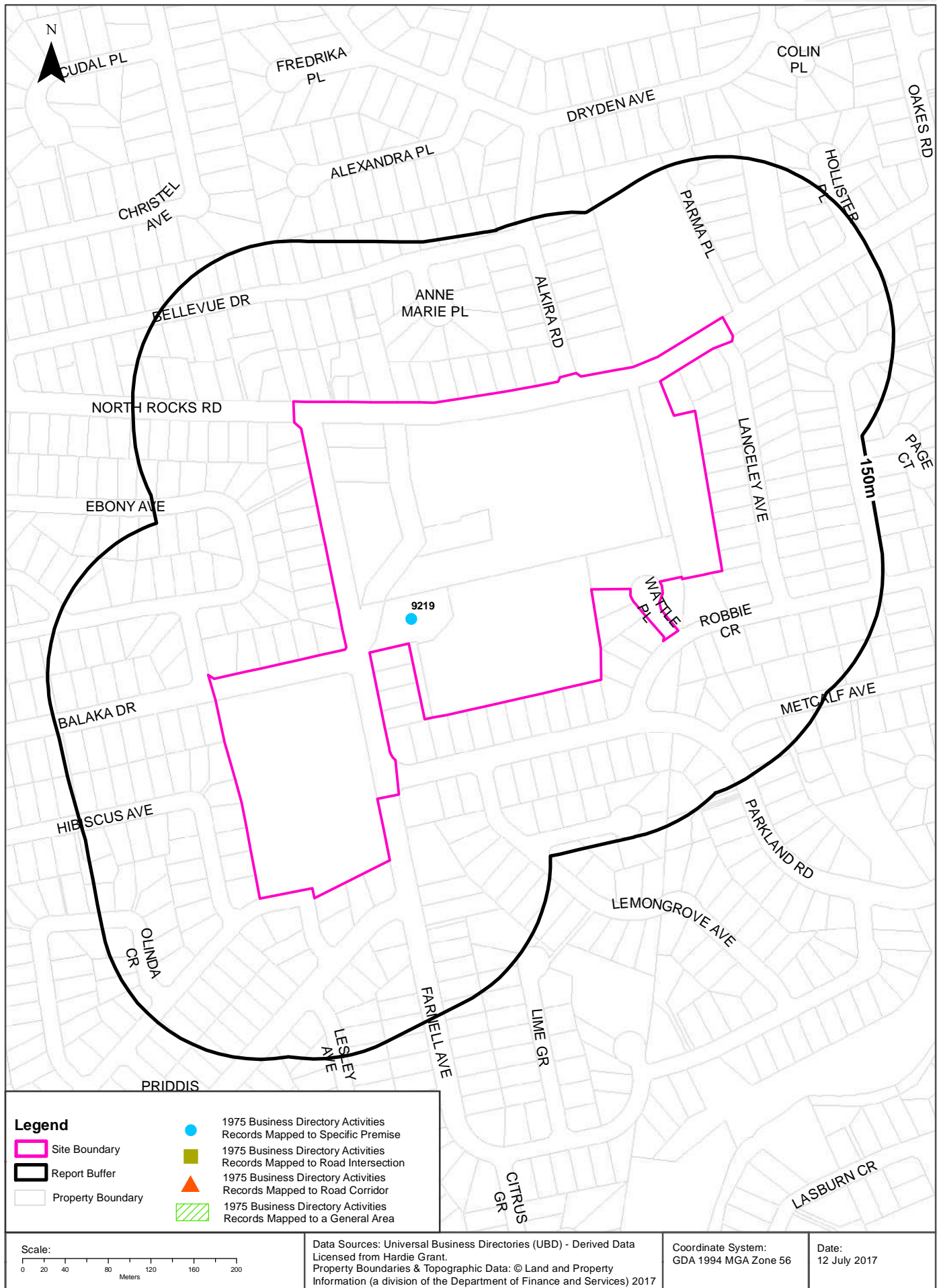
Records from the 1978 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	West Epping Servicentre, North Rocks Rd., West Epping.	51076	Road Match	0m

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

1975 Historical Business Directory Records

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Historical Business Directories

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

1975 Business Directory Records Premise or Road Intersection Matches

Records from the 1975 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Feature Point	Direction
BUILDERS SUPPLIERS.	Deltec Pty. Ltd., 4 Farnell Ave., Carlingford.	9219	Premise Match	0m	Onsite

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

1975 Business Directory Records Road or Area Matches

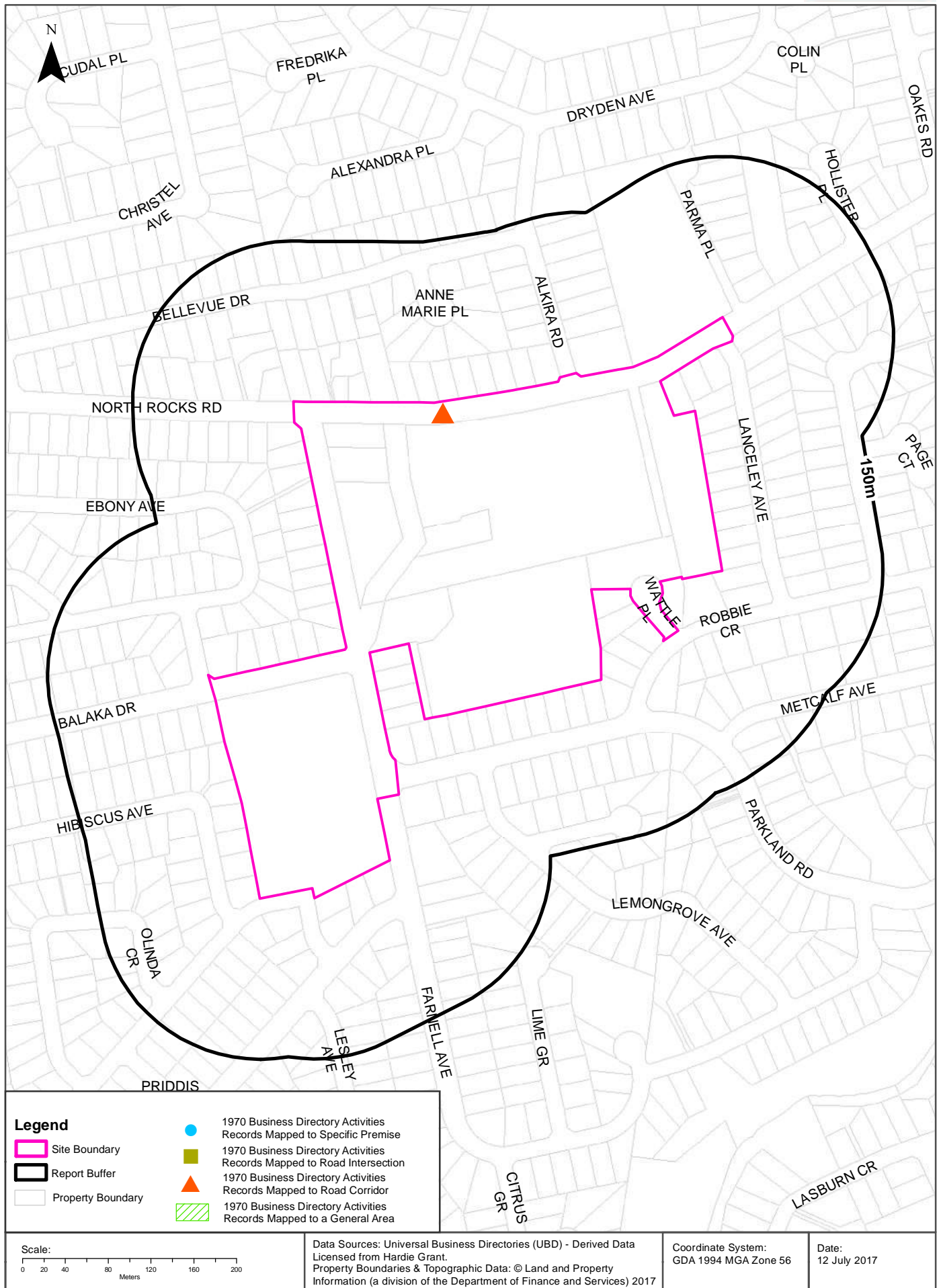
Records from the 1975 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
N/A	No records in buffer			

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

1970 Historical Business Directory Records

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Historical Business Directories

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

1970 Business Directory Records Premise or Road Intersection Matches

Records from the 1970 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Feature Point	Direction
N/A	No records in buffer				

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

1970 Business Directory Records Road or Area Matches

Records from the 1970 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
MOTOR GARAGES & ENGINEERS(M6S6)	West Epping Servicentre,North Rocks Rd.,West Epping.EPPING	338858	Road Match	0m

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

Historical Business Directories

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

1965 Business Directory Records Premise or Road Intersection Matches

Records from the 1965 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Feature Point	Direction
N/A	No records in buffer				

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

1965 Business Directory Records Road or Area Matches

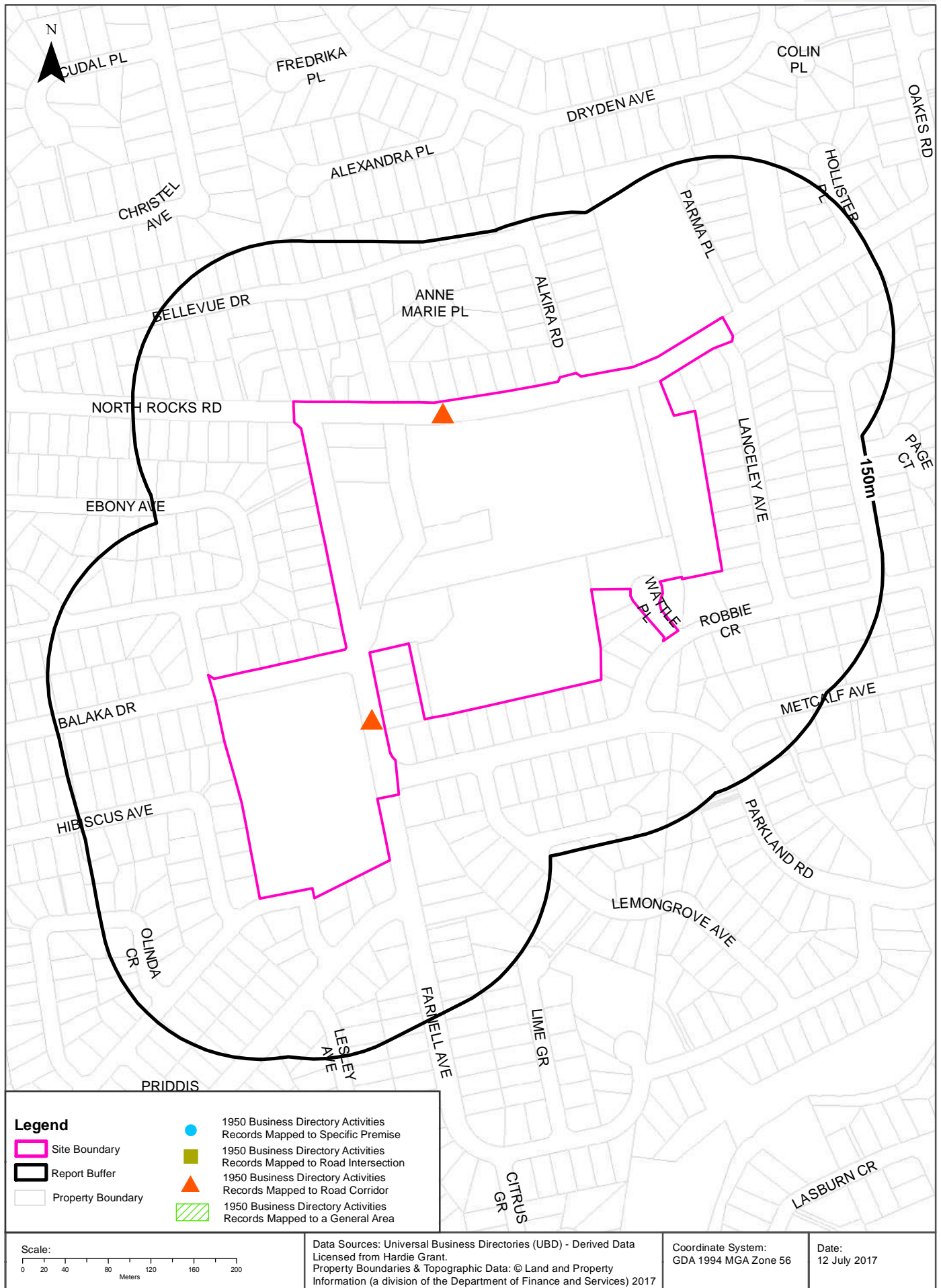
Records from the 1965 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
N/A	No records in buffer			

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

1950 Historical Business Directory Records

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Historical Business Directories

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

1950 Business Directory Records Premise or Road Intersection Matches

Records from the 1950 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Feature Point	Direction
N/A	No records in buffer				

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

1950 Business Directory Records Road or Area Matches

Records from the 1950 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
POULTRY FARMERS	Iddon, B., North Rocks Rd., Carlingford	94090	Road Match	0m
NURSERYMEN	Robinson, L., Farnell Ave., Carlingford	89269	Road Match	0m
POULTRY FARMERS	Stephenson, E. H., North Rocks Rd., Carlingford	94294	Road Match	0m

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

Historical Business Directories

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

Dry Cleaners, Motor Garages & Service Stations Premise or Road Intersection Matches

Dry Cleaners, Motor Garages & Service Stations from UBD Business Directories, mapped to a premise or road intersection, within the dataset buffer:

Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Feature Point	Direction
MOTOR GARAGES &/OR ENGINEERS.	North Rocks Service Station, 340 North Rocks Rd., North Rocks.	59327	1975	Premise Match	577m	West
MOTOR GARAGES & SERVICE STATIONS.	North Rocks Service Station, 340 North Rocks Rd., North Rocks.	65190	1986	Premise Match	579m	West
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS. (M6860)	North Rocks Service Station, 340 North Rocks Rd., North Rocks.2151.	57301	1982	Premise Match	579m	West
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	North Rocks Service Station, 340 North Rocks Rd., North Rocks.	50595	1978	Premise Match	579m	West
MOTOR GARAGES & ENGINEERS(M6S6)	North Rocks Service Station,340 North Rocks Rd.NORTH ROCKS	338338	1970	Premise Match	579m	West
Motor Garages & Engineers - North Rocks	North Rocks Service Station, 340 North Rocks Rd.	123129	1965	Premise Match	579m	West
MOTOR GARAGES & SERVICE STATIONS.	Turanga Service Station, 714 Pennant Hills Rd., Carlingford.	65649	1986	Premise Match	771m	North East
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS. (M6860)	Turanga Service Station, 714 Pennant Hills Rd., Carlingford. 2118.	57775	1982	Premise Match	771m	North East
Motor Garages & Service Stations	Turanga Service Station 714 Penant Hills Rd., Carlingford	53966	1991	Premise Match	797m	North East
MOTOR GARAGES & SERVICE STATIONS.	BP Muirfield Service Station, 316 North Rocks Rd., North Rocks.	64187	1986	Premise Match	809m	West
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS. (M6860)	BP Muirfield Service Station, 316 North Rocks Rd., North Rocks.2151.	56262	1982	Premise Match	809m	West
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	BP Muirfield Service Station, 316 North Rocks Rd., North Rocks.	49583	1978	Premise Match	809m	West
MOTOR SERVICE STATIONS - PETROL, OIL	BP Muirfield Service Station, 316 North Rocks Rd, North Rocks.	61526	1975	Premise Match	809m	West
MOTOR GARAGES & ENGINEERS(M6S6)	BP Muirfield Service Station,316 North Rocks Rd.NORTH ROCKS	337388	1970	Premise Match	809m	West
MOTOR SERVICE STATIONS - PETROL, OIL	BP Village Service Station, 712 Pennant Hills Rd., Carlingford.	61578	1975	Premise Match	820m	North East
MOTOR GARAGES & SERVICE STATIONS.	BP Village Service Station, 712 Pennant Hills Rd., Carlingford.	64246	1986	Premise Match	856m	North East
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS. (M6860)	BP Village Service Station, 712 Pennant Hills Rd., Carlingford. 2118.	56317	1982	Premise Match	856m	North East
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	BP Village Service Station. 712 Pennant Hills Rd., Carlingford.	49640	1978	Premise Match	856m	North East
MOTOR GARAGES & ENGINEERS(M6S6)	B.P. Village Service Station,712 Pennant Hills Rd.CARLINGFORD	337257	1970	Premise Match	856m	North East
MOTOR GARAGES & SERVICE STATIONS.	Shell Tingaroo Auto Port, 639 Pennant Hills Rd., Carlingford.	65445	1986	Premise Match	882m	North East
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS. (M6860)	Shell Tingaroo Auto Port, 639 Pennant Hills Rd., Carlingford. 2118.	57565	1982	Premise Match	882m	North East
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	Tingaroo Auto Port. 639 Pennant Hills Rd., Carlingford.	50946	1978	Premise Match	882m	North East
MOTOR GARAGES &/OR ENGINEERS.	Tingaroo Auto Port, 639 Pennant Hilla Rd, Carlingford.	59640	1975	Premise Match	882m	North East
MOTOR GARAGES & ENGINEERS(M6S6)	Tingaroo Auto Port,639 Pennant Hills Rd.CARLINGFORD	338733	1970	Premise Match	891m	North East

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

Historical Business Directories

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

Dry Cleaners, Motor Garages & Service Stations Road or Area Matches

Dry Cleaners, Motor Garages & Service Stations from UBD Business Directories, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
Motor Garages & Service Stations	Ampol Carlingford Service Station North Rocks Rd., Carlingford	53466	1991	Road Match	0m
MOTOR GARAGES & SERVICE STATIONS.	Ampol Service Station, North Rocks Rd., Carlingford.	63948	1986	Road Match	0m
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS. (M6860)	Ampol Service Station, North Rocks Rd., Carlingford. 2118.	56028	1982	Road Match	0m
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	West Epping Servicentre, North Rocks Rd., West Epping.	51076	1978	Road Match	0m
MOTOR GARAGES & ENGINEERS(M6S6)	West Epping Servicentre,North Rocks Rd.,West Epping.EPPING	338858	1970	Road Match	0m
MOTOR GARAGES & SERVICE STATIONS.	Amoco North Rocks Service Station, North Rocks Rd., North Rocks.	63898	1986	Road Match	275m
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS. (M6860)	Amoco North Rocks Service Station, North Rocks Rd., North Rocks.2151.	55979	1982	Road Match	275m
MOTOR GARAGES &/OR ENGINEERS.	Amoco Service Station, North Rocks Rd., North Rocks.	58332	1975	Road Match	275m
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	Amoco Service Station. North Rocks Rd., North Rocks.	49246	1978	Road Match	275m
MOTOR SERVICE STATIONS.	Amoco Service Station. North Rocks Rd., North Rocks.	61346	1975	Road Match	275m
MOTOR GARAGES & SERVICE STATIONS.	Caltex North Rocks Service Station, North Rocks Rd., North Rocks.	64369	1986	Road Match	275m
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS. (M6860)	Caltex North Rocks Service Station, North Rocks Rd., North Rocks.2151.	56438	1982	Road Match	275m
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	Caltex Service Station, North Rocks Rd., North Rocks.	49716	1978	Road Match	275m
MOTOR SERVICE STATIONS - PETROL, OIL	Caltex Service Station, North Rocks Rd., North Rocks.	61609	1975	Road Match	275m
Motor Garages & Service Stations	Esso North Rocks Service Station 264 North Rocks Rd., North Rocks	53727	1991	Road Match	275m
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS. (M6860)	Esso North Rocks Service Station, 264 North Rocks Rd., NorthRocks. 2151.	56720	1982	Road Match	275m
MOTOR SERVICE STATIONS.	Esso Servicenter, 264 North Rocks Rd., North Rocks.	61352	1975	Road Match	275m
Motor Garages & Service Stations	Ampol Carlingford Service Station Murray Farm Rd., Carlingford	53467	1991	Road Match	550m
MOTOR GARAGES & SERVICE STATIONS.	Ampol Service Station, Murray Farm Rd., Carlingford.	63949	1986	Road Match	550m
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	Ampol Service Station, Murray Farm Rd., Carlingford.	49294	1978	Road Match	550m
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS. (M6860)	Ampol Service Station, Murryfarm Rd., Carlingford. 2118.	56027	1982	Road Match	550m
MOTOR GARAGES &/OR ENGINEERS	Angel, A. R., Pennant Hills Rd., Carlingford	83378	1950	Road Match	614m
Motor Garages & Service Stations	BP Pioneer Service Station 89 Pennant Hills Rd., Carlingford. 2118	53592	1991	Road Match	614m
MOTOR GARAGES & SERVICE STATIONS.	BP Pioneer Service Station, 189 Pennant Hills Rd., Carlingford.	64203	1986	Road Match	614m

Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS. (M6860)	BP Pioneer Service Station, 189 Pennant Hills Rd., Carlingford.2118.	56280	1982	Road Match	614m
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	BP Pioneer Service Station. 189 Pennant Hills Rd., Carlingford.	49596	1978	Road Match	614m
MOTOR GARAGES &/OR ENGINEERS	Breem, M., Pennant Hills Rd., Carlingford	83492	1950	Road Match	614m
Motor Garages & Engineers - Carlingford	Breen Mart Service Station, 382 Pennant Hills Rd.	122388	1965	Road Match	614m
MOTOR GARAGES & ENGINEERS(M6S6)	Breen Mart Service Station,382 Pennant Hills Rd.CARLINGFORD	337427	1970	Road Match	614m
MOTOR SERVICE STATIONS-PETROL, Etc.	Breen, M., Pennant Hills Rd., Carlingford	85816	1950	Road Match	614m
MOTOR GARAGES & ENGINEERS(M6S6)	Carlingford Service,Station,Pennant Hills Rd.CARLINGFORD	337529	1970	Road Match	614m
MOTOR GARAGES & SERVICE STATIONS.	Carlingford Service Centre, Pennant Hills Rd., Carlingford.	64434	1986	Road Match	614m
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS. (M6860)	Carlingford Service Centre, Pennant Hills Rd., Carlingford. 2118.	56487	1982	Road Match	614m
Motor Garages & Engineers - Carlingford	Carlingford Service, Station, Pennant Hills Rd.	122389	1965	Road Match	614m
DRY CLEANERS & PRESSERS.	Galaxy Dry Cleaners, 2898 Pennant Hills Rd., Carlingford.	25315	1986	Road Match	614m
DRY CLEANERS & PRESSERS. (D8500)	Galaxy Dry Cleaners, 2898 Pennant Hills Rd., Carlingford. 2118.	23846	1982	Road Match	614m
DRY CLEANERS, PRESSERS &/OR DYERS	Galaxy Dry Cleaners, 289b Pennant Hills Rd., Carlingford.	20785	1978	Road Match	614m
DRY CLEANERS,PRESSERS/DYERS (D710)	Galaxy Dry Cleaners,289b Pennant Hills Rd.,Carlingford	292308	1970	Road Match	614m
Motor Garages & Engineers - Carlingford	Gilmore, G. H. , Pennant Hills Rd.	122390	1965	Road Match	614m
MOTOR GARAGES &/OR ENGINEERS	Gilmour, G. H., Pennant Hills Rd., Carlingford	83803	1950	Road Match	614m
MOTOR SERVICE STATIONS-PETROL, Etc.	Gilmour, G. H., Pennant Hills Rd., Carlingford	85994	1950	Road Match	614m
Motor Garages & Engineers - Carlingford	Golden Fleece Carlingford, Pennant Hills Rd.	122391	1965	Road Match	614m
MOTOR GARAGES &/OR ENGINEERS	Grandview Garage (I. Baker, Propr.), Pennant Hills Rd., Carlingford	83819	1950	Road Match	614m
MOTOR SERVICE STATIONS-PETROL, Etc.	Hart's Garage, Pennant Hills Rd., Carlingford	86044	1950	Road Match	614m
Motor Service Stations - Petrol, Oil, Etc. - Carlingford	Hart's Garage, Pennant Hills Rd.	125566	1965	Road Match	614m
MOTOR SERVICE STATIONS-PETROL, Etc.	Jones, V., Pennant Hills Rd., Carlingford	86094	1950	Road Match	614m
Motor Service Stations - Petrol, Oil, Etc. - Carlingford	Korl Inn Service Station, Pennant Hills Rd.	125567	1965	Road Match	614m
MOTOR SERVICE STATIONS-PETROL, Etc.	Korl-Inn Service Station (N. Carty), Pennant Hills Rd., Carlingford	86118	1950	Road Match	614m
Motor Garages & Service Stations	Sundeck Service Station 792 Pennant Hills Rd., Carlingford	53930	1991	Road Match	614m
MOTOR GARAGES &/OR ENGINEERS.	Sundeck Service Station, 792 Pennant Hills Rd . Carlingford.	59592	1975	Road Match	614m
Motor Garages & Engineers - Carlingford	Sundeck Service Station, 792 Pennant Hills Rd.	122393	1965	Road Match	614m
MOTOR GARAGES & SERVICE STATIONS.	Sundeck Service Station, 792 Pennant Hills Rd., Carlingford.	65525	1986	Road Match	614m
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS.	Sundeck Service Station, 792 Pennant Hills Rd., Carlingford.	50891	1978	Road Match	614m
MOTOR GARAGES &/OR ENGINEERS &/OR SERVICE STATIONS. (M6860)	Sundeck Service Station, 792 Pennant Hills Rd., Carlingford. 2118,	57642	1982	Road Match	614m
MOTOR GARAGES & ENGINEERS(M6S6)	Sundeck Service Station,792 Pennant Hills Rd.CARLINGFORD	338681	1970	Road Match	614m

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

Aerial Imagery 2014

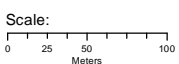
Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Legend

- X Site Centre
- Site Boundary
- Buffer 150m

© Land and Property Information 2015



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

Coordinate System:
GDA 1994 MGA Zone 56



Date: 12 July 2017

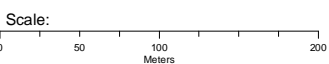
Aerial Imagery 2009

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Legend

-  Site Boundary
-  Buffer 150m



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Coordinate System:
GDA 1994 MGA Zone 56

Date: 11 July 2017

Aerial Imagery 2003

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Legend	
	Site Boundary
	Buffer 150m



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Coordinate System:
GDA 1994 MGA Zone 56

Date: 11 July 2017

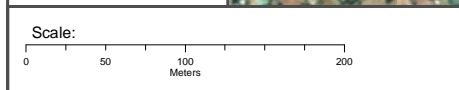
Aerial Imagery 1991

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Legend

- Site Boundary
- Buffer 150m



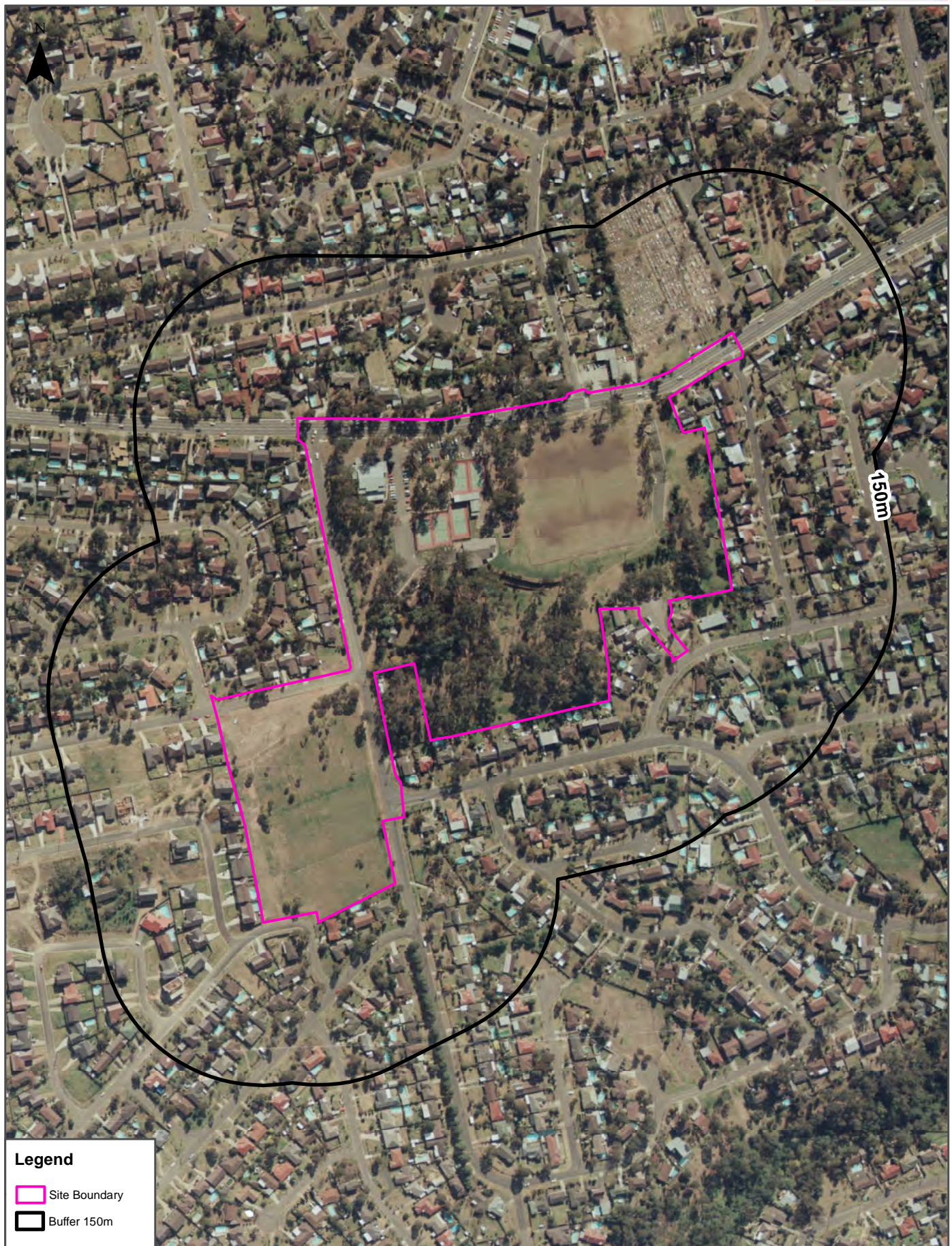
Data Sources: Historical Aerials: © Land and Property Information (a division of the Department of Finance and Services)

Coordinate System: GDA 1994 MGA Zone 56

Date: 11 July, 2017

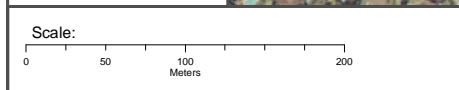
Aerial Imagery 1982

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Legend

- Site Boundary
- Buffer 150m



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Coordinate System: GDA 1994 MGA Zone 56

Date: 11 July, 2017

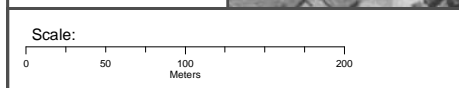
Aerial Imagery 1970

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Legend

- Site Boundary
- Buffer 150m



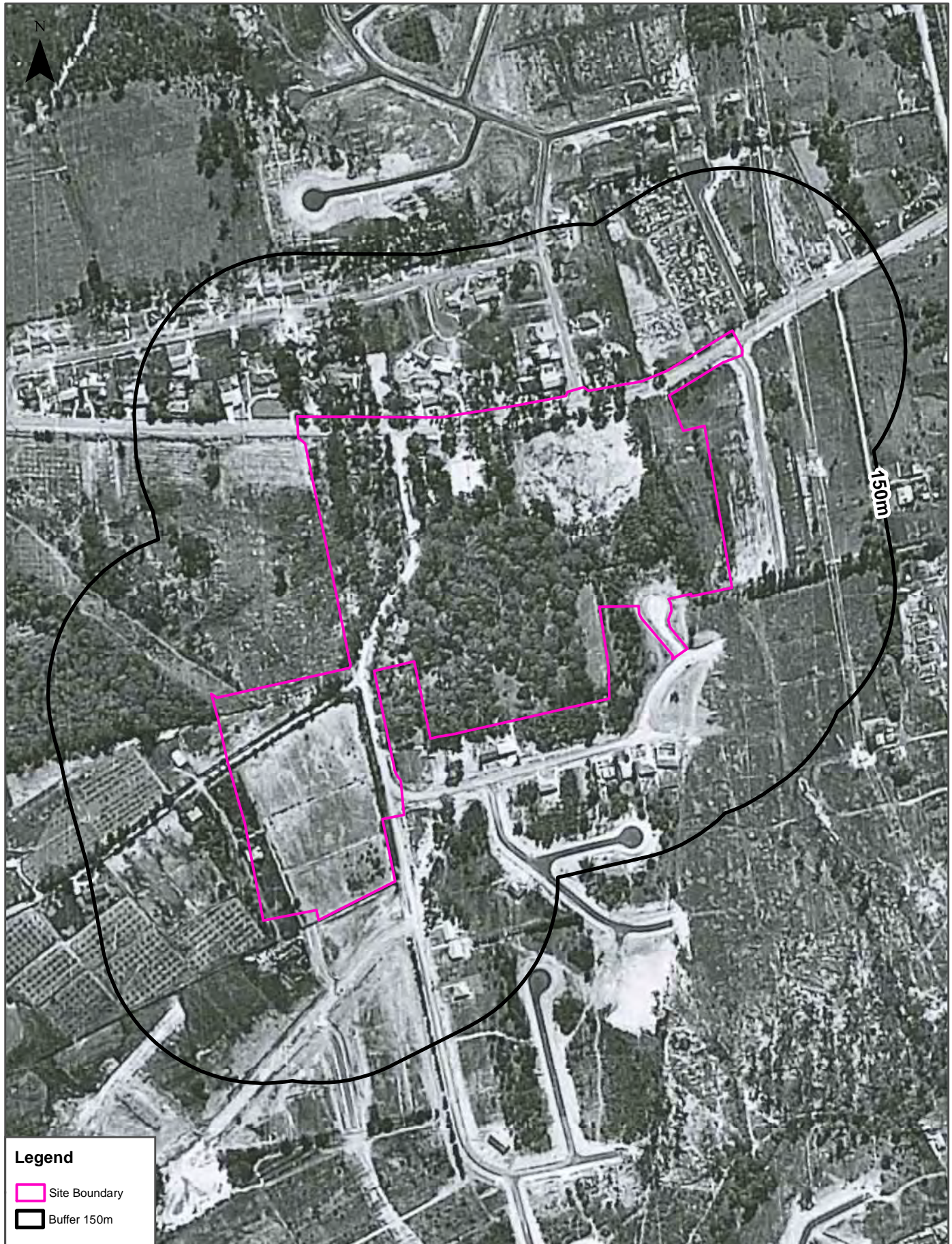
Data Sources: Historical Aerials: © Land and Property Information (a division of the Department of Finance and Services)

Coordinate System: GDA 1994 MGA Zone 56



Date: 11 July, 2017

Aerial Imagery 1965

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Legend

-  Site Boundary
-  Buffer 150m



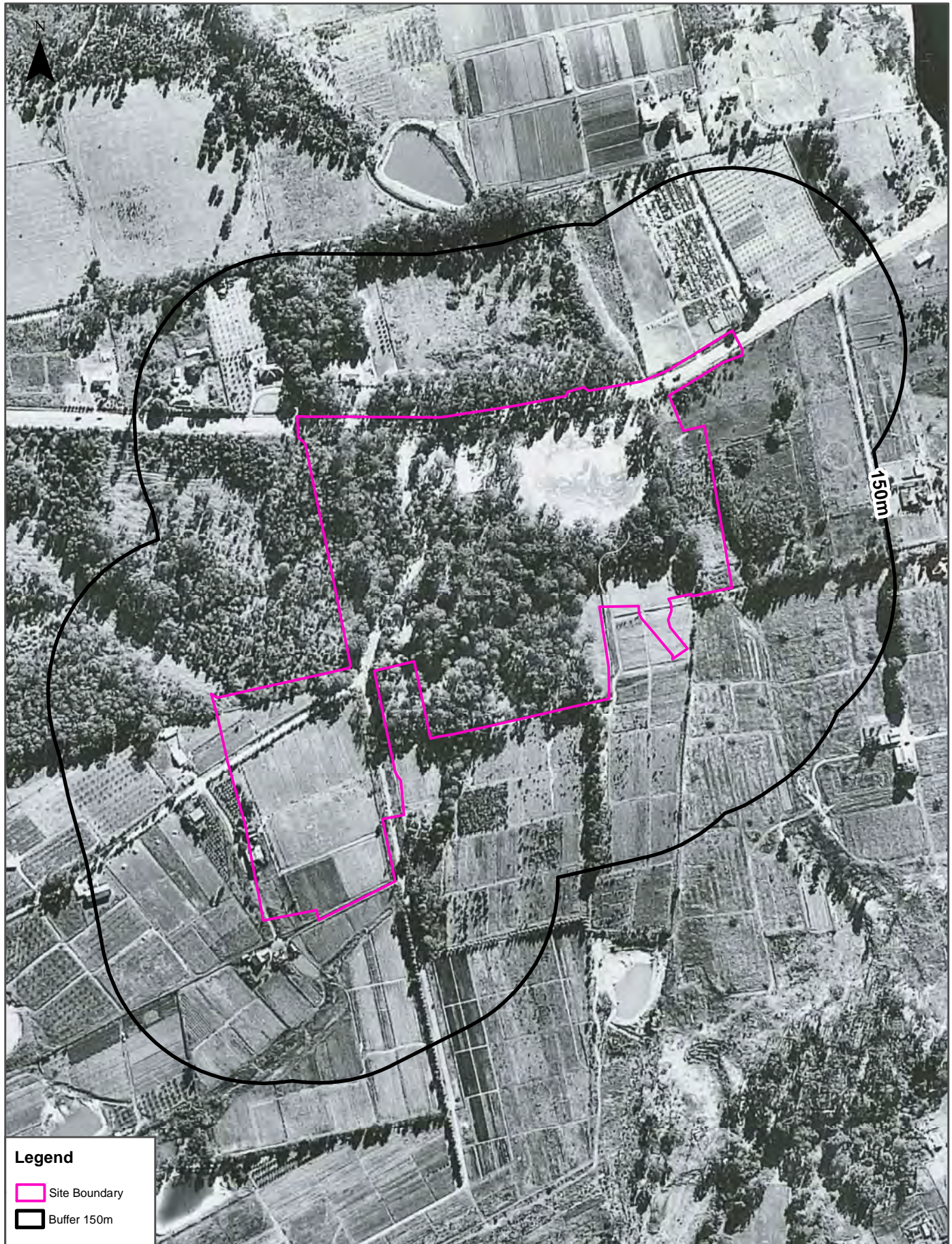
Data Sources: Historical Aerials: © Land and Property Information (a division of the Department of Finance and Services)

Coordinate System: GDA 1994 MGA Zone 56



Date: 11 July, 2017

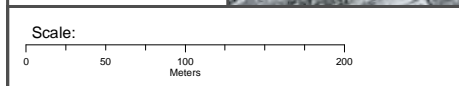
Aerial Imagery 1961

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Legend

-  Site Boundary
-  Buffer 150m



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: 11 July, 2017

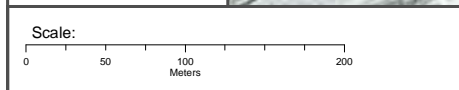
Aerial Imagery 1956

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Legend

-  Site Boundary
-  Buffer 150m



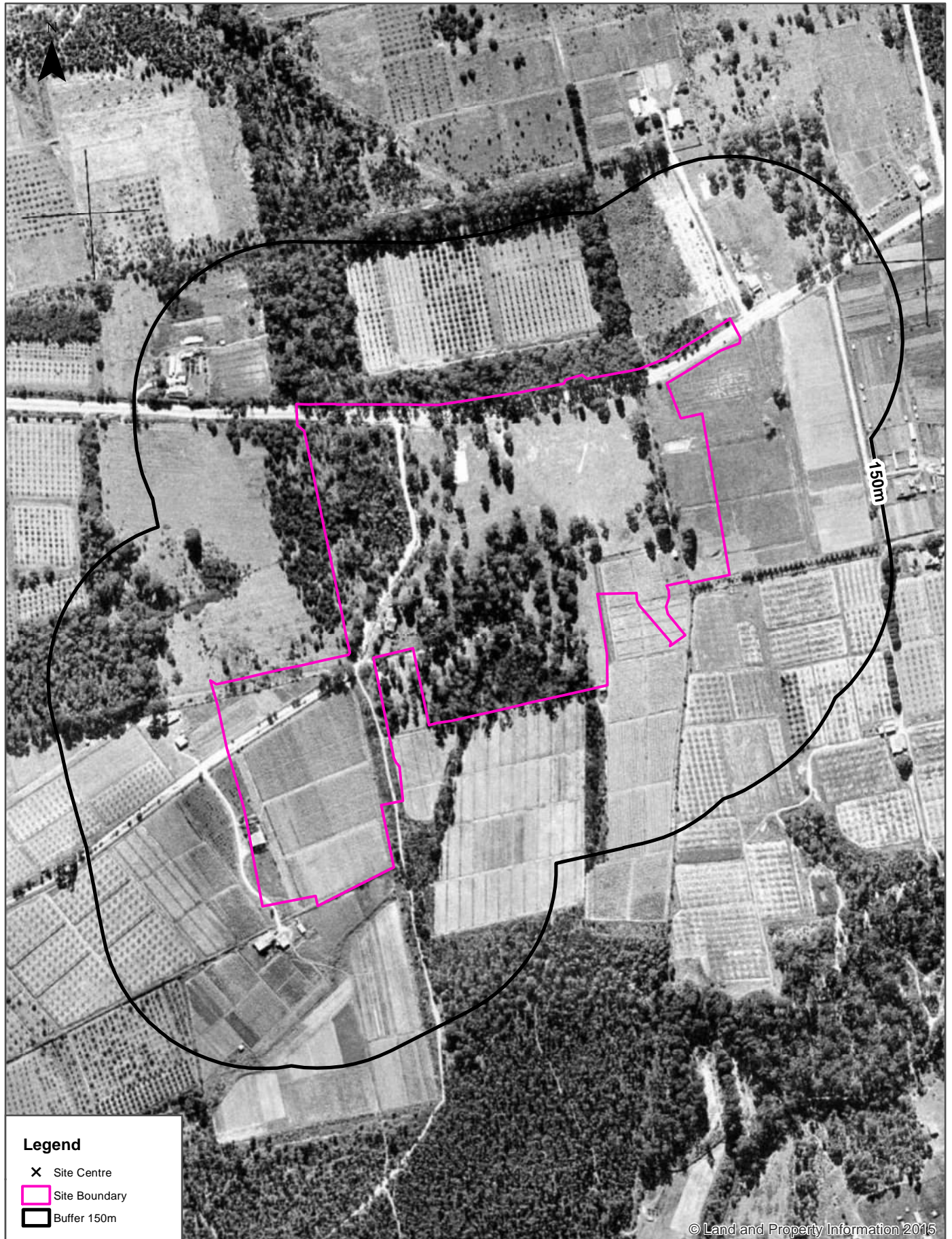
Data Sources: Historical Aerials: © Land and Property Information (a division of the Department of Finance and Services)

Coordinate System:
GDA 1994 MGA Zone 56

Date: 11 July, 2017

Aerial Imagery 1943

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Legend

- X Site Centre
- Site Boundary
- Buffer 150m

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Scale:
0 25 50 100
Meters

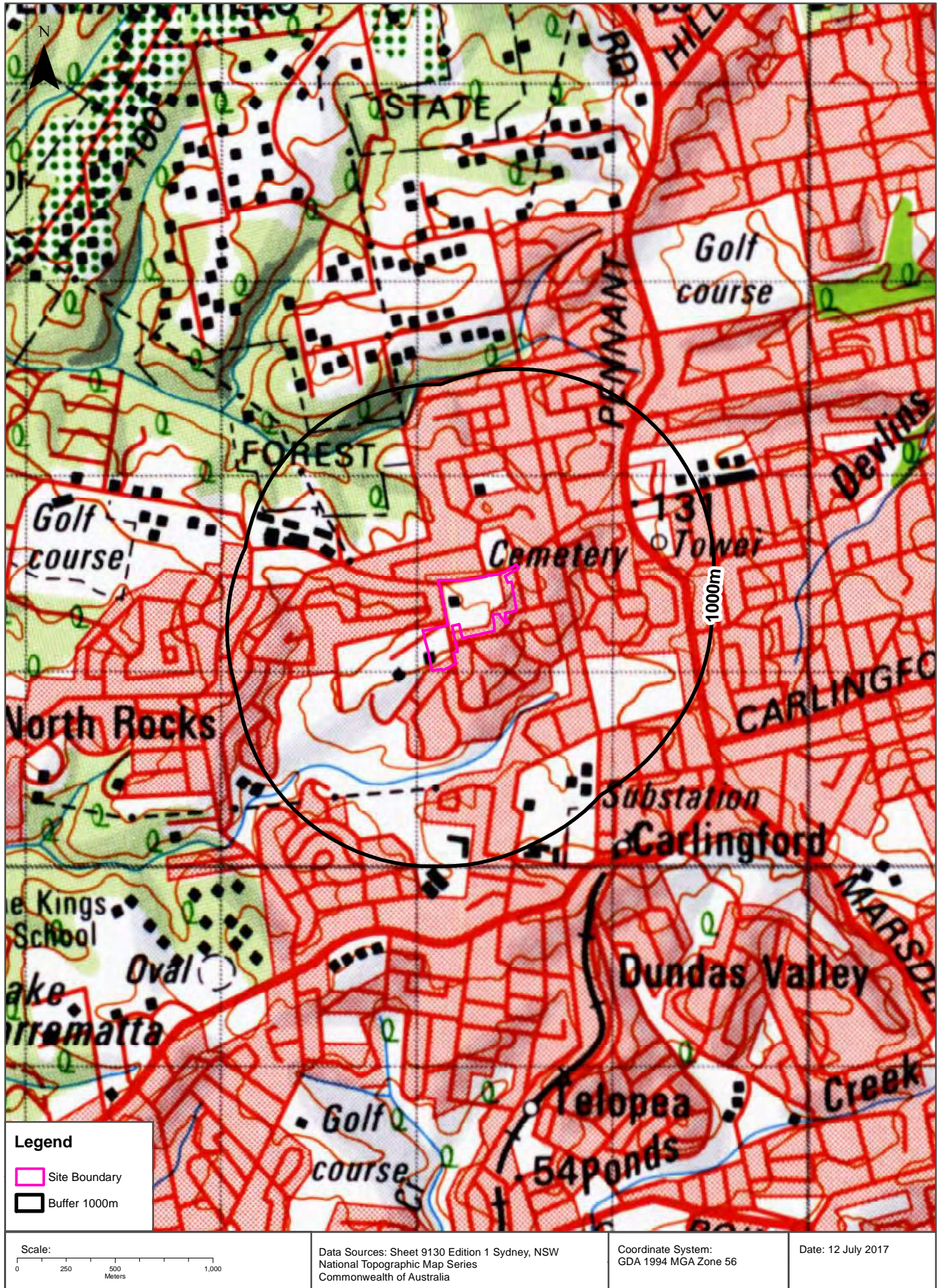
Data Sources: Aerial Imagery © Land and Property Information (a division of the Department of Finance and Services)

Coordinate System:
GDA 1994 MGA Zone 56

Date: 12 July 2017

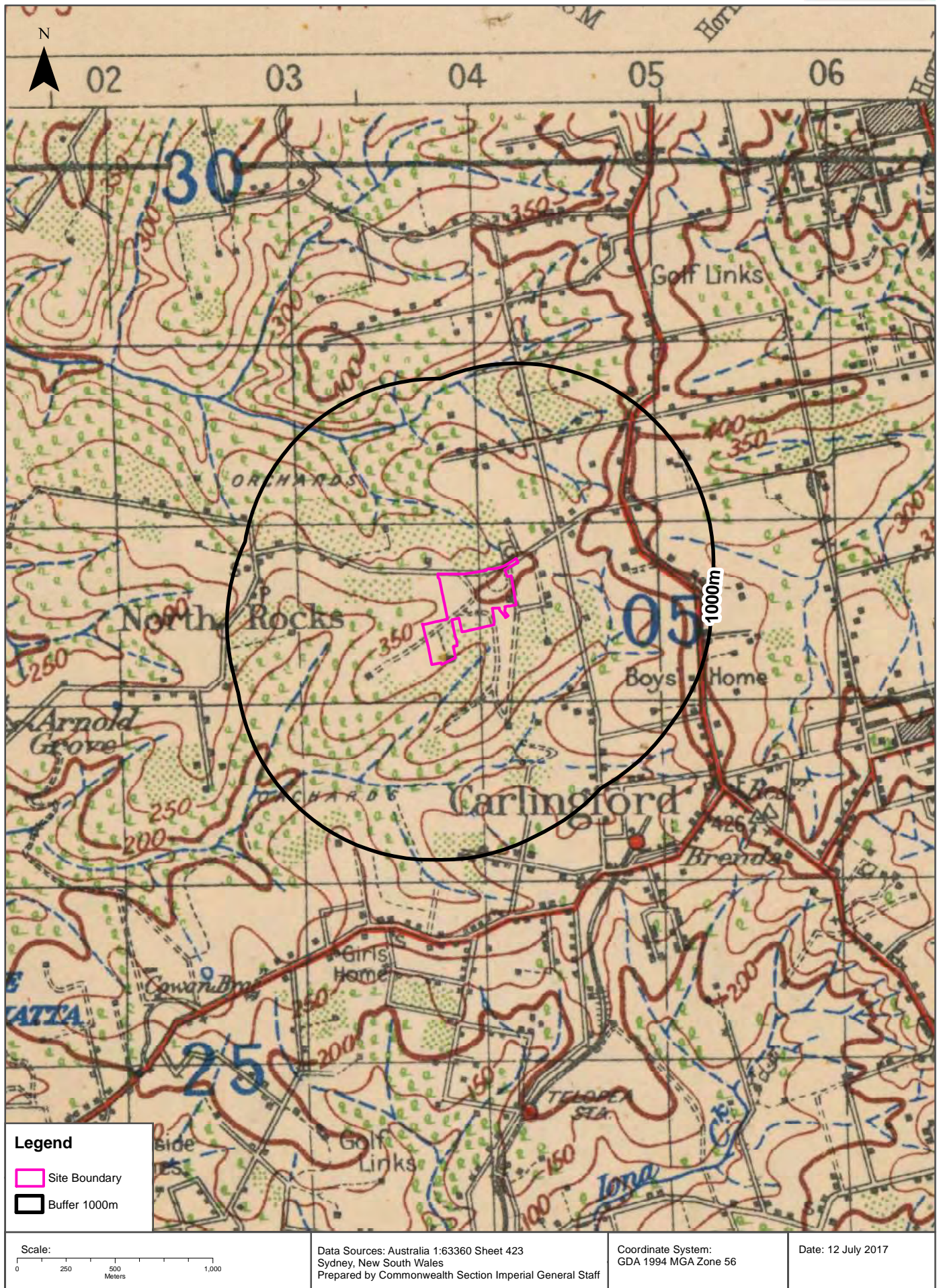
Historical Map 1975

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Historical Maps ca.1949

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



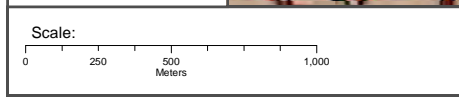
Historical Maps ca.1917

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Legend

- Site Boundary
- Buffer 1000m



Data Sources: Australia 1:63360 Sheet 423
Sydney, New South Wales
Prepared by Commonwealth Section Imperial General Staff

Coordinate System:
GDA 1994 MGA Zone 56

Date: 12 July 2017

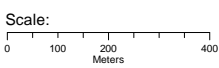
Topographic Features

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Legend

- Site Centre
- Place Name
- Points of Interest
- Tank Point
- Site Boundary
- Report Buffer
- Property Boundary
- Crown Land
- 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



Data Sources: Property Boundaries & Topographic Data:
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 Department of Finance and Services) 2017

Coordinate System:
 GDA 1994 MGA Zone 56

Date: 12 July 2017

Topographic Features

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

Points of Interest

What Points of Interest exist within the dataset buffer?

Map Id	Feature Type	Label	Distance	Direction
85328	Community Facility	DON MOORE COMMUNITY CENTRE	0m	Onsite
85718	Park	NORTH ROCKS PARK	0m	Onsite
85751	Sports Court	TENNIS COURTS	0m	Onsite
85783	Suburb	CARLINGFORD	0m	Onsite
85803	Sports Court	JOHN WEARN RESERVE SKATE PARK	0m	Onsite
85805	Park	JOHN WEARN RESERVE	0m	Onsite
85812	Child Care Centre	NORTH ROCKS CHILD CARE CENTRE	0m	Onsite
85688	Cemetery	ST GERARD MAJELLA CEMETERY	74m	North East
85745	Park	Park	110m	North East
85707	Park	Park	254m	South
85590	Park	Park	268m	South East
85748	Park	Park	286m	East
85777	Primary School	MURRAY FARM PUBLIC SCHOOL	356m	North
85664	Park	Park	434m	South East
85569	Park	Park	487m	East
85733	Park	Park	514m	East
85705	Park	PINE TREE PARK	561m	North East
85740	Park	Park	580m	South West
85347	Special School	RIDBC GARFIELD BARWICK SCHOOL	689m	North West
85701	Park	Park	691m	South West
85764	Locality	MURRAY FARM	695m	North
85739	Park	Park	697m	West
85695	Park	MURRAY FARM RESERVE	713m	North
85579	Park	Park	741m	East
85319	Firestation - Bush	NORTH ROCKS RFB	760m	North West
85686	Shopping Centre	NORTH ROCKS WESTFIELD SHOPPING TOWN	765m	West
85749	Park	Park	767m	North East
85798	Special School	RIDBC ALICE BETTERIDGE SCHOOL	779m	North West
108271	Roadside Emergency Telephone	13	793m	North West
85790	Roadside Emergency Telephone	14	802m	North West
85550	Place Of Worship	ANGLICAN CHURCH	851m	South East
85691	Park	ROSELEA PARK	859m	North East

Map Id	Feature Type	Label	Distance	Direction
85685	Post Office	NORTH ROCKS POST OFFICE	864m	West
85799	Special School	RIDBC THOMAS PATTISON SCHOOL	887m	West
85779	Primary School	ST GERARD'S CATHOLIC PRIMARY SCHOOL	891m	North East
85586	Park	HAROLD WEST RESERVE	900m	South East
85678	Place Of Worship	BAPTIST CHURCH	921m	East
85676	Place Of Worship	CATHOLIC CHURCH	924m	North East
85778	Primary School	CARLINGFORD WEST PUBLIC SCHOOL	932m	South
85726	Park	Park	939m	North
85692	Park	Park	944m	North East
85673	Locality	CARLINGFORD NORTH	950m	North East

Topographic Data Source: © Land and Property Information (2015)

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Topographic Features

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

Tanks (Areas)

What are the Tank Areas located within the dataset buffer?

Note. The large majority of tank features provided by LPI are derived from aerial imagery & are therefore primarily above ground tanks.

Map Id	Tank Type	Status	Name	Feature Currency	Distance	Direction
	No records in buffer					

Tanks (Points)

What are the Tank Points located within the dataset buffer?

Note. The large majority of tank features provided by LPI are derived from aerial imagery & are therefore primarily above ground tanks.

Map Id	Tank Type	Status	Name	Feature Currency	Distance	Direction
14977	Water	Operational		01/01/2009	942m	North West

Tanks Data Source: © Land and Property Information (2015)

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Major Easements

What Major Easements exist within the dataset buffer?

Note. Easements provided by LPI are not at the detail of local governments. They are limited to major easements such as Right of Carriageway, Electrical Lines (66kVa etc.), Easement to drain water & Significant subterranean pipelines (gas, water etc.).

Map Id	Easement Class	Easement Type	Easement Width	Distance	Direction
120119356	Primary	Undefined		0m	Onsite
120107671	Primary	Undefined		0m	Onsite
120107670	Primary	Undefined		0m	West
120110260	Primary	Undefined		122m	South East
120119384	Primary	Undefined		243m	West
120114069	Primary	Undefined		455m	South East
120118059	Primary	Undefined		506m	North West
120115430	Primary	Undefined		510m	South East
120119316	Primary	Undefined		554m	South East
120115600	Primary	Undefined		568m	South West
120115401	Primary	Undefined		598m	North
120113988	Primary	Undefined		614m	North West
120113768	Primary	Undefined		615m	South East
120109881	Primary	Undefined		622m	South East
120110074	Primary	Undefined		655m	East

Map Id	Easement Class	Easement Type	Easement Width	Distance	Direction
120121645	Primary	Undefined		677m	South
120121928	Primary	Undefined		678m	South
120118223	Primary	Undefined		738m	South
120111513	Primary	Undefined		749m	North
120111542	Primary	Undefined		755m	South East
120115452	Primary	Undefined		802m	South East
120119286	Primary	Undefined		926m	North
120107682	Primary	Undefined		993m	North

Easements Data Source: © Land and Property Information (2015)

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Topographic Features

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State Forest

What State Forest exist within the dataset buffer?

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

State Forest Data Source: © Land and Property Information (2015)

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National Parks and Wildlife Service Reserves

What NPWS Reserves exist within the dataset buffer?

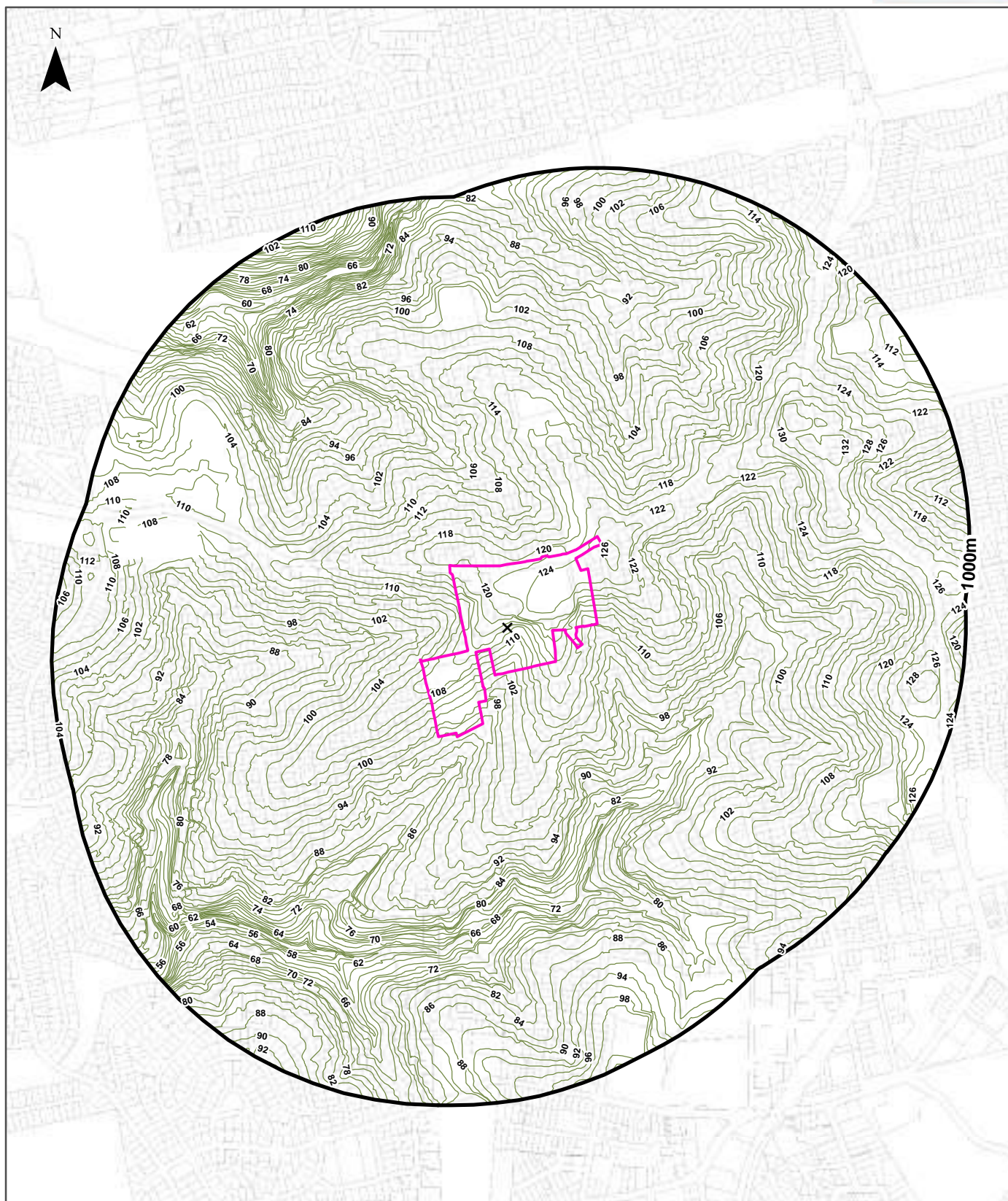
Reserve Number	Reserve Type	Reserve Name	Gazetted Date	Distance	Direction
N/A	No records in buffer				

NPWS Data Source: © Land and Property Information (2015)

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Elevation Contours (m AHD)

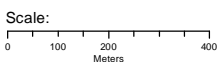
Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Legend

- Site Centre
- Site Boundary
- Elevation Contour (m AHD)
- 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.



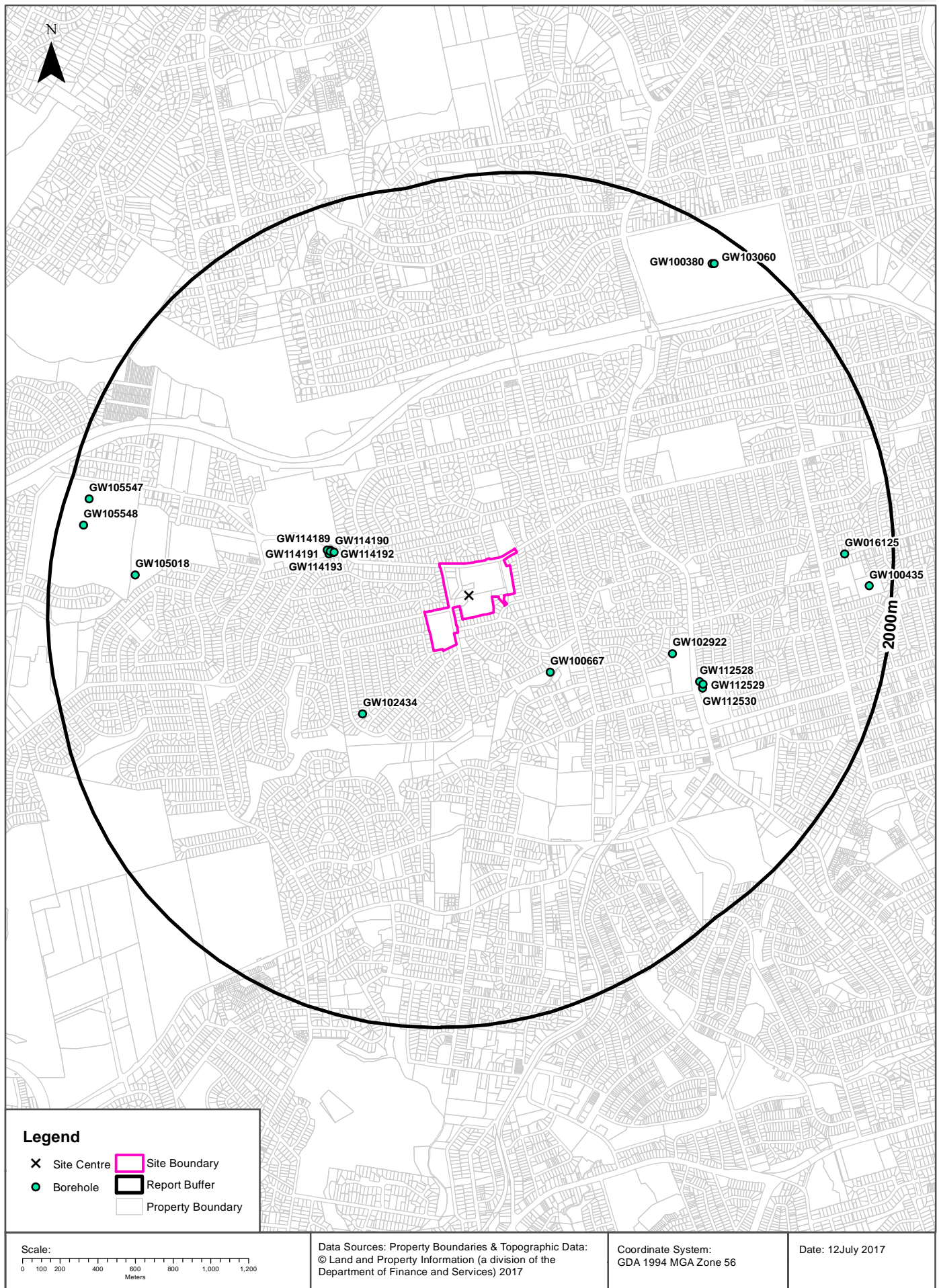
Data Sources: Property Boundaries & Topographic Data:
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 Department of Finance and Services) 2017

Coordinate System:
 GDA 1994 MGA Zone 56

Date: 12 July 2017

Groundwater Boreholes

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Hydrogeology & Groundwater

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

Hydrogeology

Description of aquifers on-site:

Description
Porous, extensive aquifers of low to moderate productivity

Description of aquifers within the dataset buffer:

Description
Porous, extensive aquifers of low to moderate productivity

Hydrogeology Map of Australia : Commonwealth of Australia (Geoscience Australia)
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Groundwater Boreholes

Boreholes within the dataset buffer:

GW No.	Licence No	Work Type	Owner Type	Purpose	Contractor	Complete Date	Final Depth	Drilled Depth	Salinity	SWL	Yield	Elev	Dist	Dir
GW100667	10BL157756	Bore	Private	Monitoring	Macquarie Drilling	07/10/1996	3.70	3.70	260	1.67			430m	South East
GW102434	10BL158966, 10WA108437	Bore		Domestic, Stock	Ultra Drilling	31/05/1999	146.00	146.00	1600	65.00	1.000		503m	South West
GW114195	10BL604085	Bore	Private	Monitoring	Numac Drilling Services	12/03/2014	1.39	1.39					560m	West
GW114194	10BL604085	Bore	Private	Monitoring	Numac Drilling Services	12/03/2014	1.50	1.50					566m	West
GW114192	10BL604085	Bore	Private	Monitoring Bore	Numac Drilling Services	12/03/2014	9.00	9.00					571m	West
GW114190	10BL604085	Bore	Private	Monitoring	Numac Drilling Services	12/03/2014	9.00	9.00					573m	West
GW114188	10BL604085	Bore	Private	Monitoring	Numac Drilling Services	17/06/2010	6.84	6.84					581m	West
GW114189	10BL604085	Bore	Private	Monitoring	Numac Drilling Services	12/03/2014	2.00	2.00					582m	West
GW114193	10BL604085	Bore	Private	Monitoring	Numac Drilling Services	12/03/2014	8.32	8.32					588m	West
GW114191	10BL604085	Bore	Private	Monitoring	Numac Drilling Services	12/03/2014	8.01	8.01					598m	West
GW102922	10BL156680, 10BL600502, 10BL602287, 10BL603542, 10WA109587	Bore	Private	Recreation	Intertec Drilling Services	07/08/2009	173.00	173.00	4000	61.00	3.000		897m	East
GW112528	10BL605355	Bore	Private	Monitoring	EPOCA ENVIRONMETAL	15/04/2013	5.00	5.00		3.69			1088m	East
GW112529	10BL605355	Bore	Private	Monitoring	EPOCA ENVIRONMETAL	15/04/2013	5.00	5.00		4.20			1110m	East
GW112530	10BL605355	Bore	Private	Monitoring	EPOCA ENVIRONMETAL	15/04/2013	5.00	5.00		3.54			1117m	East

GW No.	Licence No	Work Type	Owner Type	Purpose	Contractor	Complete Date	Final Depth	Drilled Depth	Salinity	SWL	Yield	Elev	Dist	Dir
GW105018	10BL160128, 10BL162414, 10BL162496, 10CA109427	Bore	Private	Irrigation, Recreation	Intertec Drilling Services	31/10/2003	240.50	240.50	3300	80.0 0	1.200		1547m	West
GW016125	10BL007597	Well	Private	Irrigation			5.40						1741m	East
GW100380	10BL142460	Bore	Private	Test Bore	Slade Drilling	10/12/1990	180.00	180.00	2000	12.0 0	20.00 0		1840m	North East
GW103060	10BL159553, 10BL162231, 10CA109389	Bore		Recreation	Intertec Drilling Services	24/03/2000	204.50	204.50	2670				1846m	North East
GW105548	10BL162414, 10BL162496, 10CA109427	Bore		Irrigation, Recreation	Ultra Drilling	22/09/2004	186.00	186.00		90.0 0	0.800		1865m	West
GW105547	10BL162414	Bore		Test Bore	Ultra Drilling	22/09/2004	306.00	306.00			0.700		1876m	West
GW100435	10BL157898, 10WA108396	Bore	Private	Domestic, Stock	Windley's Water Wells Pty Ltd	16/01/1997	24.00	24.00		7.00	2.500		1881m	East

Borehole Data Source : NSW Department of Primary Industries - Office of Water / Water Administration Ministerial Corporation for all bores prefixed with GW. All other bores © Commonwealth of Australia (Bureau of Meteorology) 2015. Creative Commons 3.0 © Commonwealth of Australia <http://creativecommons.org/licenses/by/3.0/au/deed.en>

Hydrogeology & Groundwater

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Driller's Logs

Drill log data relevant to the boreholes within the dataset buffer:

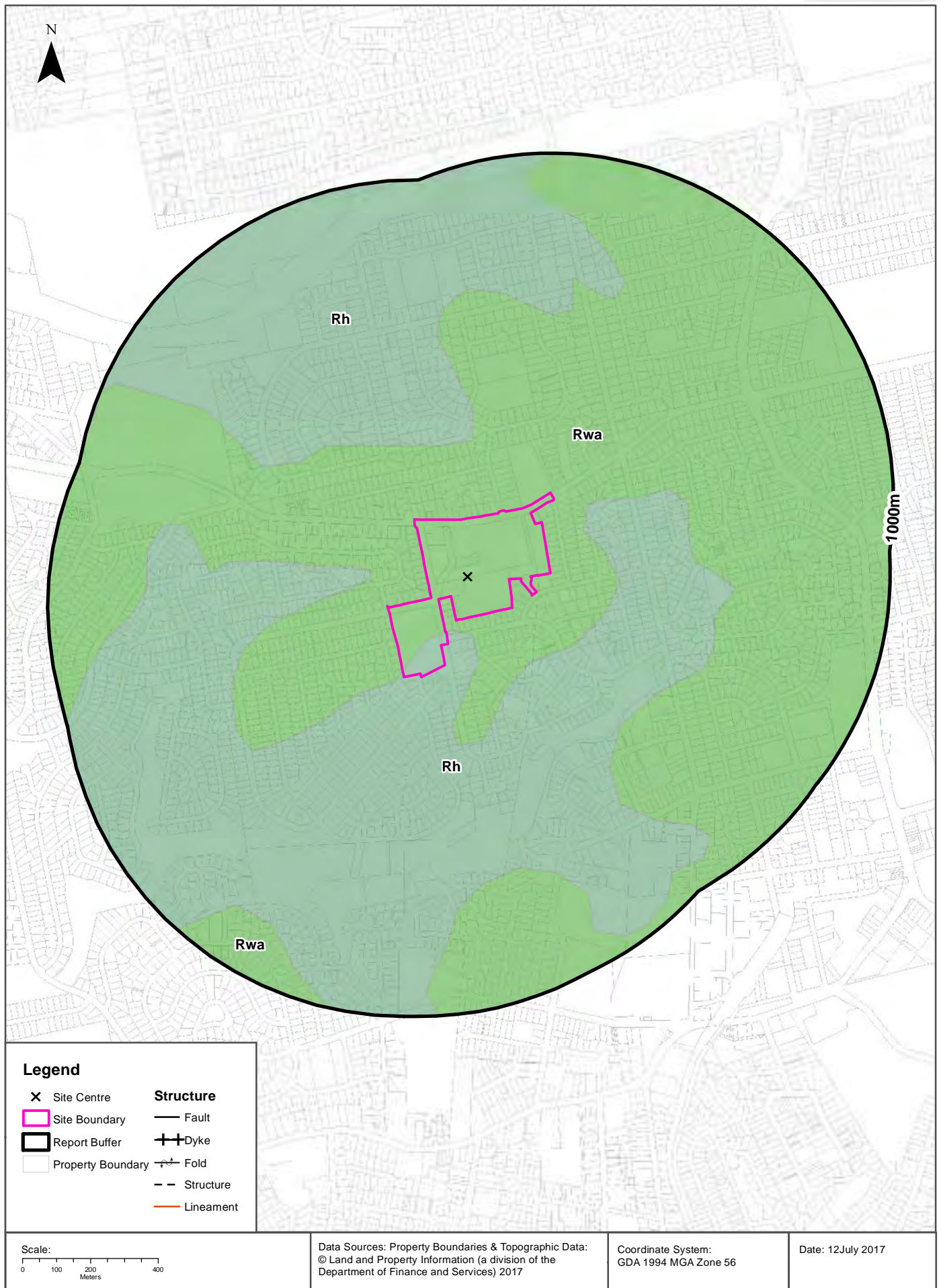
Groundwater No	Drillers Log	Distance	Direction
GW100667	0.00m-0.30m Topsoil, Clayey 0.30m-0.50m Clay, Dkgrey, firm 0.50m-1.00m Clay, Orange/red, Fe nod; moist 1.00m-1.60m Clay, mottled grey/red, firm-stiff, Wet at 1.6m 1.60m-3.00m Shale, highly weathered, hard 3.00m-3.70m Shale, mottled grey/orange, moderately weath.	430m	South East
GW102434	0.00m-1.50m SOIL 1.50m-2.10m SANDSTONE FLOATER 2.10m-38.10m SANDSTONE 38.10m-39.00m SHALE 39.00m-41.00m SHALE/SANDSTONE 41.00m-54.00m SANDSTONE/SHALE BANDS 54.00m-116.00m SANDSTONE 116.00m-120.00m SHALE 120.00m-126.00m SANDSTONE 126.00m-133.00m SANDSTONE/QUARTZ/IRONSTONE 133.00m-138.00m SANDSTONE SOFT 138.00m-146.00m SANDSTONE	503m	South West
GW102922	0.00m-0.50m TOPSOIL 0.50m-4.70m CLAY BROWN 4.70m-22.00m SHALE GREY 22.00m-32.60m SANDSTONE GREY 32.60m-38.00m SANDSTONE YELLOW 38.00m-42.00m SANDSTONE QUARTZ FRACTURED 42.00m-46.10m SANDSTONE GREY 46.10m-46.30m SANDSTONE FRACTURED 46.30m-49.00m SANDSTONE GREY 49.00m-51.00m CLAY, SILTSTONE GREY 51.00m-64.00m SANDSTONE GREY 64.00m-65.50m SILTSTONE 65.50m-70.00m SANDSTONE GREY 70.00m-70.20m SANDSTONE FRACTURED 70.20m-88.00m SANDSTONE GREY 88.00m-96.00m SANDSTONE/SILTSTONE 96.00m-105.00m SANDSTONE GREY 105.00m-105.50m SANDSTONE FRACTURED 105.50m-128.50m SANDSTONE GREY 128.50m-131.00m SANDSTONE QUARTZ 131.00m-134.00m SANDSTONE GREY 134.00m-141.00m SANDSTONE QUARTZ 141.00m-152.00m SANDSTONE GREY 152.00m-164.00m SANDSTONE QUARTZ 164.00m-164.50m SANDSTONE FRACTURED 164.50m-172.50m SANDSTONE GREY 172.50m-173.00m SANDSTONE FRACTURED	897m	East
GW112528	0.00m-0.50m FILL 0.50m-1.60m CLAY, ASH 1.60m-5.00m CLAYSTONE VERY HARD GREY	1088m	East
GW112529	0.00m-0.33m FILL 0.33m-0.50m GRAVELLY CLAY STIFF BROWN AND GREY 0.50m-1.10m CLAY MOTTLED, VERY STIFF 1.10m-2.80m SILTSTONE VERY HARD, GREY 2.80m-5.00m CLAYSTONE, HARD GREY, IRONSTONE	1110m	East
GW112530	0.00m-0.30m FILL 0.30m-3.70m CLAYSTONE WITH IRONSTONE, HARD GREY 3.70m-5.00m SHALE HARD DARK BROWN WEATHERED	1117m	East

Groundwater No	Drillers Log	Distance	Direction
GW105018	0.00m-1.00m LOAM 1.00m-6.00m WEATHERED SANDSTONE 6.00m-35.50m SANDSTONE LIGHT GREY 35.50m-37.00m SANDSTONE DARK GREY 37.00m-40.00m HARD SHALE 40.00m-82.50m SANDSTONE LIGHT GREY 82.50m-84.00m SANDSTONE QUARTZ 84.00m-85.50m SILTSTONE 85.50m-89.00m SANDSTONE LIGHT GREY 89.00m-90.00m SANDSTONE QUARTZ 90.00m-150.50m SANDSTONE LIGHT GREY 150.50m-153.00m SANDSTONE GREY 153.00m-156.50m SANDSTONE QUARTZ 156.50m-161.50m SANDSTONE GREY 161.50m-164.00m SANDSTONE FINE QUARTZ 164.00m-177.00m SANDSTONE LIGHT GREY 177.00m-181.00m SANDSTONE FINE QUARTZ 181.00m-190.50m SANDSTONE LIGHT GREY 190.50m-194.00m SANDSTONE DARK BROWN 194.00m-240.50m SANDSTONE GREY	1547m	West
GW100380	0.00m-5.00m CLAYS 5.00m-109.00m SANDSTONE 109.00m-115.00m SHALE/ SANDSTONE 115.00m-180.00m SANDSTONE	1840m	North East
GW103060	0.00m-2.00m CLAY 2.00m-6.00m WEATHERED SHALE 6.00m-13.00m SHALE 13.00m-20.00m HARD SHALE 20.00m-23.00m SANDSTONE M.G. 23.00m-26.00m HARD SHALE 26.00m-88.00m SANDSTONE M.G. 88.00m-92.50m HARD SHALE 92.50m-109.00m SANDSTONE M.G. 109.00m-111.00m HARD SHALE 111.00m-111.50m QUARTZ SANDSTONE 111.50m-122.00m SANDSTONE M.G. 122.00m-124.00m QUARTZ / SANDSTONE 124.00m-145.00m SANDSTONE M.G. 145.00m-149.00m QUARTZ/SANDSTONE 149.00m-159.00m SANDSTONE M.G. 159.00m-161.00m SANDSTONE/SHALE 161.00m-164.00m QUARTZ/SANDSTONE 164.00m-167.00m SANDSTONE M.G. 167.00m-171.00m QUARTZ/SANDSTONE 171.00m-172.00m HARD SHALE 172.00m-178.00m QUARTZ SANDSTONE 178.00m-182.00m SANDSTONE M.G. 182.00m-184.00m QUARTZ/SANDSTONE 184.00m-204.50m SANDSTONE M.G.	1846m	North East
GW105548	0.00m-12.00m SANDSTONE BROKEN 12.00m-66.00m SANDSTONE 66.00m-144.00m SANDSTONE/SHALE 144.00m-186.00m SANDSTONE	1865m	West
GW105547	0.00m-18.00m SANDSTONE BROKEN 18.00m-144.00m SANDSTONE 144.00m-175.00m SHALE/SANDSTONE 175.00m-186.00m SANDSTONE SOFT/QUARTZ 186.00m-192.00m SANDSTONE/SHALE BANDS 192.00m-199.00m SHALE 199.00m-210.00m SANDSTONE/SHALE 210.00m-238.00m SANDSTONE 238.00m-302.00m SHALE 302.00m-306.00m RED CLAYSTONE	1876m	West
GW100435	0.00m-0.50m SOIL 0.50m-5.00m CLAY 5.00m-6.00m SAND 6.00m-12.00m CLAY 12.00m-18.00m GRAVEL 18.00m-24.00m SANDSTONE	1881m	East

Drill Log Data Source: NSW Department of Primary Industries - Office of Water / Water Administration Ministerial Corp
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Geology 1:100,000

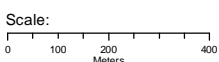
Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



1000m

Legend

- | | |
|---------------------|------------------|
| ✕ Site Centre | Structure |
| ▭ Site Boundary | — Fault |
| ▭ Report Buffer | ⊕ Dyke |
| ▭ Property Boundary | ↕ Fold |
| | - - Structure |
| | — Lineament |



Data Sources: Property Boundaries & Topographic Data:
© Land and Property Information (a division of the
Department of Finance and Services) 2017

Coordinate System:
GDA 1994 MGA Zone 56

Date: 12 July 2017

Geology

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Geological Units

What are the Geological Units onsite?

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

What are the Geological Units within the dataset 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 dataset buffer?

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

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

© State of New South Wales through the NSW Department of Industry, Resources & Energy

Naturally Occurring Asbestos Potential

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Naturally Occurring Asbestos Potential

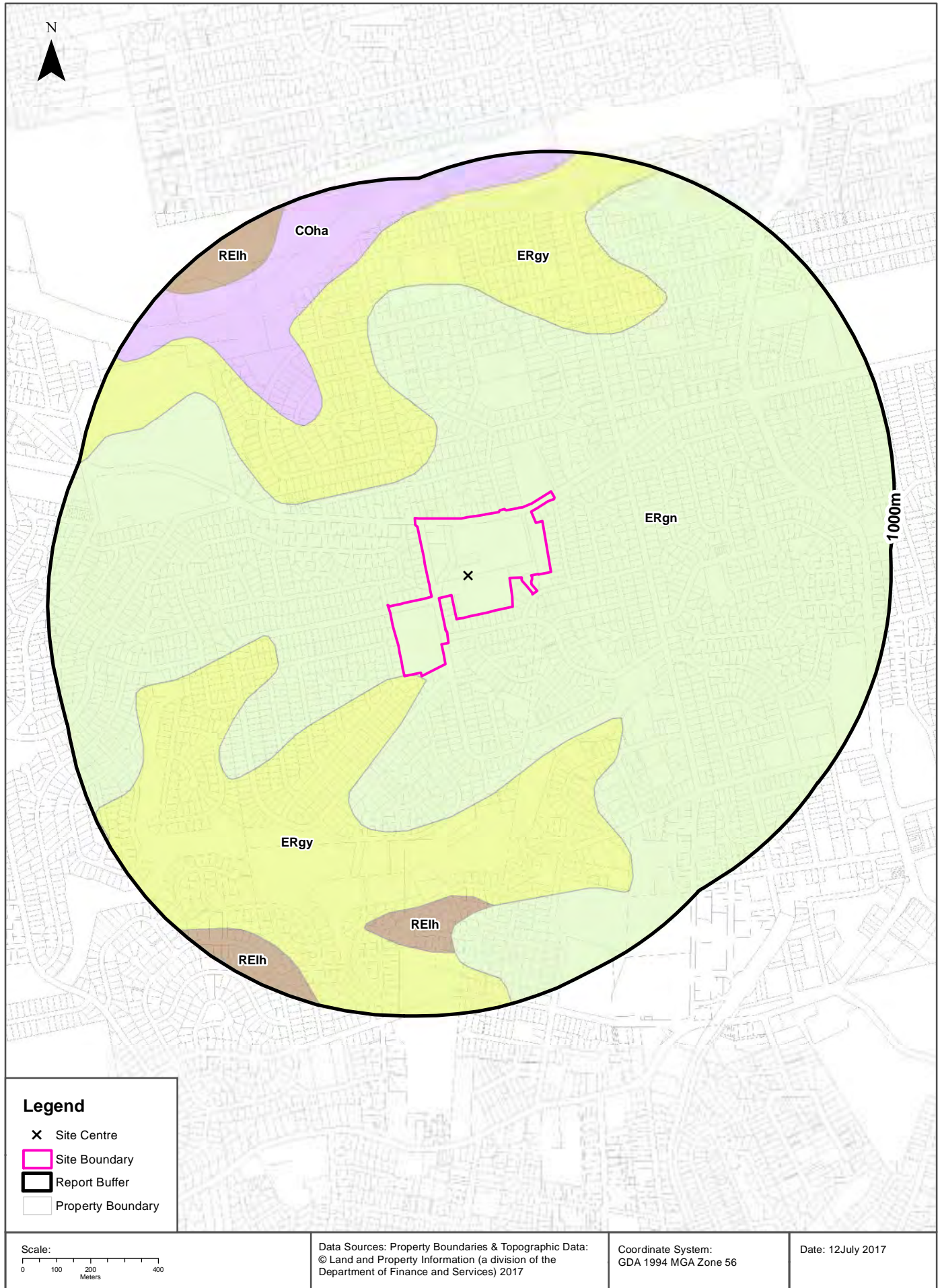
Naturally Occurring Asbestos Potential within the dataset buffer:

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

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

Soil Landscapes

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Soils

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

Soil Landscapes

What are the onsite Soil Landscapes?

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

What are the Soil Landscapes within the dataset buffer?

Soil Code	Name	Group	Process	Map Sheet	Scale
COha	HAWKESBURY		COLLUVIAL	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

Soils Landscapes Data Source : NSW Office of Environment and Heritage

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Standard Local Environmental Plan Acid Sulfate Soils

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

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		

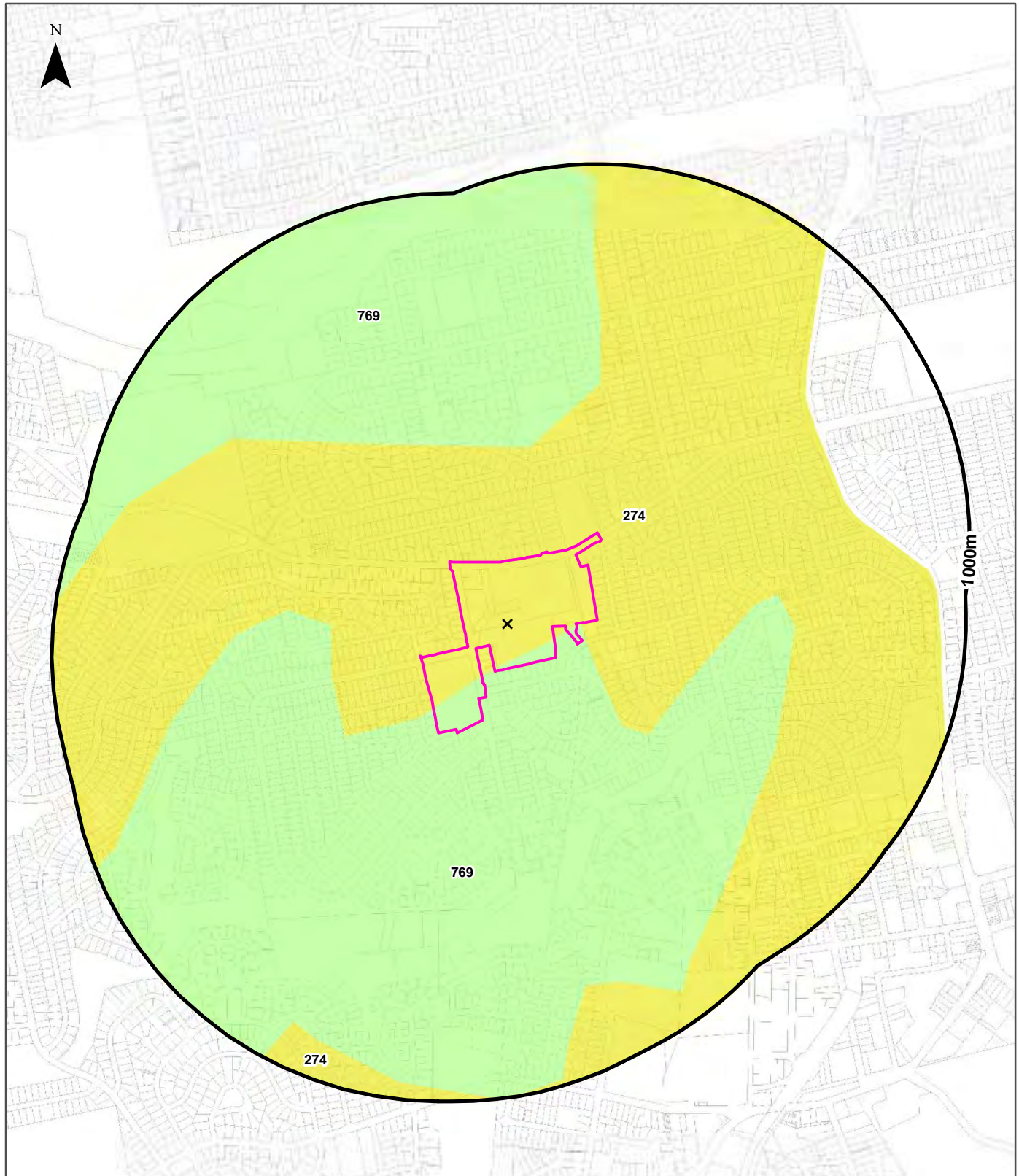
If the on-site Soil Class is 5, what other soil classes exist within 500m?

Soil Class	Description	LEP	Distance	Direction
N/A				

Acid Sulfate Data Source Accessed 07/10/2016: NSW Crown Copyright - Planning and Environment
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Dryland Salinity

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Legend	Dryland Salinity - National Assessment	Salinity Potential of Western Sydney
<ul style="list-style-type: none"> X Site Centre Site Boundary Report Buffer Property Boundary 	<ul style="list-style-type: none"> Delineated risk area but no high hazard or risk rating for either 2000, 2020, 2050 High hazard or risk in 2050 only High hazard or risk defined for 2050, but no assessment made for 2000 or 2020 	<ul style="list-style-type: none"> High hazard or risk in 2020 and 2050 High hazard or risk in 2000 and 2050. 2020 not defined as high hazard High hazard or risk defined for all years: 2000, 2020, 2050
		<ul style="list-style-type: none"> Area of Known Salinity Area of High Salinity Potential Area of Moderate Salinity Potential Area of Very Low Salinity Potential Area of Water

<p>Scale:</p>	<p>Data Sources: Property Boundaries & Topographic Data: © Land and Property Information (a division of the Department of Finance and Services) 2017</p>	<p>Coordinate System: GDA 1994 MGA Zone 56</p>	<p>Date: 12 July 2017</p>
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Dryland Salinity

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

Dryland Salinity - National Assessment

Is there Dryland Salinity - National Assessment data onsite?

No

Is there Dryland Salinity - National Assessment data within the dataset buffer?

No

What Dryland Salinity assessments are given?

Assessment 2000	Assessment 2020	Assessment 2050	Distance	Direction
N/A	N/A	N/A	N/A	N/A

Dryland Salinity Data Source : National Land and Water Resources Audit

The Commonwealth and all suppliers of source data used to derive the maps of "Australia, Forecast Areas Containing Land of High Hazard or Risk of Dryland Salinity from 2000 to 2050" do not warrant the accuracy or completeness of information in this product. Any person using or relying upon such information does so on the basis that the Commonwealth and data suppliers shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information. Any persons using this information do so at their own risk.

In many cases where a high risk is indicated, less than 100% of the area will have a high hazard or risk.

Dryland Salinity Potential of Western Sydney

Dryland Salinity Potential of Western Sydney within the dataset buffer?

Feature Id	Classification	Description	Distance	Direction
274	MODERATE	Area of Moderate Salinity Potential	0m	Onsite
769	LOW	Area of Very Low Salinity Potential	0m	Onsite

Dryland Salinity Potential of Western Sydney Data Source : NSW Office of Environment and Heritage

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Mining Subsidence Districts

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Mining Subsidence Districts

Mining Subsidence Districts within the dataset buffer:

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

Mining Subsidence District Data Source: © Land and Property Information (2016)
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Environmental Zoning

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State Environmental Planning Policy Protected Areas

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

Dataset	Onsite	Within Site Buffer	Distance
SEPP14 - Coastal Wetlands	No	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
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State Environmental Planning Policy Major Developments (2005)

State Environmental Planning Policy Major Developments within the dataset buffer:

Map Id	Feature	Effective Date	Distance	Direction
N/A	No records within buffer			

SEPP Major Development Data Source: NSW Department of Planning & Environment
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State Environmental Planning Policy Strategic Land Use Areas

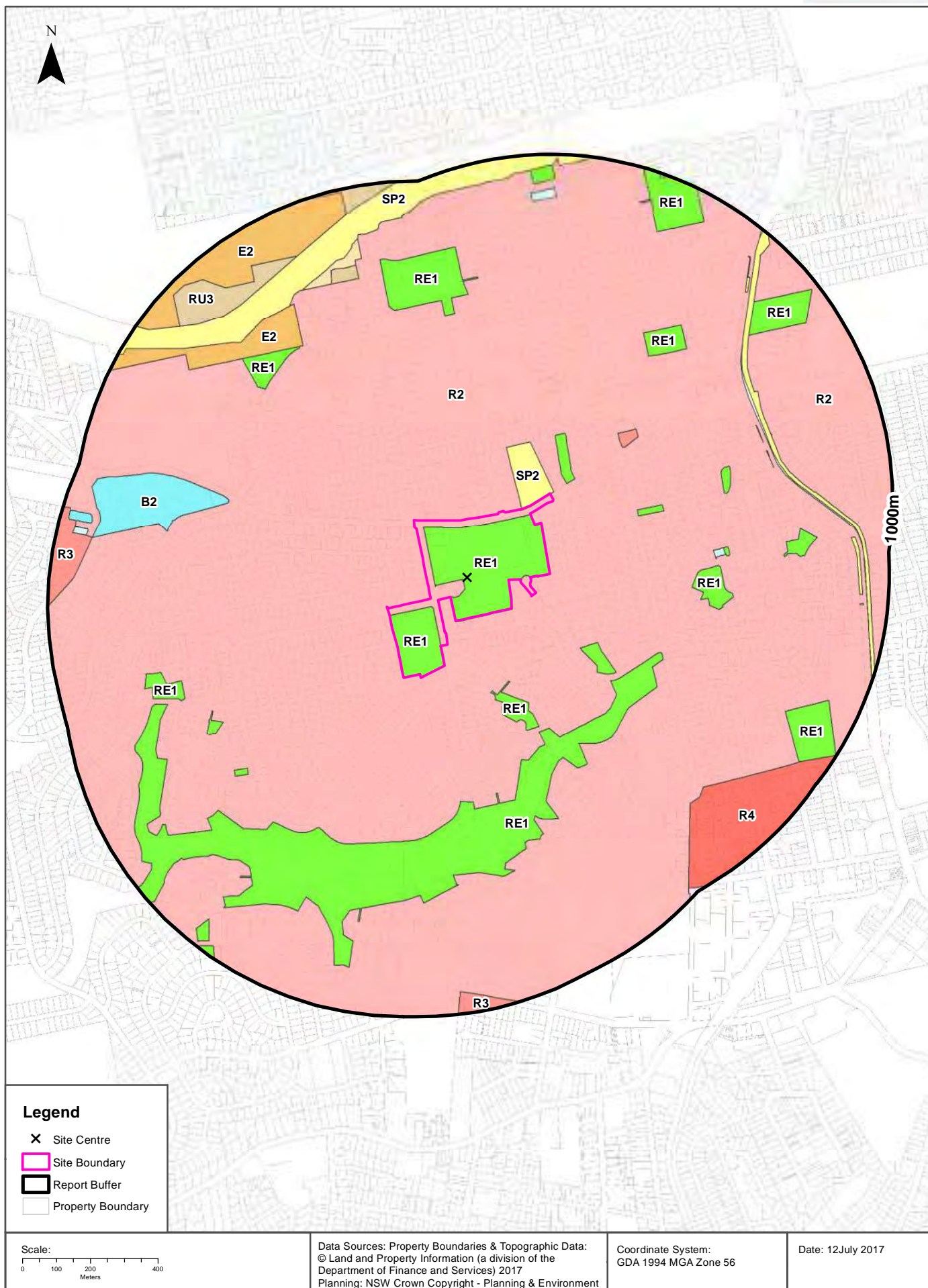
State Environmental Planning Policy Strategic Land Use Areas onsite or within the dataset buffer:

Strategic Land Use	SEPPNo	Effective Date	Amendment	Amendment Year	Distance	Direction
No records within buffer						

SEPP Strategic Land Use Data Source: NSW Department of Planning & Environment
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LEP Planning Zones

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Local Environmental Plan

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

Land Zoning

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

Zone	Description	Purpose	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		0m	Onsite
R2	Low Density Residential		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		0m	Onsite
SP2	Infrastructure	Cemetery	The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		0m	North East
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		57m	North East
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		157m	South
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		207m	South East
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		247m	East
R3	Medium Density Residential		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		252m	North East
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		339m	South West
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		418m	East
B1	Neighbourhood Centre		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		485m	East
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		498m	North East
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		499m	East
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		515m	East
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		532m	South West
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		548m	South West
B2	Local Centre		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		549m	West
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		585m	North West
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		602m	North
E2	Environmental Conservation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		611m	North West
R2	Low Density Residential		The Hills Local Environmental Plan 2012	11/12/2015	11/12/2015	21/04/2017	Amendment No 33	634m	North East
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		640m	West
R2	Low Density Residential		The Hills Local Environmental Plan 2012	11/12/2015	11/12/2015	21/04/2017	Amendment No 33	643m	East
SP2	Infrastructure	Road	Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	21/10/2016		652m	North
R2	Low Density Residential		Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	21/10/2016		665m	East
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		689m	East
SP2	Infrastructure	Classified Road	The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		732m	West
RU3	Forestry		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		733m	North
E4	Environmental Living		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		739m	North West
RE1	Public Recreation		Hornsby Local Environmental Plan 2013	27/09/2013	11/10/2013	21/10/2016		747m	North East

Zone	Description	Purpose	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
R4	High Density Residential		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		754m	South East
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		802m	South East
RU3	Forestry		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		816m	North West
SP2	Infrastructure	Classified Road	The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		826m	North East
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		833m	North East
E2	Environmental Conservation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		848m	North West
B1	Neighbourhood Centre		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		862m	North
SP2	Infrastructure	Classified Road	The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		883m	East
R3	Medium Density Residential		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		893m	West
B2	Local Centre		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		906m	West
B1	Neighbourhood Centre		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		910m	West
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		912m	South West
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		913m	North
SP2	Infrastructure	Classified Road	The Hills Local Environmental Plan 2012	11/12/2015	11/12/2015	21/04/2017	Amendment No 33	916m	East
RU3	Forestry		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		922m	North
R3	Medium Density Residential		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		932m	South
RE1	Public Recreation		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		969m	South West
R1	General Residential		The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	21/04/2017		972m	South East

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Local Environmental Plan

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

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
Q	700 m ²	The Hills Local Environmental Plan 2012	05/12/2012	05/12/2012	21/04/2017		100

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
10	9.00 m	The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	29/04/2016		19.6

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	The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	05/10/2012		100

Land Reservation Acquisition

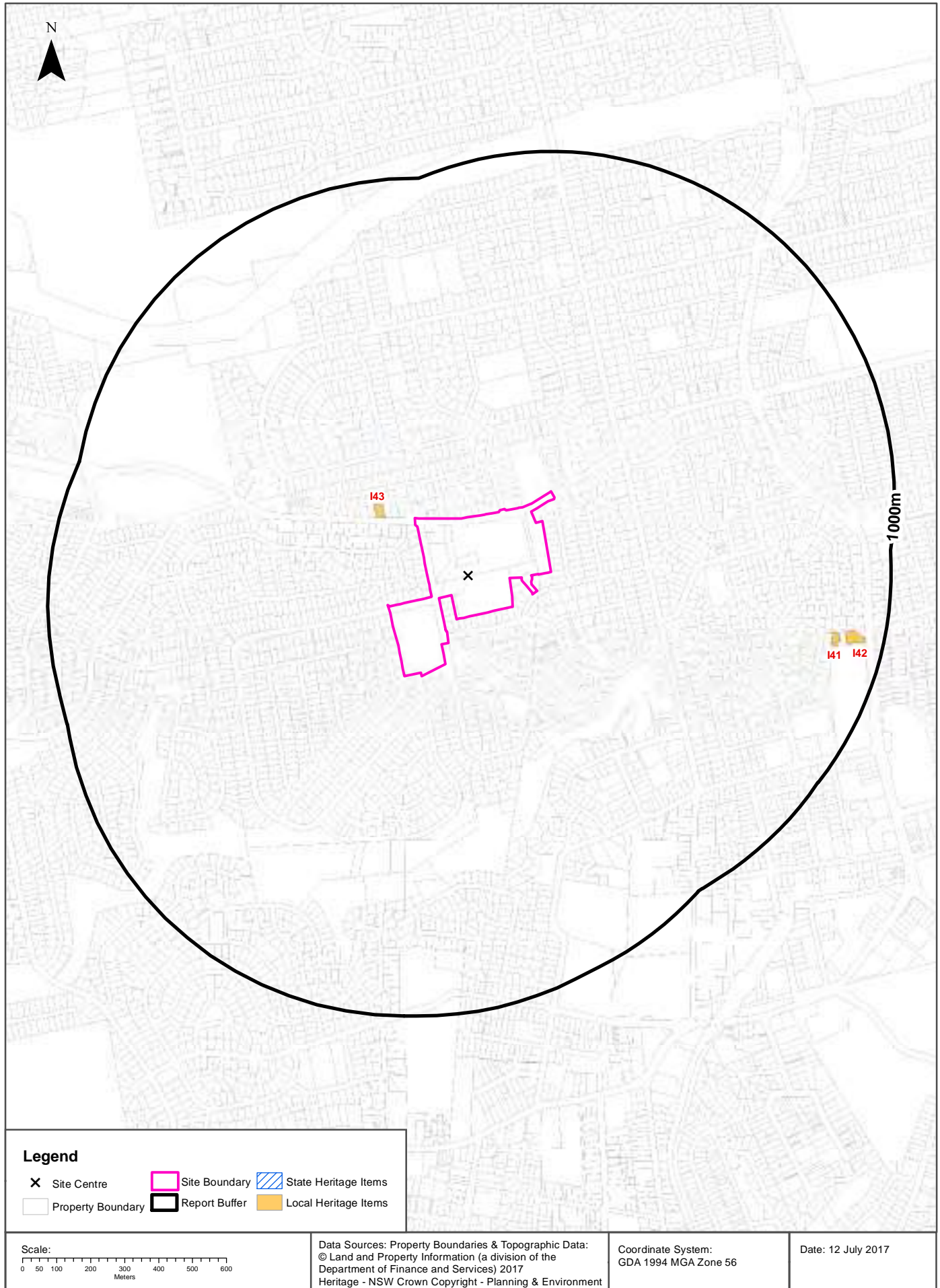
What are the onsite Local Environmental Plan Land Reservation Acquisitions?

Reservation	LEP	Published Date	Commenced Date	Currency Date	Amendment	Comments	Percentage of Site Area
No Data							

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Heritage Items

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Heritage

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State Heritage Items

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

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

Heritage Data Source: NSW Crown Copyright - Planning & Environment

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Local Heritage Items

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

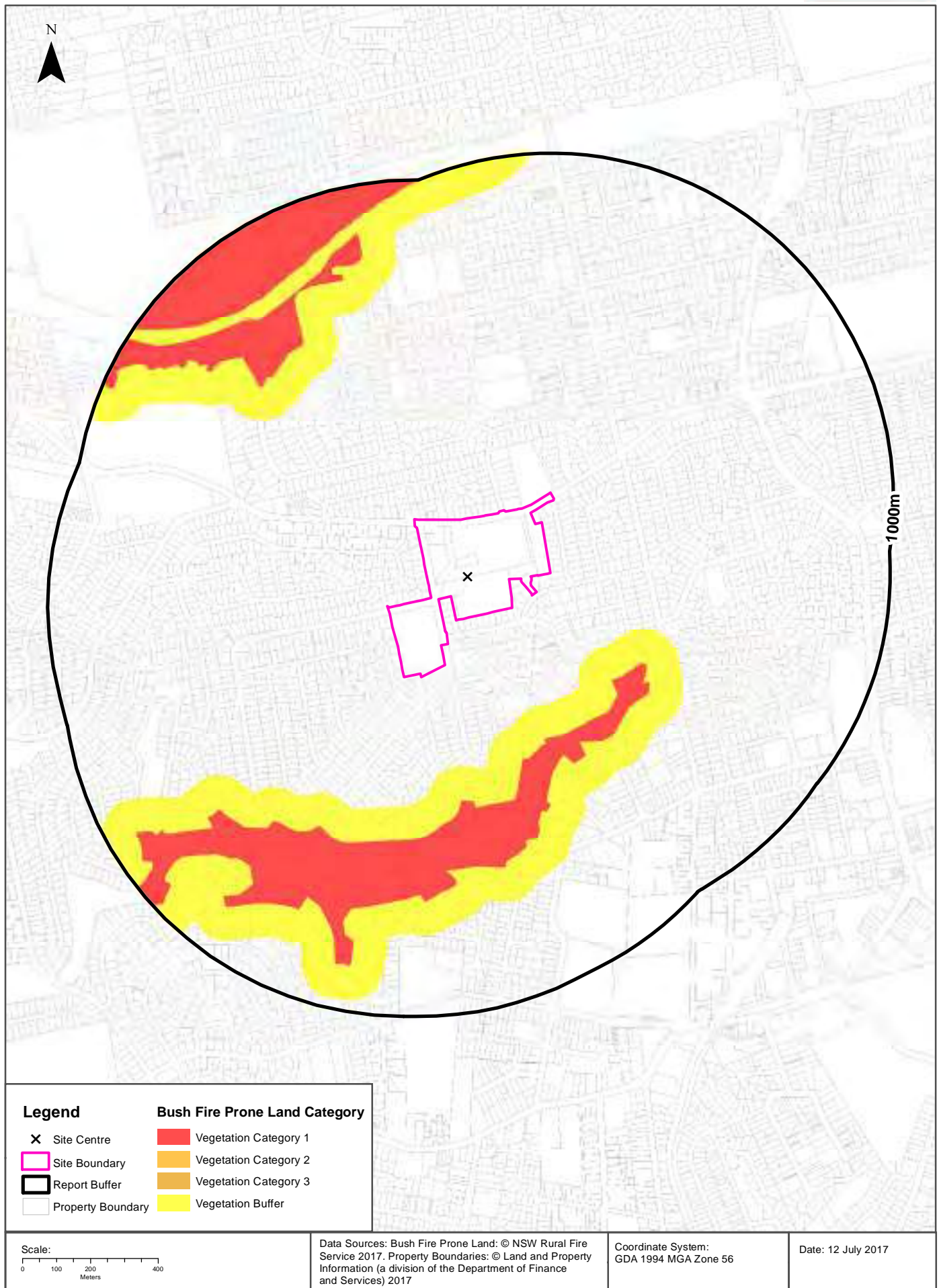
Map Id	Name	Classification	Significance	LEP or Act	Published Date	Commenced Date	Currency Date	Distance	Direction
I43	House and outbuilding	Item - General	Local	The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	23/12/2016	89m	North West
I41	'Havilah', stables	Item - General	Local	The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	23/12/2016	846m	East
I42	'Havilah House'	Item - General	Local	The Hills Local Environmental Plan 2012	05/10/2012	05/10/2012	23/12/2016	878m	East

Heritage Data Source: NSW Crown Copyright - Planning & Environment

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Natural Hazards - Bush Fire Prone Land

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Natural Hazards

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

Bush Fire Prone Land

What are the nearest Bush Fire Prone Land Categories that exist within the dataset buffer?

Bush Fire Prone Land Category	Distance	Direction
Vegetation Buffer	239m	South
Vegetation Category 1	339m	South

NSW Bush Fire Prone Land - © NSW Rural Fire Service under Creative Commons 4.0 International Licence

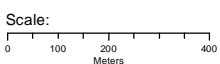
Ecological Constraints - Native Vegetation & RAMSAR Wetlands

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118



Legend

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



Data Sources: Property Boundaries & Topographic Data:
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Department of Finance and Services) 2017

Coordinate System:
GDA 1994 MGA Zone 56

Date: 12 July 2017

Ecological Constraints

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

Native Vegetation

What native vegetation exists within the dataset buffer?

Map ID	Map Unit Name	Threatened Ecological Community NSW	Threatened Ecological Community EPBC Act	Understorey	Disturbance	Disturbance Index	Dominant Species	Dist	Direction
Plant_n	Plant_n: Plantation (native and/or exotic)			00: Not assessed	00: Not assessed	0: Not assessed	Native or Exotic Plantations	0m	Onsite
S_WSF01	S_WSF01: Blue Gum High Forest	Blue Gum High Forest	Blue Gum High Forest (possible)	15: Grassy natives and exotics	20: Previously cleared 1943	3: High	E.salignaE.pilularis/S.glomulifera/E.paniculata/A.costata	0m	Onsite
S_WSF01	S_WSF01: Blue Gum High Forest	Blue Gum High Forest	Blue Gum High Forest (possible)	15: Grassy natives and exotics	31: Parkland open understorey	4: Very high	E.salignaE.pilularis/S.glomulifera/E.paniculata/A.costata	0m	Onsite
S_WSF09	S_WSF09: Sydney Turpentine-Ironbark Forest	Sydney Turpentine Ironbark Forest	Turpentine Ironbark Forest (possible)	15: Grassy natives and exotics	31: Parkland open understorey	4: Very high	S.glomulifera/E.paniculata/E.resinifera	0m	Onsite
Urban_E/N	Urban_E/N: Urban Exotic/Native			00: Not assessed	00: Not assessed	0: Not assessed	Urban Exotic/Native	0m	Onsite
S_DSF04	S_DSF04: Coastal Enriched Sandstone Dry Forest			12: Dry xeric shrubs	11: Roads/trails	1: Low	E.pilularis/S.glomuliferaA.costata/E.resinifera	342m	South
S_WSF02	S_WSF02: Coastal Enriched Sandstone Moist Forest			10: Mesic/rainforest	13: Weeds	2: Moderate	E.pilularis/A.costata/C.gummifera E.resinifera	381m	South West
Weed_Ex	Weed_Ex: Weeds and Exotics			00: Not assessed	00: Not assessed	0: Not assessed	Exotic Species >90%cover	392m	South East
S_RF02	S_RF02: Coastal Sandstone Gallery Rainforest			10: Mesic/rainforest	13: Weeds	2: Moderate	C.apetalum/T.laurina/C.serratifolia	668m	South West
S_WSF06	S_WSF06: Coastal Shale-Sandstone Forest			12: Dry xeric shrubs	13: Weeds	3: High	E.resinifera/E.pilularis/A.costata/S.glomulifera	807m	North West

Native Vegetation of the Sydney Metropolitan Area : NSW Office of Environment and Heritage
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RAMSAR Wetlands

What RAMSAR Wetland areas exist within the dataset buffer?

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

RAMSAR Wetlands Data Source: © Commonwealth of Australia - Department of Environment

Ecological Constraints

Master Plan, North Rocks Park Precinct, Carlingford, NSW 2118

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	<i>Litoria aurea</i>	Green and Golden Bell Frog	No	Endangered, Protected	Vulnerable
Amphibia	Myobatrachidae	<i>Pseudophryne australis</i>	Red-crowned Toadlet	No	Vulnerable, Protected	
Aves	Accipitridae	<i>Circus assimilis</i>	Spotted Harrier	No	Vulnerable, Protected	
Aves	Accipitridae	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	No	Vulnerable, Protected	CAMBA
Aves	Accipitridae	<i>Hieraetus morphnoides</i>	Little Eagle	No	Vulnerable, Protected	
Aves	Accipitridae	<i>Lophoictinia isura</i>	Square-tailed Kite	No	Vulnerable, Protected, Category 3 Sensitive Species	
Aves	Accipitridae	<i>Pandion cristatus</i>	Eastern Osprey	No	Vulnerable, Protected, Category 3 Sensitive Species	
Aves	Anatidae	<i>Stictonetta naevosa</i>	Freckled Duck	No	Vulnerable, Protected	
Aves	Ardeidae	<i>Botaurus poiciloptilus</i>	Australasian Bittern	No	Endangered, Protected	Endangered
Aves	Ardeidae	<i>Ixobrychus flavicollis</i>	Black Bittern	No	Vulnerable, Protected	
Aves	Artamidae	<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	No	Vulnerable, Protected	
Aves	Cacatuidae	<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	No	Vulnerable, Protected, Category 3 Sensitive Species	
Aves	Cacatuidae	<i>Callocephalon fimbriatum</i>	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	<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	No	Vulnerable, Protected, Category 2 Sensitive Species	
Aves	Charadriidae	<i>Charadrius leschenaultii</i>	Greater Sand-plover	No	Vulnerable, Protected	V,C,J,K
Aves	Ciconiidae	<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	No	Endangered, Protected	
Aves	Columbidae	<i>Ptilinopus superbus</i>	Superb Fruit-Dove	No	Vulnerable, Protected	
Aves	Falconidae	<i>Falco hypoleucos</i>	Grey Falcon	No	Endangered, Protected, Category 2 Sensitive Species	
Aves	Falconidae	<i>Falco subniger</i>	Black Falcon	No	Vulnerable, Protected	
Aves	Haematopodidae	<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	No	Vulnerable, Protected	
Aves	Laridae	<i>Sternula albifrons</i>	Little Tern	No	Endangered, Protected	CAMBA, JAMBA, ROKAMBA
Aves	Meliphagidae	<i>Anthochaera phrygia</i>	Regent Honeyeater	No	Critically Endangered Species, Protected	Critically Endangered
Aves	Meliphagidae	<i>Epthianura albifrons</i>	White-fronted Chat	No	Vulnerable, Protected	
Aves	Meliphagidae	<i>Epthianura albifrons</i>	White-fronted Chat population in the Sydney Metropolitan Catchment Management Area	No	Endangered Population, Vulnerable, Protected	
Aves	Meliphagidae	<i>Meliphreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	No	Vulnerable, Protected	
Aves	Neosittidae	<i>Daphoenositta chrysoptera</i>	Varied Sittella	No	Vulnerable, Protected	
Aves	Petroicidae	<i>Petroica boodang</i>	Scarlet Robin	No	Vulnerable, Protected	
Aves	Petroicidae	<i>Petroica phoenicea</i>	Flame Robin	No	Vulnerable, Protected	

Class	Family	Scientific	Common	Exotic	NSW Status	Commonwealth Status
Aves	Petroicidae	<i>Petroica rodinogaster</i>	Pink Robin	No	Vulnerable, Protected	
Aves	Psittacidae	<i>Glossopsitta pusilla</i>	Little Lorikeet	No	Vulnerable, Protected	
Aves	Psittacidae	<i>Lathamus discolor</i>	Swift Parrot	No	Endangered, Protected, Category 3 Sensitive Species	Critically Endangered
Aves	Psittacidae	<i>Polytelis swainsonii</i>	Superb Parrot	No	Vulnerable, Protected, Category 3 Sensitive Species	Vulnerable
Aves	Rostratulidae	<i>Rostratula australis</i>	Australian Painted Snipe	No	Endangered, Protected	Endangered
Aves	Scolopacidae	<i>Calidris ferruginea</i>	Curlew Sandpiper	No	Endangered, Protected	CE,C,J,K
Aves	Scolopacidae	<i>Calidris tenuirostris</i>	Great Knot	No	Vulnerable, Protected	CE,C,J,K
Aves	Scolopacidae	<i>Limicola falcinellus</i>	Broad-billed Sandpiper	No	Vulnerable, Protected	CAMBA, JAMBA, ROKAMBA
Aves	Scolopacidae	<i>Limosa limosa</i>	Black-tailed Godwit	No	Vulnerable, Protected	CAMBA, JAMBA, ROKAMBA
Aves	Scolopacidae	<i>Xenus cinereus</i>	Terek Sandpiper	No	Vulnerable, Protected	CAMBA, JAMBA, ROKAMBA
Aves	Strigidae	<i>Ninox connivens</i>	Barking Owl	No	Vulnerable, Protected, Category 3 Sensitive Species	
Aves	Strigidae	<i>Ninox strenua</i>	Powerful Owl	No	Vulnerable, Protected, Category 3 Sensitive Species	
Aves	Tytonidae	<i>Tyto longimembris</i>	Eastern Grass Owl	No	Vulnerable, Protected, Category 3 Sensitive Species	
Aves	Tytonidae	<i>Tyto novaehollandiae</i>	Masked Owl	No	Vulnerable, Protected, Category 3 Sensitive Species	
Gastropoda	Camaenidae	<i>Meridolum corneovirens</i>	Cumberland Plain Land Snail	No	Endangered	
Gastropoda	Camaenidae	<i>Pommerhelix duralensis</i>	Dural Woodland Snail	No	Endangered	Endangered
Mammalia	Dasyuridae	<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	No	Vulnerable, Protected	Endangered
Mammalia	Emballonuridae	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	No	Vulnerable, Protected	
Mammalia	Molossidae	<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	No	Vulnerable, Protected	
Mammalia	Pteropodidae	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	No	Vulnerable, Protected	Vulnerable
Mammalia	Vespertilionidae	<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	No	Vulnerable, Protected	Vulnerable
Mammalia	Vespertilionidae	<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	No	Vulnerable, Protected	
Mammalia	Vespertilionidae	<i>Miniopterus australis</i>	Little Bentwing-bat	No	Vulnerable, Protected	
Mammalia	Vespertilionidae	<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	No	Vulnerable, Protected	
Mammalia	Vespertilionidae	<i>Myotis macropus</i>	Southern Myotis	No	Vulnerable, Protected	
Mammalia	Vespertilionidae	<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	No	Vulnerable, Protected	
Flora	Convolvulaceae	<i>Wilsonia backhousei</i>	Narrow-leafed Wilsonia	No	Vulnerable, Protected	
Flora	Dilleniaceae	<i>Hibbertia superans</i>		No	Endangered, Protected	
Flora	Elaeocarpaceae	<i>Tetratheca glandulosa</i>		No	Vulnerable, Protected	
Flora	Ericaceae	<i>Epacris purpurascens</i> var. <i>purpurascens</i>		No	Vulnerable, Protected	
Flora	Ericaceae	<i>Leucopogon fletcheri</i> subsp. <i>fletcheri</i>		No	Endangered, Protected	
Flora	Fabaceae (Faboideae)	<i>Dillwynia tenuifolia</i>		No	Vulnerable, Protected	
Flora	Fabaceae (Mimosoideae)	<i>Acacia bynoeana</i>	Bynoe's Wattle	No	Endangered, Protected	Vulnerable
Flora	Fabaceae (Mimosoideae)	<i>Acacia clunies-rossiae</i>	Kanangra Wattle	No	Vulnerable, Protected	
Flora	Fabaceae (Mimosoideae)	<i>Acacia gordonii</i>		No	Endangered, Protected	Endangered

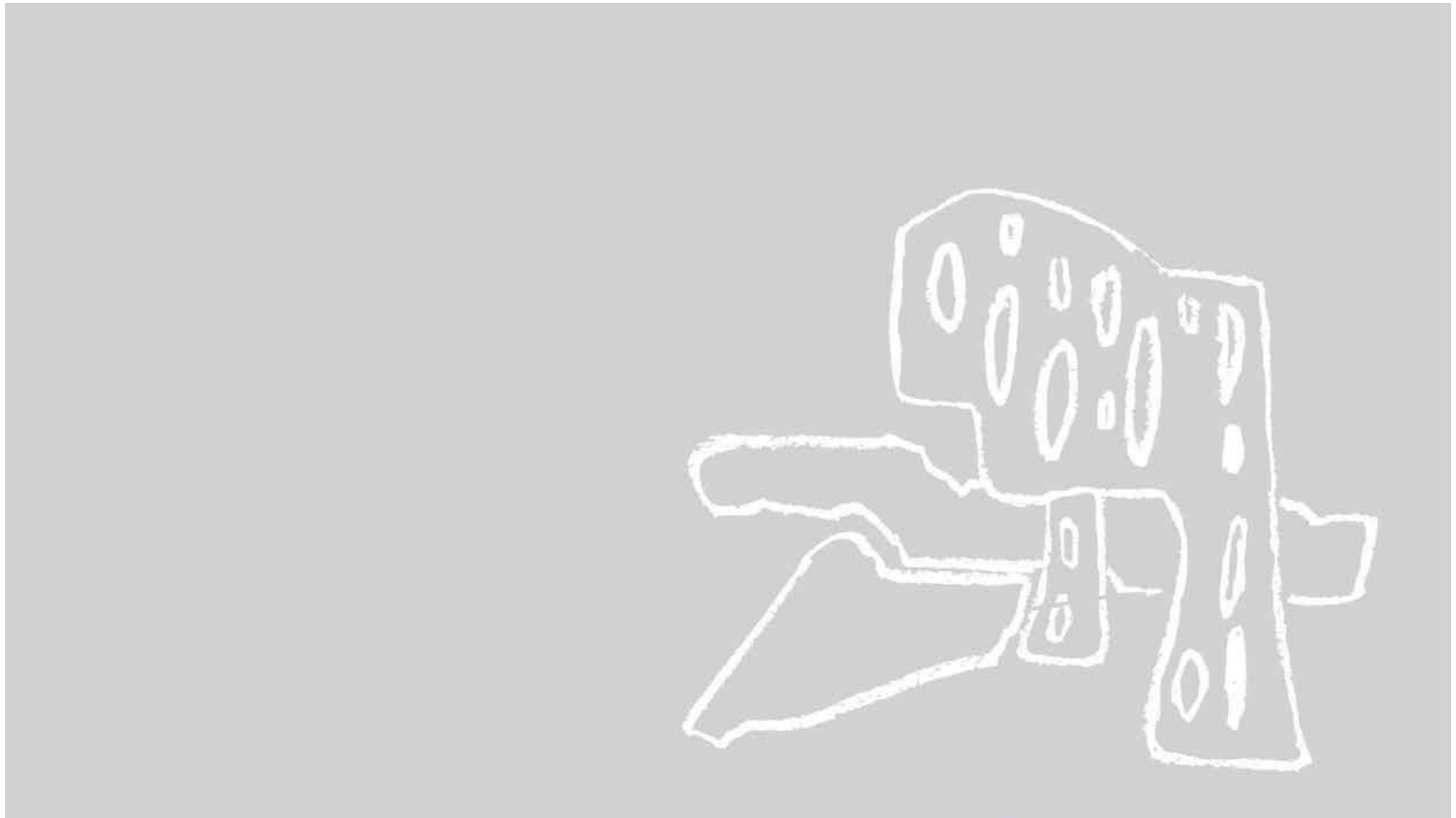
Class	Family	Scientific	Common	Exotic	NSW Status	Commonwealth Status
Flora	Fabaceae (Mimosoideae)	Acacia pubescens	Downy Wattle	No	Vulnerable, Protected	Vulnerable
Flora	Grammitidaceae	Grammitis stenophylla	Narrow-leaf Finger Fern	No	Endangered, Protected, Category 3 Sensitive Species	
Flora	Haloragaceae	Haloragodendron lucasii		No	Endangered, Protected	Endangered
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	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	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	
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	

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 12/07/2017

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CITY OF PARRAMATTA - NORTH ROCKS PARK

Ecological Constraints Analysis

For:

JMD Design

September 2017

Final



**PO Box 2474
Carlingford Court 2118**

Report No. 17101RP2

The preparation of this report has been in accordance with the brief provided by the Client and has relied upon the data and results collected at or under the times and conditions specified in the report. All findings, conclusions or recommendations contained within the report are based only on the aforementioned circumstances. The report has been prepared for use by the Client and no responsibility for its use by other parties is accepted by Cumberland Ecology.

Version	Date Issued	Amended by	Details
1	21/08/2017	BF	Draft
2	25/09/2017	BF	Final

Approved by: David Robertson

Position: Director

Signed: _____

David Robertson

Date: 25 September, 2017

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Introduction

1.1 Purpose

Cumberland Ecology has been commissioned by JMD Design to prepare an Ecological Constraints Analysis (ECA) for two parks; North Rocks Park and John Wearn Reserve, within Carlingford, NSW (hereafter referred to as the Subject Site). JMD Design have been commissioned by the City of Parramatta Council to prepare a Master Plan for the redevelopment of the parks within an area referred to as the North Rocks Park Master Plan Precinct.

The purpose of this ECA is to guide the preparation of the Master Plan by detailing ecological constraints to the redevelopment of the parks. Aims are:

- To document the results of a flora survey and to describe the vegetation communities occurring on the Subject Site;
- To document the results of a fauna survey and to describe fauna habitats on the Subject Site;
- To assess the likelihood that threatened flora and fauna species could occur on the Subject Site;
- To identify and discuss any potential development constraints and opportunities from biodiversity matters, particularly any relevant threatened flora, fauna and vegetation communities.

1.2 Background

1.2.1 *Location of the Subject Site*

The Subject Site is comprised of two parks within Carlingford, NSW that are owned by the City of Parramatta Council. The first park is North Rocks Park which is bound by North Rocks Road in the north, Farnell Avenue in the west, and residential dwellings in the south and west. The park is comprised of Lots 105 and 106 in DP233494, Lot 1 in DP228805, Lot 1 in DP709745, Lots 7010 and 7011 in DP93824, Lot 26 in DP230685, Lot 7 in DP227305, Lot 1 in DP221238, and Lot 6 in DP748981. An additional area of land comprised of Lot 1

DP748981, a residential lot was assessed during the site survey. This area has since been excluded from the Subject Site.

The second park is John Wearn Reserve which occurs to the south-west of North Rocks Park. The park is bounded by Balaka Drive in the north, Farnell Avenue in the east, and residential properties in the west and south. It is comprised of Lot 2 in DP604323.

1.2.2 Subject Site Description

The Subject Site contains buildings including child care facilities, a community centre, a residential dwelling, and a senior citizens centre, facilities for barbecuing and picnicking, and children's playgrounds. Paved surfaces for recreational activities including walking, skating, tennis, basketball, and cycling are also present.

Vegetated areas consist of open areas of mown grassland, and areas of woody vegetation including gardens, planted trees, and patches of remnant/regrowth native vegetation.

1.2.3 Zoning

The Subject Site is currently zoned as RE1 – Public Recreation under The Hills Local Environmental Plan (LEP) 2012. The land within the Subject Site has recently been transferred from The Hills Shire Local Government Area (LGA) to the City of Parramatta LGA. As of the date of preparation of this ECA the Parramatta LEP 2011 has not been updated to reflect the new land within the LGA, and the Subject Site is still zoned under The Hills LEP 2012.

1.3 Legislation

1.3.1 Existing Legislation

i. Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* is the overarching planning legislation in NSW. This act provides for the creation of planning instruments that guide land use. The EP&A Act also provides for the consideration of the environment and biodiversity values, which is addressed in Section 5A (Significant effect on species, populations or ecological communities or their habitats) should a land use change be proposed. This includes threatened species, communities, habitat and processes as listed under the *NSW Threatened Species Conservation Act 1995 Act* and *Fisheries Management Act 1994 (FM Act)*.

ii. Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places — defined in the EPBC Act as Matters of National Environmental Significance (MNES). Under the EPBC Act, any action (which includes a

development, project or activity) that is considered likely to have a significant impact on MNES (including nationally listed threatened ecological communities and species, and listed migratory species) must be referred to the Australian Government Minister for the Environment (the Minister). The purpose of the referral is to allow a decision to be made about whether an action requires approval by the Commonwealth. If an action is declared a “controlled action”, then Commonwealth approval is required.

iii. Threatened Species Conservation Act 1995

The TSC Act is the key piece of legislation in NSW relating to the protection and management of biodiversity and threatened species. The TSC Act aims to protect and encourage the recovery of threatened species, populations and communities that are listed under the Act through threat abatement and species recovery programs.

The TSC Act requires consideration of whether a development (Part 4) or an activity (Part 5) is likely to significantly impact threatened species, populations, communities or their habitat. The potential impacts of any developments, land use changes or activities would need to undergo an “Assessment of Significance” under Section 5A of the EP&A Act.

If the results of an Assessment of Significance indicate that a development or activity is likely to significantly affect threatened species, populations or ecological communities, the DA must be accompanied by a Species Impact Statement (SIS), which is a detailed ecological study carried out in accordance with a set of assessment requirements issued by the Chief Executive of Office of Environment and Heritage (OEH).

This act will be replaced by the NSW *Biodiversity Conservation Act 2016* (BC Act) on the 25th of August 2017. Key details of this legislation are yet to be released and as such ecological assessments in line with the new legislation cannot be undertaken until after that date. The current information available on the BC Act is summarised in **Section 1.3.2** below.

iv. Biosecurity Act 2015

The *Noxious Weeds Act 1993* was repealed on the 1st July 2017 and problematic weeds are now managed under the NSW *Biosecurity Act 2015* (Biosecurity Act).

The NSW Biosecurity Act provides a framework for the roles of government, private landholders and public authorities regarding the management of priority weeds and other biosecurity threats (such as pests and disease) which may have an impact on the economy, community or environment. The aim of this legislation is to manage the negative impact of weeds by preventing, eliminating, or restricting significant weeds from spreading or establishing, and implementing effective management and monitoring of priority weeds. Under the act all land owners and managers have a duty to address the biosecurity threat posed by weeds within the land they own or manage.

Local Land Services NSW has established 11 regional weed committees, overseen by a State weed committee. Each regional weed committee has created a strategic weed management plan for the region they manage. Landowners and managers within the Greater Sydney region are required to manage the biosecurity threat posed by weeds as specified in

the Greater Sydney Regional Strategic Weed Management Plan. The plan specifies management objectives to comply with legal requirements to control State Priority Weeds. These weeds have specified legislated management requirements within controls and regulations of the Biosecurity Act.

All 32 Weeds of National Significance (WoNS) are now listed as State Priority Weeds. WoNS are species that have been identified by Australian governments based on their invasiveness, potential for spread, and environmental, social and economic impacts and are priorities for control.

A further two sets of weeds are detailed within the management plan for each region. Regional Priority Weeds are required to be managed as per the proposed objectives in the management plan to fulfil a General Biosecurity Duty which applies to all land owners and managers under the act. "Other weeds of regional concern" is the second category weeds have been assigned to. These weeds may have legal management requirements by a managing authority to be controlled as part of the General Biosecurity Duty in circumstances where they may impact upon an asset such as the environment or human health.

1.3.2 Future Legislation – Biodiversity Conservation Act 2016

Under the NSW Land Management and Biodiversity Conservation (LMBC) reform, the NSW Parliament passed the following two Acts in November 2016:

- *Biodiversity Conservation Act 2016 (BC Act)*, which replaces the *Threatened Species Conservation Act 1995*, the *Nature Conservation Trust Act 2001* and parts of the *National Parks and Wildlife Act 1974*; and
- *Local Land Services Amendment Act 2016 (LLSA Act)*, which replaces the *Native Vegetation Act 2003* and the *Native Vegetation Regulation 2005*.

Regulations and other key products to support the BC Act and LLSA Act were on exhibition until 21 June 2017 and are currently in draft form. These products include 19 documents, several maps and two new calculator tools. It is anticipated that the reforms will commence on 25 August 2017.

The listing of threatened species and threatened ecological communities (TECs) under the TSC Act will remain the same under the new legislation. The main changes will be how impacts to TECs and threatened species are assessed and offset with a bigger emphasis on utilisation of the Biodiversity Assessment Methodology (BAM), formerly known as the BioBanking Assessment Methodology. Most biodiversity offsetting for impacts will be done through purchase and retirement of biodiversity credits where available, and when not possible, through contribution to a Government biodiversity fund.

A number of threatened species and TECs are to be placed on a list for which there is potential for Serious and Irreversible Impacts (SII) to occur to the entity. These communities and species will have a cap placed upon them above which an area of clearing or number of individuals to be impacted cannot be exceeded. If impacts are proposed above this threshold an approving authority will be unable to approve a development application for a project. Blue

Gum High Forest (BGHF), a community which has been recorded within the Subject Site occurs on the proposed SAll list. The clearing threshold for this community is not known yet.

For vegetation clearing, a threshold area of clearing for any native vegetation will be stated under the new legislation. Proposed clearing above this threshold will trigger a requirement for offsetting under the Biodiversity Offsetting Scheme. This threshold is currently unknown, and it is uncertain how impacts to small areas of TECs in urban areas, such as to a single BGHF tree will be assessed and offset under the new legislation.

i. Summary of Changes

The main changes under the reform include:

- The Biodiversity Assessment Method (BAM) is replacing three current biodiversity assessment methods, i.e. BioBanking Assessment Methodology (BBAM), Biodiversity Certification Assessment Methodology (BCAM) and Framework for Biodiversity Assessment (FBA) for major projects;
- Additional thresholds and triggers are provided, where proposed development approval pathway are required to apply the NSW Biodiversity Offset Scheme, such as the Sensitive Biodiversity Values Land Map;
- The proponent for Biodiversity Certification can now be a private or public entity, rather than a Planning Authority only;
- Serious and Irreversible Impacts (SAll), which require special consideration by the consent authority and additional avoidance measures might be requested;
- Changes to the field assessment methodology;
- Changes to Consultant Accreditation;
- New online biodiversity credit calculator;
- New offset payment calculator; and
- Changes to Biodiversity Offset Rules.

The following assessment types are available under the LMBC reform:

- Streamlined biodiversity assessment for small area clearing;
- Biodiversity assessments for Part 4 projects;
- Biodiversity assessments for Major Projects;
- Biodiversity assessments for State Significant Infrastructure (SSDI) and Developments (SSD);

- Biodiversity certification; and
- Stewardship site for offsets (to replace biobank sites).

It is important to note that the documents under the LMBC reform are in draft form and are subject to change.

ii. Missing Information

Several key documents/maps are referred to in the LMBC reform but are not yet available. The main documents/maps which are not yet available are:

- Native Vegetation Regulatory Map;
- Vegetation SEPP;
- Biodiversity Conservation Investment Strategy;
- Thresholds of self-assessment codes for land holders; and
- Thresholds for SAI.



Legend

 Subject Site

North Rocks Road

NORTH ROCKS
PARK

Famell Avenue

JOHN WEARN
RESERVE



Coordinate System: MGA Zone 56 (GDA 94)



0 50 100 150 200 m

Figure 1.1. Location of the Subject Site



Legend

 Subject Site

Image Source:
Image © NearMap
(dated 6-05-2017)

Coordinate System: MGA Zone 56 (GDA 94)



0 25 50 75 100 m

Figure 1.2. Extent of the Subject Site

Methods

2.1 Database Analyses

Database analysis was conducted for the locality using the Office of Environment and Heritage (OEH) Atlas of NSW Wildlife Database (OEH 2017). The Atlas of NSW Wildlife was examined for post-1980 records of any threatened flora and fauna species listed under the *Threatened Species Conservation Act 1995* (TSC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* within a 10km radius of the site. GIS layers for the vegetation mapping scheme *The Native Vegetation of the Sydney Metropolitan Area* (Reference) which covers the Subject Site was reviewed to determine the potential for Threatened Ecological Communities to occur on the site, or any other native vegetation community.

2.2 Site Surveys

2.2.1 Flora Survey

A flora survey was conducted by a botanist on the 20th July 2017. The flora survey consisted of:

- Random meander survey method across the entire Subject Site to compile a species list and assess and map vegetation communities;
- Targeted searches for threatened flora species recorded as occurring within 10km of the Subject Site; and
- Photographs taken of vegetation on site to provide a visual documentation of communities occurring, and community condition.
- One 20 x 20 Detailed Floristics Quadrat using BioBanking Methodology.

The results of the Random Meander Surveys and Biobanking Quadrat are presented in **Table A.1**. Within each Random Meander Survey all Blue Gum High Forest (BGHF) canopy trees and their locations, or locations of tree on the periphery of patches were recorded with a hand-held GPS device to assist with mapping of the extent of vegetation communities.

2.2.2 Fauna Survey

A fauna habitat assessment was conducted by an ecologist on the 20th July 2017. The Subject Site was assessed for groundcover, shrub/understory cover, canopy cover, tree hollows as well as other habitat features such as bush rock, fallen trees and signs of fauna use such as scats, scratches and scrapings.

The nature and extent of fauna habitats in the Subject Site were assessed and areas where fauna species could reside or forage were identified. This included consideration of important indicators of habitat condition and complexity including the occurrence of microhabitats such as tree hollows, fallen logs, bush rock and wetland areas such as creeks and soaks.

An assessment of the structural complexity of vegetation, the age structure of the vegetation and the nature and extent of human disturbance throughout the Subject Site was also undertaken and considered. Tree hollows were used as a general indication of habitat quality for arboreal fauna and hollow-dwelling birds and bats. Any hollows observed during surveys were recorded and the general vegetation condition and tree maturity was used to predict whether trees on site were likely to contain hollows.

During this habitat assessment opportunistic sightings of diurnal fauna were recorded.

2.2.3 Survey Limitations

The flora survey was conducted during one site visit in July. Growing conditions in the vicinity of the Subject Site had been suitable to enable adequate production of features to enable identification to be made of most plants to species level at the time of the survey and accurate assessment of the site's ecological significance. An effort was made to identify all exotic species and garden cultivars where possible, however due to the lack of diagnostic plant keys for exotic garden plants and horticultural cultivars, some species were only identified to genus level.

It is unlikely that all species present have been recorded. During the survey the particular focus was on endemic plant species and communities, due to time constraints, and as such a small number of exotic plants in the garden areas were not identified. Despite this, it is probable that the vast majority of species, and all of the endemic, native species present at the time of the survey were recorded, and that issues including conservation significance of the flora, and ecological constraints of native vegetation on development have been satisfactorily assessed. An assessment of the likelihood of occurrence of all threatened flora species recorded or likely to occur within a 10km radius of the Subject Site was undertaken to supplement the flora survey.

Limited fauna surveys were undertaken for this assessment, which mainly relied on database analysis of species recorded within a 10km radius, and fauna habitat assessment. The data produced by the database analysis and fauna habitat assessment is intended to be indicative of the types of species that could occur on the Subject Site. Additional targeted fauna surveys were considered unwarranted due to the degraded and urban nature of the habitat present.



- Legend**
- Subject Site
 - ↔ Random Meander
 - Flora Quadrat

Image Source:
Image © NearMap
(dated 6-05-2017)

Coordinate System: MGA Zone 56 (GDA 94)

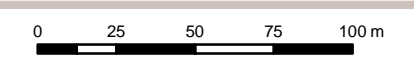


Figure 2.1. Flora Survey Locations



Legend



-  Subject Site
-  Random Meander

Image Source:
Image © NearMap
(dated 6-05-2017)

Coordinate System: MGA Zone 56 (GDA 94)

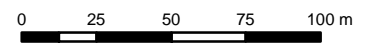


Figure 2.2. Fauna Survey Locations

Results

3.1 Vegetation Communities

Sydney Metropolitan Mapping identifies four vegetation communities across the Subject Site (OEH 2016). These communities are:

- Blue Gum High Forest;
- Sydney Turpentine Ironbark Forest;
- Plantation (native and/or exotic); and
- Urban Exotic/Native.

Two of these communities Blue Gum High Forest (BGHF) and Sydney Turpentine Ironbark Forest are naturally occurring vegetation communities, while the other two communities are descriptive names for vegetation which consists predominately of urban plantings and cannot be assigned to any naturally occurring vegetation communities known to occur in the locality.

During the site survey Cumberland Ecology confirmed the presence and absence of these vegetation communities within the Subject Site and refined the vegetation mapping (**Figure 3.1**). Broad-scale mapping schemes rely heavily on interpretation of aerial photography and accuracy varies. Within the GIS layer for the Sydney Metropolitan Mapping Scheme all polygons covering vegetation within the site are noted as not having been ground-truthed.

Areas of vegetation communities across the Subject Site as mapped by Cumberland Ecology are provided in **Table 3.1** below. All non-naturally occurring vegetation has been mapped as Urban Exotic/Native, as there is no ecologically significant difference between the Plantation and Urban Exotic/Native communities within the Sydney Metropolitan Mapping, and these communities are not well described. An additional exotic vegetation community, Exotic Dominated Grassland has been mapped and described by Cumberland Ecology, to describe areas of mown areas of exotic grasses and lawn weeds in which there is no woody vegetation present. Areas of vegetation fitting this description are not mapped or described under the Sydney Metro Mapping.

Sydney Turpentine Ironbark Forest was not located within the Subject Site and the area mapped by OEH (2016) as this community is more consistent with the BGHF community. A

description of vegetation communities as they occur within the Subject Site is provided in **Section 3.1.3** below.

Table 3.1 Vegetation Communities and areas present within the Subject Site

Vegetation	Area (ha)
Blue Gum High Forest	2.85
Urban Exotic/ Native	2.16
Exotic Dominated Grassland	3.39
Total	8.40

3.1.1 Threatened Ecological Communities

One native vegetation community occurring within the Subject Site is a TEC. This community, BGHF, is listed under the TSC Act as a Critically Endangered Ecological Community (CEEC) as *Blue Gum High Forest in the Sydney Basin Bioregion*. It is also listed under the EPBC Act as a CEEC as *Blue Gum High Forest of the Sydney Basin Bioregion*.

This community has been proposed as a candidate for listing under the BC Act 2016 as a species that meets the principles and guidelines for being susceptible to a Serious and Irreversible Impact (SAIL). As such a clearing threshold is likely to be set for the community. Any Development Application under Part 4 of the EP&A Act proposing clearing of the community higher than the threshold will not be granted consent.

3.1.2 Vegetation Community Descriptions

Vegetation communities as they occur within the Subject Site are described below.

i. Blue Gum High Forest

This community occurs as a large patch in the south of North Rocks Park (**Photograph 3.1**), strips in the western (**Photograph 3.2**) and eastern sides of North Rocks Park, and as scattered trees throughout North Rocks Park (**Photograph 3.3**) and along the North Rocks Road (**Photograph 3.4**). The community also occurs as a small patch in the north-east of John Wearn Reserve (**Photograph 3.5**).

The community across the Subject Site predominately occurs as remnant trees and regrowth small trees without persisting native ground layer or understorey vegetation. The ground and shrub layers in most areas consist either of mown exotic grasses, or planted herbs and shrubs in gardens. Exceptions to this occur in the large patch in the south of North Rocks Park and across the adjoining residential Lot 1 in DP748981. A small area adjoining the residential lot is unmown, along with fringing areas in the residential lot, in which several BGHF shrub species persist and occur amongst exotic plantings and weeds. The ground layer in this area also contains persisting native herbs and is generally native dominated

(**Photograph 3.6**). A native BGHF grass is also a dominant and co-dominant in large areas of the patch in the south of North Rocks Park.

The canopy across the community in the Subject Site is tall and consists of a number of BGHF species. A sub-canopy of smaller, regrowth trees is present, mostly consisting of younger individuals of the canopy species. The most prevalent species are *Eucalyptus pilularis* (Blackbutt) and *Eucalyptus saligna* (Sydney Blue Gum), and to a lesser extent *Eucalyptus paniculata* subsp. *paniculata* (Grey Ironbark). Other species occurring less frequently include *Eucalyptus acmenoides* (White Stringybark), *Angophora floribunda* (Rough-barked Apple), and *Angophora costata* (Smooth-barked Apple). A small area in the south-west of the large patch in North Rocks Park has several individuals of *Eucalyptus resinifera* subsp. *resinifera* amongst more typically BGHF species indicating this may have historically been a transitional area between BGHF and Sydney Turpentine Ironbark Forest.

Within the large patch of the community in the south of North Rocks Park there are numerous plantings of non-endemic native trees occurring within the canopy. These trees are mapped as BGHF in the Sydney Metro Mapping (OEH 2016). They have been excised and mapped as Urban Exotic/Native Vegetation by Cumberland Ecology in **Figure 3.1** where they occur at the edges of the patch and do not contain intermixed BGHF canopy species. These native species which do not naturally occur in the Sydney Metropolitan area and are not BGHF species include *Eucalyptus microcorys* (Tallowwood), *Eucalyptus deanei* (Mountain Blue Gum) (**Photograph 3.7**), and *Corymbia citriodora* (Lemon-scented Gum).

Persisting native shrubs in unmown areas of BGHF in North Rocks Park and the adjacent residential property include *Breynia oblongifolia* (Coffee Bush), *Polyscias sambucifolia* subsp. *long leaflets* (Elderberry Panax), and *Acacia parramattensis* (Sydney Green Wattle). They co-occur with exotic species including *Olea europaea* subsp. *cuspidata* (African Olive), *Harpephyllum caffrum* (Kaffir Plum), and *Ulmus parvifolia* (Chinese Elm). A small number of native shrubs in the shrub layer of the patch in John Wearn Park such as *Acacia floribunda* (White Sally) may or may not have been planted.

Elsewhere the shrub layer is comprised of a diverse array of planted locally native species (mostly cultivars), non-endemic native species, and exotic species. Locally native species include *Melaleuca linariifolia* (Flax-leaved Paperbark), *Banksia ericifolia* (Heath-leaved Banksia), and *Callistemon citrinus* (Crimson Bottlebrush). Non-endemic native species include juvenile *Grevillea robusta* (Silky Oak) and *Chamelaucium uncinatum* (Geraldton Wax). Exotic species include *Murraya paniculata* (Orange Jessamine) and *Nandina domestica* (Heavenly Bamboo).

The ground layer in the unmown patches in North Rocks Park and the adjacent residential property include persisting native BGHF species such as the grasses *Microlaena stipoides* (Weeping Grass) and *Oplismenus aemulus* (Basket Grass), and forbs including *Pseuderanthemum variabile* (Pastel Flower), *Geranium homeanum* (Native Geranium), and *Pratia purpurascens*. The twiners *Glycine microphylla* and *Hardenbergia violacea* (False Sarsparilla) are also present. These areas also contain occurrences of exotic weed species in the layer including *Bidens pilosa* (Cobbler's Pegs), *Sida rhombifolia* (Paddys Lucerne),

and *Hypochaeris radicata* (Catsear), and the grass *Ehrharta erecta* (Panic Veldtgrass) which is common.

Outside of the small unmown area, the ground layer throughout the larger BGHF patches varies from being dominated by the native grass *Microlaena stipoides*, with scattered occurrences of some BGHF herbs such as *Pseuderanthemum variabile* and *Brunoniella australis* (Blue Trumpet) along with exotic species, to being dominated by exotic lawn grasses and lawn weeds including *Ehrharta erecta*, *Stenotaphrum secundatum* (Buffalo Grass), *Stellaria media* (Chickweed), and *Senecio madagascariensis* (Fireweed). This area throughout the larger patch is maintained by mowing, and growth height of ground layer species is limited, and establishment of native shrubs and regenerating canopy species is not possible.

The remainder of the BGHF throughout the Subject Site has a ground layer consisting of either planted herbs in gardens, predominately exotic with the exception of several commonly planted native species such as *Lomandra longifolia* (Spiny Mat-rush) and *Dianella caerulea*, or Exotic Dominated Grassland as described in **Section 3.1.iii** below.

There are several *Eucalyptus pilularis* trees planted in John Wearn Reserve outside of the BGHF patch in the north-east. A review of historical aerial photography shows that in 1943 (**Figure 3.2**) this area was entirely cultivated and these trees are unlikely to be remnant or natural regrowth of BGHF. The trees have been mapped as Urban Exotic/Native as described in **Section 3.1.ii** below. The current BGHF patch in the north-east however is in the proximate location of trees present on a roadside in 1943 which are likely to have provided propagules for regrowth of the extant patch, and the several large trees in this area may be remnant.



Photograph 3.1 Large patch BGHF in the south of North Rocks Park



Photograph 3.2 BGHF in north-east of John Wearn Reserve



Photograph 3.3 Strip of BGHF in west of North Rocks Park



Photograph 3.4 BGHF canopy over exotic grassland within North Rocks Park



Photograph 3.5 BGHF in gardens along north of North Rocks Park



Photograph 3.6 BGHF with unmown ground layer and persisting shrubs



Photograph 3.7 Planted *Eucalyptus deanei* on edge of a large patch of BGHF

ii. *Urban Exotic/Native Vegetation*

Outside of areas mapped as BGHF, all woody vegetation across the Subject Site has been mapped as Urban Exotic/Native Vegetation (**Photographs 3.8-3.10**). This community is comprised of a composition of planted native and exotic species which are not consistent with any naturally occurring native vegetation community. The community occurs as garden plantings or trees and shrubs planted over Exotic Dominated Grassland as described in **Section 3.1.iii**.

Planted trees include locally occurring natives such *Eucalyptus pilularis* (in John Wearn Reserve), *Eucalyptus sideroxylon* (Mugga Ironbark), *Melaleuca quinquenervia* (Broad-leaved Paperbark), and *Eucalyptus crebra* (Narrow-leaved Ironbark). Non-endemic native trees are commonly planted in the community and include *Eucalyptus grandis* (Flooded Gum), *Eucalyptus scoparia* (Wallangarra White Gum), *Eucalyptus microcorys* (Tallowwood), *Araucaria bidwillii* (Bunya Pine), and *Lophostemon confertus* (Queensland Brush Box). Exotic species include *Cinnamomum camphora* (Camphor Laurel), *Jacaranda mimosifolia* (Jacaranda), and *Liquidambar styraciflua* (American Sweetgum).

The shrub layer also consists of an array of native and exotic species. Locally native species include *Tristania laurina* (Water Gum), *Melaleuca armillaris* (Bracelet Honey-myrtle), and *Melaleuca linariifolia*. Non-endemic natives include *Grevillea olivacea* (Olive Grevillea), *Grevillea rosmarinifolia* (Rosemary Grevillea), and *Leptospermum petersonii* (Lemon-

scented Tea-tree). Exotic species present include *Celtis sinensis* (Chinese Celtis), *Magnolia* sp., and *Tibouchina* sp.

Ground layer species include planted natives such as *Lomandra longifolia*, *Doryanthes excelsa* (Gynea Lily), and exotics including both weeds and planted species such as *Hedychium gardnerianum* (Ginger Lily), *Tradescantia fluminensis* (Wandering Trad), and *Clivia miniata*.



Photograph 3.8 Urban Exotic/Native Vegetation within North Rocks Park (north)



Photograph 3.9 Urban Exotic/Native Vegetation within North Rocks Park (west)



Photograph 3.10 Urban Exotic/Native Vegetation in John Wearn Reserve (south)

iii. *Exotic Dominated Grassland*

Large areas of the Subject Site consist of mown areas of exotic grasses, along with exotic lawn weeds (**Photograph 3.11**). Very few native species persist with individuals limited to very scattered isolated occurrences of common forbs such as *Cyperus gracilis* and grasses such as *Microlaena stipoides*. Exotic grasses present include the species *Cenchrus clandestinus* (Kikuyu), *Cynodon dactylon* (Couch), *Stenotaphrum secundatum* (Buffalo Grass). Lawn weeds include *Medicago polymorpha* (Burr-medic), *Plantago lanceolata* (Plant's Tongues), *Arctotheca calendula* (Capeweed), and *Paronychia brasiliensis* (Chilean Whitlow Wort).



Photograph 3.11 Exotic Dominated Grassland (John Wearn Park)

3.1.3 Flora Species

i. *General Species*

A total of 171 flora species were recorded within the Subject Site. Of these 76 species are exotic species, and 16 species are non-endemic species not known to occur naturally in the Sydney Metropolitan area. Fifty native species were recorded that are likely to naturally occur on the site due to being BGHF species, or species that could not be excluded from naturally occurring on the site from landscape position, or being species known to occur in the locality and utilise shale soils. Additionally ten native species were recorded that are known to be nursery produced cultivars, and an additional 19 species are locally native

species that were ascertained to be planted due to their situation within the landscape, such as in clumps in garden beds, or would not naturally occur within Hornsby Plateau shale soils.

ii. *Threatened Species*

No threatened flora species were recorded within the Subject Site and due to the degraded, urban nature of the habitat, none are expected to occur. The likelihood of occurrence of threatened flora species has been assessed and is included in **Table C.1**.

iii. *Priority Weeds*

Priority weeds recorded within the study area and their categories are detailed in **Table 3.2** below. Appendix A of the Greater Sydney Regional Strategic Weed Management Plan details the specific legal requirements and objectives to fulfil the General Biosecurity Duty with regards to these weed species.

Table 3.2 Priority Weed Species

Species	Common Name	Status	WoNS
<i>Agapanthus praecox subsp. orientalis</i>	Lily of the Nile	OWRC	No
<i>Araujia sericifera</i>	Moth Vine	OWRC	No
<i>Cenchrus clandestinus</i>	Kikuyu	OWRC	No
<i>Celtis sinensis</i>	Japanese Hackberry	OWRC	No
<i>Cinnamomum camphora</i>	Camphor Laurel	OWRC	No
<i>Hedychium gardnerianum</i>	Ginger Lily	OWRC	No
<i>Murraya paniculata</i>	Orange Jessamine	OWRC	No
<i>Olea europaea subsp. cuspidata</i>	African Olive	RP	No
<i>Romulea rosea var. australis</i>	Onion Grass	OWRC	No
<i>Senecio madagascariensis</i>	Fireweed	SP	Yes
<i>Senna pendula var. glabrata</i>	Cassia	OWRC	No
<i>Solanum mauritianum</i>	Wild Tobacco Bush	OWRC	No
<i>Tradescantia fluminensis</i>	Wandering Trad	OWRC	No
<i>Ulmus parviflora</i>	Chinese Elm	OWRC	No
<i>Vinca major</i>	Greater Periwinkle	OWRC	No

Key: SP = State Priority Weed, RP = Regional Priority Weed, OWRC = Other weed of regional concern.

3.2 Fauna

3.2.1 Fauna Habitat

Habitats for fauna species across the Subject Site are generally degraded or absent due to the long term utilisation of the Subject Site as public parks. A number of tall BGHF trees are present within the Subject Site however.

Key habitat features recorded within the Subject Site include:

- Hollow-bearing trees and stags;
- Cockatoo feed trees;
- Debris and leaf litter; and
- Nectar and fruit producing trees and shrubs.

These key habitat features provide habitat for a variety of fauna, including some species that are listed as threatened under the TSC Act and EPBC Act. Specific habitat features are considered in more detail below in subsequent subheadings. The locations of habitat features are detailed in **Figure3.3** and described in **Table B.1**.

i. Hollow-bearing trees

A large number of hollow trees (approximately 10 cm diameter opening) were recorded within the Subject Site. These ranged from small to medium and would generally be suitable for small birds, and mammals such as bats, and larger hollow would be suitable for mid-sized birds and the Common Brushtail Possum. Habitation of the smaller hollows is likely to be by a small parrot species such as the Rainbow Lorikeet (*Trichoglossus moluccanus*) as the species was commonly recorded at the Subject Site, or possibly hollow roosting microchiropteran bat species.

ii. Debris and leaf litter

Debris and leaf litter are present within landscaped garden beds and the Urban Exotic/Native Vegetation community area in the Study Area. The debris and leaf litter are habitat features which provide potential shelter for amphibians, reptiles (mainly skinks given the urban environment) and terrestrial mammals.

iii. Nectar and fruit producing trees and shrubs

Nectar and fruit producing trees and shrubs occur across the Subject Site. These would provide foraging habitat for a range of species including blossom-dependant birds, arboreal mammals and flying-foxes. A number of *Ficus macrocarpa* (Moreton Bay Fig) are present planted along the western street front of North Rocks Park which could provide a large amount of fruit which is a favourable food source for flying-foxes.

3.2.2 General Species

Numerous vertebrate fauna species are known to occur within the locality. The Subject Site is degraded through long term use for public recreation however, and fauna habitats are limited. The habitat provided by the Subject Site is likely to be used by fauna species such as birds, bats, other mammals (i.e. possums) and some reptiles. Due to its location and surrounding land use, the Subject Site is likely to generally support urban-aggressive native species which are common within urban environments.

A list of opportunistic species recorded within the Subject Site is provided in **Table B.1**. Sixteen birds were recorded and include common and urban adapted birds: Australian Magpie (*Cracticus tibicen*), Laughing Kookaburra (*Dacelo novaeguineae*), Noisy Miner (*Manorina melanocephala*) and Rainbow Lorikeet (*Trichoglossus haematodus*).

One common species of reptile was recorded, the Garden Skink (*Lampropholis delicata*).

Although night surveys were not undertaken for spotlighting, habitats present within the site are likely to support both common possums which occur in the locality, the Common Ringtail-possum (*Pseudocheirus peregrinus*) and the Common Brushtail Possum (*Trichosurus vulpecula*).

A complete list of fauna species is provided in **Table B.2**.

3.2.3 Threatened Species

The Subject Site is degraded to the extent that it is unlikely to provide significant habitat for threatened fauna species. The likelihood of occurrence for threatened fauna species has been assessed and is included as **Table C.2**. The listing status of these species is included in the likelihood of occurrence table, along with potential habitat types they may utilise within the Subject Site. This assessment indicates there may be habitat present for eight threatened fauna species, including birds and microchiropteran bats. Habitat for most of these species is likely to be limited to foraging habitat only, as part of a much wider foraging range. Species with potential to occur are:

- Dusky Woodswallow (*Artamus cyanopterus*);
- Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*);
- Eastern Freetail-bat (*Mormopterus norfolkensis*);
- Gang-gang Cockatoo (*Callocephalon fimbriatum*);
- Grey-headed Flying-fox (*Pteropus poliocephalus*);
- Powerful Owl (*Ninox strenua*);
- Swift Parrot (*Lathamus discolor*); and
- Yellow-bellied Sheath-tail-bat (*Saccolaimus flaviventris*).



Figure 3.1. Vegetation Communities within the Subject Site



Legend



-  Subject Site
-  Current Extent of Blue Gum High Forest

Image Source:
Image © Six Maps

Coordinate System: MGA Zone 56 (GDA 94)

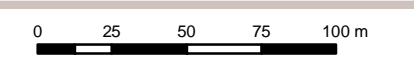


Figure 3.2. Historical Aerial (1943) with Current Extent of Blue Gum High Forest

I:\...17101\Figures\RP1\20170925\Figure 3.2. Historical Aerial



- Legend**
- Subject Site
 - Habitat Feature

Image Source:
Image © NearMap
(dated 6-05-2017)

Coordinate System: MGA Zone 56 (GDA 94)

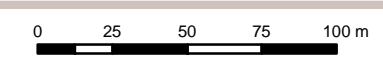


Figure 3.3. Fauna Habitat Locations

Ecological Constraints and Opportunities

This chapter discusses ecological constraints (constraints imposed by native flora and fauna) of the Subject Site.

4.1 Ecological Constraints

4.1.1 *Potential Ecological Impacts*

Any future development of the Subject Site will require land clearance that has the potential to directly and indirectly impact biodiversity values within the Subject Site and surrounds. Potential impacts of future development of the Subject Site include:

- Removal of native vegetation;
- Removal of fauna habitat features such as hollow-bearing trees, coarse woody debris, rocky outcrops and blossom-producing trees and shrubs;
- Removal of potential habitat for threatened flora and fauna species;
- Modification of microhabitats through edge effects;
- Modification of habitat connectivity;
- Runoff, sedimentation and erosion;
- Weed invasion; and
- Injury or mortality to fauna species.

4.1.2 *Overview*

i. Native Vegetation

The primary ecological constraint within the Subject Site is the presence of BGHF. Although BGHF exists on the Subject Site in fragmented patches of variable condition, the community is listed as a CEEC and is therefore afforded a high level of protection. All occurrences across the Subject Site are likely to meet the TSC Act listing criteria for BGHF as a minimum, as the Final Determination under the State legislation states that “Highly modified

relics of the community also persist as small clumps of trees without a native understorey” (NSW Scientific Committee 2008).

In addition the large patch in the south of North Rocks Park is likely to meet the criteria for the Commonwealth legislation as it has canopy coverage greater than 10% and the patch is greater than one ha in size. Conservation Advice (DotE 2005) states that:

Occurrences of the Blue Gum High Forest of the Sydney Basin Bioregion ecological community are considered to be part of the nationally listed ecological community if they are greater than one hectare in size and:

- *have a canopy cover greater than 10%; or*
- *have a canopy cover less than 10% and occur in areas of native vegetation in excess of five hectares.*

Any clearance of this vegetation would need to be offset via accepted biodiversity offset mechanisms. As any impact assessment will occur after the 25th of August it will need to be completed using the Biodiversity Assessment Methodology. Impact Assessment will need to be done wither through a Biodiversity Development Assessment Report (BDAR), if biodiversity values are to be offset offsite, or a Biodiversity Certification Assessment Report (BCAR) if offsetting is to be done within the Subject Site.

Future development applications assessed under Part 4 of the EP&A Act will need to include an assessment of significance under Section 5A.

A referral to the Commonwealth Department of the Environment would be required for clearing areas of BGHF that meet the Commonwealth condition thresholds.

ii. Threatened Species and Threatened Species Habitat

No threatened species were recorded on the Subject Site. Whilst there are records of threatened species in the locality of the Subject Site, the value of the Subject Site as habitat for many of these species is generally considered to be low, however available habitat within the Subject Site is still an ecological constraint.

There are a number of trees with small to medium sized hollows that could be used by threatened bat species and small mammals that are known to occur in the locality; however, these species have a wide range and are unlikely to depend on the habitats within the Subject Site. Likewise, threatened bird species with potential to forage on the Subject Site are unlikely to depend on the Subject Site because they have large foraging ranges.

The best areas of habitat for threatened species are located in the southern forest patch which contains abundant hollow bearing trees. Potential impacts to any threatened species habitat could be adequately dealt with during development application stages or as part of the mitigation and/or biodiversity offsetting of native vegetation on the Subject Site if any particular trees are required to be removed. With the exception of one tree with a small

hollow in John Wearn Park, all fauna habitat features occur within areas of BGHF and are thus already constrained.

4.2 Constraints Mapping

An ecological constraints analysis was carried out to assess the ecological attributes of the Subject Site, including presence of threatened species, populations and communities, and the presence of valuable habitat resources for such threatened species. These attributes were used to develop a map of the areas of highest to lowest ecological constraint to future re-zoning and associated development (**Figure 4.1**).

Future development is subject to the following ecological constraints which have been identified within the Subject Site:

- Presence of BGHF; and
- Presence of fauna habitat features such as hollow-bearing trees and nectar-producing trees suitable for use by native fauna species.

This assessment has identified three levels of ecological constraint; high, moderate and low. These are discussed further below.

4.2.1 High

The patches of BGHF throughout the site are considered to be areas of high ecological constraint. These areas in addition to containing BGHF have abundant hollow trees for fauna habitation.

4.2.2 Moderate

Areas containing tree hollows outside of BGHF areas have been mapped as a moderate constraint. This constraint is limited to a single hollow bearing tree within John Wearn Park.

4.2.3 Low

The areas of Urban Exotic/Native Vegetation and exotic dominated grasslands, and the existing buildings have very low ecological value and are considered to be of low ecological constraint (**Figure 4.1**). These areas provide minimal foraging habitat for threatened fauna species and have a high abundance of exotic flora species. Native plantings throughout these areas are likely to provide foraging habitat for nectivorous birds and bats, but similar urban vegetation is present throughout the locality in surrounding areas, and these species are highly mobile and generally forage across large areas.

Buildings were not observed to have entry points for microchiropteran bat species and have also been mapped as containing low ecological constraint.

Preferentially, these areas should be of focus for future re-development of the parks.

4.3 Ecological Opportunities

4.3.1 Biodiversity Stewardship

Due to the current maintenance consisting of mowing of the ground layer only, and the absence of bushland regeneration works currently, the large patch of BGHF in the south of North Rocks Park offers an opportunity for creation of a Biodiversity Stewardship Site. Creation of a Biodiversity Stewardship Site will generate biodiversity credits which could be retired to offset removal of BGHF elsewhere on the site, and could also be sold to fund restoration of the BGHF. This option should be considered carefully as under the current legislation, equivalent biobank sites are required to be fenced and restored, which could create conflict with the current utilisation of this area as open space by members of the public.

The creation of a Biodiversity Stewardship Site is undertaken by preparation of a Biodiversity Stewardship Site Assessment Report (BSSAR) by a BAM accredited assessor when the stewardship site is not being created to offset vegetation within the same site (see Chapter 5 below). Biodiversity Credits are generated both by the area of vegetation to be protected within the site and the management actions required to restore and maintain the patch/es of vegetation within the site. For this reason a patch of vegetation that is more degraded will generate more credits than a less degraded site as more management is required. Following the retirement of the majority of Biodiversity Credits by the purchaser or owner of the credits a yearly payment is made to the owner of the Biodiversity Stewardship Site by the Biodiversity Conservation Fund to pay for the required management actions.

Examples of some management actions required for a stewardship site include, preparation of a management plan, fire management, management of human disturbance, and revegetation of structural layers.

4.3.2 Urban Exotic/Native Vegetation and Exotic Dominated Grasslands

These areas are considered to be of relatively low ecological constraint and can be utilised for redevelopment of the parks to provide recreational facilities or other suitable development following a formal assessment of impacts to flora and fauna as part of the DA process.



Legend

- Subject Site

Ecological Constraint

- High
- Moderate
- Low

Image Source:
Image © NearMap
(dated 6-05-2017)

Coordinate System: MGA Zone 56 (GDA 94)

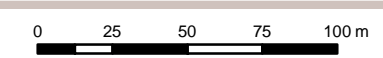


Figure 4.1. Ecological Constraints of the Subject Site

Conclusions and Recommendations

As outlined above, the Subject Site contains BGHF which meets the listing criteria for the community under the TSC Act and some areas which also meet the listing criteria under the EPBC Act. This vegetation also has the potential to provide habitat (in particular large hollows) for a number of threatened flora and fauna species listed under the TSC Act and/or EPBC Act.

The areas of BGHF are those with the highest ecological constraint to development. The constraints mapping presented in this report will assist in the development of future development plans and the results of this baseline assessment can be incorporated into a more detailed ecological assessment suitable to support a formal planning proposal.

It is recommended that a suite of impact reduction measures are considered to reduce the impacts of future development to biodiversity values in the Subject Site. Any impact reduction measures implemented for a future rezoning proposal should follow the following hierarchy of principles:

- Avoid and minimise the extent of ecological impacts where possible;
- Mitigate ecological impacts where certain impacts are unavoidable; and
- Offset the residual ecological impacts of the project.

Where possible, future redevelopment of the Subject Site should avoid areas of highest biodiversity values, in particular areas containing BGHF. Clearing areas should be positioned, as far as practicable in areas mapped as Exotic Dominated Grassland.

Where avoidance of biodiversity values is not possible, mitigation measures should be implemented to reduce the level of impact. Mitigation measures could include:

- Pre-clearance surveys and clearance supervision;
- Erosion, sediment and pollution control;
- Weed management; and
- Nest box installation.

Should a detailed ecological assessment determine that a significant residual impact exists after implementation of avoidance and mitigation measures, it is likely that future development will require the provision of offsets.

5.1 Large BGHF patch within North Rocks Park

If the large patch of BGHF in the south of North Rocks Park site is retained, and a Biodiversity Stewardship Site is created for this area, biodiversity credits could be generated on-site to generate some or all of the credits to offset clearance of BGHF elsewhere.

The retention of this patch within the site is a good ecological outcome for BGHF within the locality. BGHF is a highly fragmented community, and in many areas consists of small patches of young trees, with a large component of exotic vegetation in the understorey and ground layer (NSW Scientific Committee 2011). The patch within North Rocks Park is both large and contains abundant old trees, many of which have hollows suitable for utilisation by local fauna species. Although maintained by mowing some BGHF ground layer species persist.

If this patch is not to be incorporated into a Biodiversity Stewardship Site, for which management is required, it is recommended the following management actions are undertaken in this patch to increase the ecological value of the patch, and improve the quality of BGHF in the locality.

- Place educational signage around the patch to highlight the importance of the vegetation patch and BGHF in the locality;
- Cease mowing activities within the area under the canopy of the patch;
- Control exotic weed species within the ground layer;
- Plant locally endemic BGHF shrub and ground layer species throughout the patch to increase the species diversity.

Works could be undertaken by a council bushcare group to promote community engagement in local biodiversity issues.

5.2 Large Native Trees

Retention of non-endemic large eucalypts throughout areas of Urban Exotic/Native vegetation is recommended where possible as these provide nectar sources for native birds and mammals, and will develop hollows over time. Fauna habitat values within the Subject Site could be improved by installing nest boxes in these trees.

5.3 Biodiversity Offsets Scheme

The majority of BGHF areas within North Rocks Park with the exception of trees along North Rocks Road in the north are mapped under OEH's Biodiversity Values Map. Any clearing of native vegetation in these areas will require assessment and likely offsetting under the Biodiversity Offsets Scheme.

Any proposed impacts to BGHF trees scattered throughout the Subject Site outside of the Biodiversity Values Map will trigger the requirement for a 5 Part Assessment of Significance under the EP&A Act. If it is determined a significant impact is expected to occur to BGHF under this assessment losses to BGHF will be required to be assessed and likely offset under the Biodiversity Offsets Scheme.

Assessment of the impacts of vegetation can be done under the Biodiversity Offsets Scheme following two different pathways. These are detailed under the following headings.

5.3.1 Biodiversity Development Assessment Report

If the impacts are to be assessed and offset offsite a BDAR will need to be prepared by a BAM accredited assessor which will determine the amount of biodiversity credits required to offset impacts to BGHF. Biodiversity credits will need to be purchased and retired in order to offset impacts. Currently biodiversity credits are still found and purchased from the credit owner through the BioBanking Credits Register. The name of the register is likely to change to reflect terminology changes under the BC Act (biodiversity instead of biobanking), however the system for purchasing and selling credits will remain the same.

As an alternative, or if BGHF ecosystem credits are not available under the credits register, a monetary deposit can be made straight to the Biodiversity Conservation Fund in lieu of purchase and retirement of biodiversity credits. This is likely to be more expensive than purchasing and retiring biodiversity credits.

5.3.2 Biodiversity Certification Assessment Report

If development or clearing impacts to BGHF are proposed to be offset within the Subject Site a BCAR report will need to be prepared by a BAM accredited assessor. Under this assessment pathway areas of BGHF proposed to be retained will be assessed using the BAM to determine how many biodiversity credits they will generate. These areas will become a Biodiversity Stewardship Site. Retained vegetation will be required to be maintained and improved in perpetuity. Biodiversity credits generated within the Biodiversity Stewardship Site are used to offset impacts elsewhere within the Subject Site. If credits generated within the Biodiversity Stewardship site do not cover all of the required credits, additional credits are purchased and retired to make up the difference, or if credits are not available, an equivalent contribution of the market value of the credits is required to be made to the Biodiversity Conservation Trust.

Offsetting onsite is more cost effective as biodiversity credits have two cost components. The Part A cost of the credits represents the cost of maintaining and improving the vegetation at the Biodiversity Stewardship Site. The Part B cost of credits is a profit margin

applied to each credit by the credit owner, which is market based depending on the demand for the type of credit (i.e. ecosystem/species the credit represents). If Biodiversity credits are created and retired by the development proponent in order to offset development elsewhere within lands they own, only the Part A cost is paid (when the credits are retired) to the Biodiversity Trust Fund.

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Appendix A

Flora Species Recorded

BGHF species were recorded within each Random Meander Survey they occurred. Other Urban Exotic/Native species were generally noted successively the first time they occurred in a RMS and not subsequently if they re-occurred in a subsequent RMS.

Table A.1 Flora Species Recorded within the Subject Site

Stratum and Family	Status	Scientific Name	Common Name	RMS 1	RMS 2	RMS 3	RMS 4	RMS 5	RMS 6	RMS 7	RMS 8	Q1 - C	Q1 - A
Canopy													
Araucariaceae	NE	<i>Araucaria bidwillii</i>	Bunya Pine		X								
Araucariaceae	NE	<i>Araucaria heterophylla</i>	Norfolk Island Pine		X								
Casuarinaceae	P	<i>Casuarina glauca</i>	Swamp Oak						X				
Cupressaceae	*	<i>Cupressus sp.</i>				X							
Lauraceae	*	<i>Cinnamomum camphora</i>	Camphor Laurel		X				X				
Myrtaceae		<i>Angophora costata</i>	Smooth-bark Apple	X		X							
Myrtaceae		<i>Angophora floribunda</i>	Rough-barked Apple						X(P)	X			
Myrtaceae	NE	<i>Corymbia citriodora</i>	Lemon-scented Myrtle	X		X							
Myrtaceae		<i>Eucalyptus acmenoides</i>	White Mahogany	X				X					
Myrtaceae		<i>Eucalyptus deanei</i>	Mountain Blue Gum	X									
Myrtaceae	NE	<i>Eucalyptus grandis</i>	Flooded Gum			X			X				
Myrtaceae	NE	<i>Eucalyptus michaeliana?</i>	Hillgrove Spotted Gum	X									
Myrtaceae	NE	<i>Eucalyptus microcorys</i>	Tallowwood	X		X			X	X		2	1
Myrtaceae		<i>Eucalyptus paniculata</i>	Grey Ironbark	X	X					X			

Table A.1 Flora Species Recorded within the Subject Site

Stratum and Family	Status	Scientific Name	Common Name	RMS	RMS	RMS	RMS	RMS	RMS	RMS	RMS	RMS	Q1 -	Q1 -
				1	2	3	4	5	6	7	8	C	A	
Myrtaceae		<i>Eucalyptus pilularis</i>	Blackbutt	X	X	X	X		X(P)	X			15	1
Myrtaceae		<i>Eucalyptus punctata</i>	Grey Gum	X										
Myrtaceae		<i>Eucalyptus resinifera</i> subsp. <i>resinifera</i>	Red Mahogany	X										
Myrtaceae		<i>Eucalyptus saligna</i>	Sydney Blue Gum	X	X	X	X	X					20	2
Myrtaceae	NE	<i>Eucalyptus scoparia</i>	Wallangarra White Gum							X				
Myrtaceae	NE	<i>Lophostemon confertus</i>	Brush Box		X					X				
Sub-canopy														
Altingiaceae	*	<i>Liquidambar styraciflua</i>	Sweetgum							X				
Anacardiaceae	*	<i>Harpephyllum caffrum</i>	Kaffir Plum	X			X							
Araucariaceae	NE	<i>Araucaria heterophylla</i>	Norfolk Island Pine							X				
Bignoniaceae	*	<i>Jacaranda mimosifolia</i>	Jacaranda							X				
Casuarinaceae		<i>Allocasuarina torulosa</i>	Forest Oak	X						X				
Casuarinaceae	P	<i>Casuarina glauca</i>	Swamp Oak				X							
Cupressaceae	*	<i>Cupressus sp.</i>					X							
Fabaceae (Mimosoideae)		<i>Acacia parramattensis</i>	Sydney Green Wattle	X			X							
Lauraceae	*	<i>Cinnamomum camphora</i>	Camphor Laurel	X						X				
Malvaceae	NE	<i>Brachychiton acerifolius</i>	Illawarra Flame Tree							X				

Table A.1 Flora Species Recorded within the Subject Site

Stratum and Family	Status	Scientific Name	Common Name	RMS	RMS	RMS	RMS	RMS	RMS	RMS	RMS	RMS	Q1 -	Q1 -
				1	2	3	4	5	6	7	8	C	A	
Meliaceae	P	<i>Melia azedarach</i>	White Cedar								X			
Moraceae	*	<i>Ficus benjamina</i>	Weeping Fig	X										
Moraceae	NE	<i>Ficus macrophylla</i>	Moreton Bay Fig			X								
Myrtaceae		<i>Angophora floribunda</i>	Rough-barked Apple		X	X						X		
Myrtaceae	P	<i>Corymbia maculata</i>	Spotted Gum				X							
Myrtaceae		<i>Eucalyptus acmenoides</i>	White Mahogany	X				X						
Myrtaceae	P	<i>Eucalyptus botryoides</i>	Bangalay							X				
Myrtaceae	P	<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark	X		X								
Myrtaceae	P	<i>Eucalyptus elata</i>	River Peppermint							X				
Myrtaceae	NE	<i>Eucalyptus microcorys</i>	Tallowwood	X										
Myrtaceae	NE	<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint			X								
Myrtaceae		<i>Eucalyptus paniculata</i>	Grey Ironbark				X				X			
Myrtaceae	P	<i>Eucalyptus parramattensis</i>	Parramatta Red Gum							X				
Myrtaceae		<i>Eucalyptus pilularis</i>	Blackbutt	X	X									
Myrtaceae	P	<i>Eucalyptus sideroxylon</i>	Mugga Ironbark			X				X				
Myrtaceae	NE	<i>Lophostemon confertus</i>	Brush Box		X	X				X				
Myrtaceae	P	<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark			X								

Table A.1 Flora Species Recorded within the Subject Site

Stratum and Family	Status	Scientific Name	Common Name	RMS	RMS	RMS	RMS	RMS	RMS	RMS	RMS	Q1 -	Q1 -
				1	2	3	4	5	6	7	8	C	A
Pittosporaceae		<i>Pittosporum undulatum</i>	Sweet Pittosporum			X							
Proteaceae		<i>Banksia integrifolia</i> subsp. <i>integrifolia</i>	Coast Banksia		X								
Proteaceae	NE	<i>Grevillea robusta</i>	Silky Oak						X				
Shrubs													
Anacardiaceae	*	<i>Harpephyllum caffrum</i>	Kaffir Plum	X			X	X					
Apocynaceae	*	<i>Nerium oleander</i>	Oleander		X								
Araliaceae		<i>Polyscias sambucifolia</i> subsp. <i>Long leaflets</i>	Elderberry Panax				X	X					
Araucariaceae	NE	<i>Araucaria bidwillii</i>	Bunya Pine				X						
Berberidaceae	*	<i>Nandina domestica</i>	Heavenly Bamboo		X				X				
Cunoniaceae		<i>Ceratopetalum gummiferum</i>	NSW Christmas-bush		X								
Elaeocarpaceae	P	<i>Elaeocarpus reticulatus</i>	Blueberry Ash		X								
Ericaceae (Epacridoideae)		<i>Leucopogon juniperinus</i>	Prickly-beard Heath		X		X						
Fabaceae (Caesalpinioideae)	*	<i>Senna pendula</i> var. <i>glabrata</i>		X									
Fabaceae (Faboideae)		<i>Daviesia ulicifolia</i>	Gorse Bitter Pea	X									
Fabaceae (Mimosoideae)		<i>Acacia decurrens</i>	Black Wattle			X							
Fabaceae (Mimosoideae)		<i>Acacia floribunda</i>	White Sally							X			