

Western Parkland City Authority

## Aerotropolis Core Precinct

### Review of Contamination Issues

17th June 2021

Project No.: 0571466

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## Signature Page

17th June 2021

# Aerotropolis Core Precinct

## Review of Contamination Issues



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Ian Batterley  
Principal



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Peter Lavelle CEnvP SC  
Partner



Environmental Resources Management Australia Pty Ltd

Level 15, 309 Kent Street

Sydney NSW 2000 Australia

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## EXECUTIVE SUMMARY

### Introduction and Objectives

Environmental Resources Management Australia Pty Ltd (ERM) was engaged by Western Parkland City Authority (WPCA) to undertake a Preliminary Site Investigation (PSI) of the Site identified as Stage 1 within the Aerotropolis Core Precinct Master Plan, located in Bringelly, NSW (the Site). This PSI is being undertaken to assist in the development of a master plan being prepared by the WPCA for the Site.

The objective of this assessment was to undertake a review of previously identified contamination issues and refine the current understanding of Site to aid WPCA in assessing potential liabilities and constraints associated with site contamination that may require consideration during master planning and subsequent development works.

Information provided to ERM as part of this investigation indicates that the current concept plan for the proposed redevelopment of the Site includes the following key features:

- The Moore Gully Billabongs, Thompson Park and a Waterfront Precinct located within the southern portion of the Site;
- Educational facilities, a metro plaza, green gateways and sports fields located within the central portion of the Site;
- Manufacturing / industrial lands, CSIRO facility, TAFE / multiversity and hotel located within the northern portion of the Site; and
- Proposed landscaping within the Site would include open water bodies for flood water storage / adaptive re-use, swimming and play area within the existing Moore Gully alignment and planted native vegetation throughout the Site.

### Scope of Works

To meet the project objective, ERM completed the following scope of works:

- Review of background information (previous investigations, relevant database searches relating to the Site); and
- Targeted groundwater, surface water and sediment sampling to aid in refining the understanding of potential PFAS impacts.

### Discussion of Results

The Site is located within an area surrounded by rural residential, low density residential and commercial / industrial development. At the time of this investigation the site was largely vacant with the exception of former Defence infrastructure located within the central portion of the Site.

- Information from previous investigations indicated that the current Commonwealth lands were first granted to private owners by the Crown in 1818. From this time until 1957 the Site underwent various ownerships and was utilized for agricultural purposes. In 1957 the Site was transferred to the Commonwealth of Australia. The Site was used for Department of Defence purposes as a radar installation from 1957 until prior to 2005.
- Results from the desktop assessment indicate that the Site is primarily underlain by the Bringelly Shale and is described as shale, carbonaceous claystone, claystone, laminite, fine to medium grained lithic sandstone, rare coal and tuff from the Middle Triassic age. The remainder of the geology underlying the Site (along the south-eastern boundary of the Site) is described as fine-grained sand, silt and clay from the Quaternary age.
- Groundwater within the Site was identified during previous investigations and gauging undertaken as part of this investigation to be present at depths of approximately 2.5 – 7.5 metres below ground level (m bgl).

- Previous investigations identified a range of potential contamination issues at the Site that require remediation and / or site management including former fuel storage USTs and asbestos impacted fill located within stockpiled fill to the south of the main compound and within the vicinity of the former married quarters.
  - During the site inspection undertaken as part of this investigation, ERM noted the potential for additional fill material to be present within Moore Gully. Fill within this area was noted to contain bricks and other demolition wastes. ERM notes that no samples have been collected from this material to assess the potential for contamination to be present.
- Analytical results from collected sediment, surface water and groundwater samples as part of this investigation, returned concentrations of PFAS compounds less than the laboratory Limit of Reporting (LOR) and / or the adopted assessment criteria with the exception of surface water samples SW2, SW8 and SW11 (located within the eastern portion of the Site) which exceeded the adopted drinking water criteria and the adopted 99% freshwater criteria for protection of aquatic ecosystems.
  - It is considered that the above results are generally consistent with previous investigations of PFAS undertaken within the Western Environmental (2020) investigation. While the specific source of PFAS was unclear, the results of this investigation indicate the potential for PFAS to be migrating from offsite sources.
  - ERM notes that further assessment of potential PFAS should be undertaken within the site to assess the potential for historical sources of PFAS to be located within the main compound area of the Site (chemical storage area / firefighting system etc.).

As outlined within the Conceptual Site Model (CSM), ERM considers there may be a potential risk to human health / ecological receptors due to a number of potentially complete pollutant linkages identified at the site. Further investigation is thus considered to be required to assess the potential risk to human health and sensitive ecological receptors.

- ERM recommends that a detailed site investigation (DSI) should be undertaken to assess the contamination status of the site, further characterise volumes of fill materials within the Site that may require management and / or remediation and aid in the planning for future development works (offsite disposal, site management requirements etc.).

ERM notes that the DSI should be undertaken in consideration of previous investigations undertaken within the Site and the identified contaminants of potential concern (CoPCs) and include an assessment of soil, sediment, surface water and groundwater as follows.

- a targeted sampling approach to assess potential point sources of contamination such as former fuel storage infrastructure, uncontrolled fill and contaminated soils / groundwater's associated identified onsite gullies / areas of fill etc.;
- a broad grid based approach throughout the site (in consideration of previous investigation locations) to supplement existing data sets;
- the collection of background samples to facilitate assessment of results in consideration of naturally occurring / background conditions; and
- due to the potential for PFAS to occur within surface water / sediments within Thompsons Creek and Moore Gully and the potential planned future re-use of surface water within the site for irrigation and recreational purposes, future investigations should consider the potential use of surface waters in future development works.

Based on the outcomes of this assessment, including the review of previous investigations, previous approved remediation plans and Site Audit Statements, it is considered that the Site can be made suitable for the proposed development following further investigations and completion of any subsequent required remedial / site management works.

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## Acronyms and Abbreviations

Acronym	Definition
ACM	Asbestos Containing Materials
AFFF	Aqueous Film Forming Foam
AHD	Australian Height Datum
AMG	Australian Map Grid
AS	Australian Standard
BTEX	Benzene, toluene, ethylbenzene and xylene
COC	Chain of Custody
CoPC	Contaminant of Potential Concern
CSM	Conceptual Site Model
DQI	Data Quality Indicator
DQO	Data Quality Objectives
EPA	Environment Protection Authority (NSW)
ESL	Ecological Screening Level
ha	Hectare
HIL	Health-Based Investigation Level
HSL	Health Screening Level
IBC	Intermediate Bulk Container
m	Metre
m AHD	Metres Australian Height Datum
m bgl	Metres Below Ground Level
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NEMP	National Environment Management Plan
PAH	Polycyclic Aromatic Hydrocarbons
PFAS	Per and Polyfluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PFHxS	Perfluorohexane sulfonate
PFOS	Perfluorooctane Sulfonate
PID	Photo-Ionisation Detector
QA / QC	Quality Assurance / Quality Control
RPD	Relative Percentage Difference
SAQP	Sampling, Analysis and Quality Plan
SVOC	Semi Volatile Organic Compounds
TOPA	Total Oxidisable Precursor Assay
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
VOC	Volatile Organic Compounds
WPCA	Western Parkland City Authority

## 1. INTRODUCTION

Environmental Resources Management Australia Pty Ltd (ERM) was engaged by Western Parkland City Authority (WPCA) to undertake a Preliminary Site Investigation (PSI) at the site identified as Stage 1 within the Aerotropolis Core Precinct Master Plan, located in Bringelly, NSW (the Site). This PSI is being undertaken to assist in the development of a master plan being prepared by the WPCA for the site.

- The site location is illustrated on **Figure 1** and the current layout is presented on **Figure 2**.

### 1.1 Objective

Due to the range of historical and current land use practices within the site and surrounding area, WPCA has identified the potential for contamination to be present within the Site.

The objective of this assessment is therefore to undertake a review of contamination issues to refine the current understanding of potential contamination at the Site and aid WPCA in assessing potential liabilities / constraints associated with site contamination that may require consideration during master planning and subsequent development works.

### 1.2 Scope of Works

To meet the project objective, ERM completed the following scope of works:

- Review of background information relating to the site, including:
  - Information relating to surface water discharge conditions and sample results;
  - The NSW Environment Protection Authority (EPA) Contaminated Land Register;
  - Historical aerial photographs;
  - Land titles information;
  - Groundwater bore information;
  - Relevant government databases; and
  - Published soil, geology and topographic maps.
- Completion of targeted groundwater, surface water and sediment sampling; and
- Preparation of this PSI report.

Investigative works undertaken as part of this review were conducted with reference to relevant parts of the following guidelines:

- National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended May 2013) - herein referred to as the ASC NEPM (2013);
- NSW EPA (2017). *Guidelines for the NSW Site Auditor Scheme* (3<sup>rd</sup> edition);
- NSW EPA (2020) Consultants reporting on contaminated land, contaminated land guidelines; and
- PFAS National Environmental Management Plan, Heads of Environment Protection Authority (HEPA) Version 2.0 (January 2020). This is hereafter referred to as 'the NEMP'.

## 2. SITE IDENTIFICATION

Site identification information is presented within the table below:

Item	Description
Site Address	<ul style="list-style-type: none"> <li>Badgerys Creek Road, Bringelly, NSW 2556</li> </ul>
Lot and Deposited Plan – Commonwealth Land	<ul style="list-style-type: none"> <li>Lot 10 DP1235662</li> </ul>
Lot and Deposited Plan – Adjacent Residential Land	<ul style="list-style-type: none"> <li>Lot 10 DP2650</li> <li>Lot 1 DP1222355</li> <li>Lot 1 DP1215964</li> <li>Lot 1 DP243457</li> <li>Lot 1 DP244113</li> <li>Lot 21 DP1222355</li> <li>Lot 22 DP1222355</li> <li>Lot 23 DP1222355</li> <li>Lot 2 DP1222355</li> <li>Lot 2 DP1215964</li> <li>Lot 2 DP243457</li> <li>Lot 2 DP244113</li> <li>Lot 3 DP1222355</li> <li>Lot 3 DP243457</li> <li>Lot 3 DP244113</li> <li>Lot 4 DP243457</li> <li>Lot 4 DP244113</li> <li>Lot 4 DP2650</li> <li>Lot 5 DP243457</li> <li>Lot 5 DP244113</li> <li>Lot 5 DP2650</li> <li>Lot 5 DP1215964</li> <li>Lot 6 DP1215964</li> <li>Lot 6 DP243457</li> <li>Lot 6 DP244113</li> <li>Lot 6 DP2650</li> <li>Lot 7 DP243457</li> <li>Lot 8 DP243457</li> </ul>
Local Government Area	<ul style="list-style-type: none"> <li>Liverpool</li> </ul>
Zoning	<p>The following planning zones are located onsite:</p> <ul style="list-style-type: none"> <li>Approximately 80% of the Site (the centre of the Site) is zoned as MU - Mixed Use;</li> <li>Approximately 10% of the Site (the northwest corner of the Site) is zoned as ENT - Enterprise;</li> <li>Approximately 5% of the Site (the south-eastern boundary of the Site) is zoned as ENZ - Environment and Recreation; and</li> <li>The remainder of the Site is zoned as SP2 - Infrastructure.</li> </ul>
Site Area	<ul style="list-style-type: none"> <li>Approximately 158 hectares (ha)</li> </ul>
	<ul style="list-style-type: none"> <li></li> </ul>
Site Location and Site Layout	<ul style="list-style-type: none"> <li>Figure 1 – Site Location</li> <li>Figure 2 – Site Layout</li> </ul>
Geographic Co-Ordinates	<ul style="list-style-type: none"> <li>Figure 2 – Site Layout illustrating site boundary co-ordinates</li> </ul>

### 3. SITE SETTING

The following sections summarise the information obtained during the site background and history review.

- A copy of relevant database search results is provided in Appendix C.

Item	Description
<b>Current land-use</b>	<ul style="list-style-type: none"> <li>■ The Site was acquired by the Commonwealth in 1959 for use as the Royal Australian Air Force (RAAF) Bringelly Radio Receiving Station.</li> <li>■ The Site closed in 2005. The station buildings remain and the grounds continue to be maintained although the Site is no longer an active station.</li> <li>■ The area immediately adjacent to western portion and south eastern portion of the Site is currently utilised for low density / semi-rural residential dwellings.</li> </ul>
<b>Surrounding Land use</b>	<p>The land uses surrounding the site include:</p> <ul style="list-style-type: none"> <li>■ <b>North:</b> Directly north of the Site is agricultural land followed by low density / semi-rural residence (approximately 290 m north of the Site). Residential properties are located approximately 550 m north of the Site and beyond.</li> <li>■ <b>South:</b> Directly south of the Site is a strip of vegetation followed by Thompsons Creek located approximately 40 m south of the Site. Approximately 65 m south of the Site is an unknown facility which appears to be under construction. Approximately 460 m southeast of the Site is an agricultural residence. Further agricultural residences are present beyond this.</li> <li>■ <b>East:</b> Thompsons Creek runs along the majority of the eastern border of the Site beyond which is The Retreat Road located approximately 115 m east of the Site. Residential properties are located approximately 150 m to the east of the Site and beyond.</li> <li>■ <b>West:</b> Directly west of the Site are residential properties which extend for approximately 500 m and beyond.</li> </ul>
<b>Site Elevation</b>	<ul style="list-style-type: none"> <li>■ The Site elevation ranges from 62 m Australian Height Datum (AHD) within the north eastern portion of the Site to approximately 98 m AHD within the south western portion of the Site.</li> </ul>
<b>Topography</b>	<ul style="list-style-type: none"> <li>■ Information provided within desktop searches indicates the site generally slopes towards the south / south east.</li> <li>■ Topography within the surrounding area is variable with gentle / undulating slopes generally in a south easterly direction.</li> </ul>
<b>Hydrology</b>	<ul style="list-style-type: none"> <li>■ The nearest surface water body to the Site is Moore Gully which crosses the western boundary of the site and enters Thompsons Creek at the eastern boundary of the site. Thompsons Creek is a South Creek tributary with the confluence between the two creeks occurring approximately 1.3kms north-east of the Site.</li> </ul>
<b>Geology, Soils and Acid Sulfate Soils</b>	<ul style="list-style-type: none"> <li>■ The Penrith 1:100,000 Geological Mapping Sheet identifies the underlying geology to vary across the Site. Geology underlying the majority (approximately 90%) of the Site is classified as Bringelly Shale and is described as shale, carbonaceous claystone, claystone, laminite, fine to medium grained lithic sandstone, rare coal and tuff from the Middle Triassic age. The remainder of the geology underlying the Site (along the south-eastern boundary of the Site) is described as fine-grained sand, silt and clay from the Quaternary age.</li> <li>■ The soil landscape of the Site is described as ridge and valley country of gently undulating ridge tops and steep side slopes often with slumping and rounded hilly to steep hilly areas and relatively narrow valleys. Chief soils are hard acidic red soils (with hard acidic yellow mottled soils in places some ironstone gravels occur in both these soils. Associated are hard neutral and alkaline red soils and in saddles and some mid-slope positions soils, usually in depressions; and small areas of undescribed soils in wet soaks and valley areas. Small areas of other soils are likely throughout.</li> <li>■ According to the Atlas of Australian Acid Sulfate Soils (ASS), ASS onsite and within the search buffer have an extremely low probability of occurrence. There is a 1-5% chance of occurrence with occurrences in small localised areas.</li> </ul>



Item	Description
Hydrogeology	<ul style="list-style-type: none"><li>■ A search of registered groundwater bores identified five groundwater bores within the Site boundary. All bores were reported to be drilled for monitoring purposes.</li><li>■ A search of registered groundwater bores within a 2 km buffer from the Site identified eight registered groundwater bores.</li><li>■ Two of these bores were reported to be drilled for domestic / stock purposes, three were reported to be drilled for monitoring purposes, one for domestic / industrial / stock purposes and one for domestic purposes.</li><li>■ Aquifers onsite and within the buffer area are described as porous, extensive aquifers of low to moderate productivity. ERM notes that groundwater within the Bringelly Shales is often considered saline and may be unsuitable for beneficial re-uses.</li></ul>

### 3.1 Naturally Occurring Asbestos

A search of the NSW Industry, Resources and Energy databases did not identify any naturally occurring asbestos within the Site or surrounding area.

### 3.2 Regional Zoning

A search of council databases indicated the following zoning were present within the surrounding area:

Zone	Description	Distance	Direction
Sp2	Infrastructure	29 m	South
Mu	Mixed Use	32 m	South
Ru4	Primary Production Small Lots	42 m	West
Mu	Mixed Use	124 m	South East
Sp2	Infrastructure	305 m	South
Ru4	Primary Production Small Lots	330 m	South
Re1	Public Recreation	368 m	South West
Ent	Enterprise	620 m	West
Ent	Enterprise	644 m	West
Ru1	Primary Production	645 m	South West
Ru4	Primary Production Small Lots	662 m	South
Sp2	Infrastructure	665 m	West
B1	Neighbourhood Centre	707 m	South
Sp2	Infrastructure	716 m	South
Ru4	Primary Production Small Lots	761 m	South East
Sp2	Infrastructure	865 m	West

### 3.4 Groundwater Dependent Ecosystems

A search of the Bureau of Meteorology (BoM) Groundwater dependant Ecosystem Atlas identified the following Groundwater Dependent Ecosystems (GDEs) within the Site and surrounding area:

Type	GDE Potential	Geomorphology	Ecosystem Type	Aquifer Geology	Distance from Site
Terrestrial	High potential GDE - from national assessment	Undulating to low hilly country, mainly on shale.	Vegetation	Consolidated sedimentary	Onsite
Terrestrial	High potential GDE - from national assessment	Undulating to low hilly country, mainly on shale.	Vegetation	Unconsolidated sedimentary	Onsite
Terrestrial	Low potential GDE - from national assessment	Undulating to low hilly country, mainly on shale.	Vegetation	Consolidated sedimentary	Onsite
Terrestrial	Moderate potential GDE - from national assessment	Undulating to low hilly country, mainly on shale.	Vegetation	Consolidated sedimentary	Onsite

## 4. SITE HISTORY

### 4.1 Historical Titles

Information from previous investigations indicated that the current Commonwealth lands was first granted to private owners by the Crown in 1818. From this time until 1957 the site underwent various ownerships and was utilized for agricultural purposes. In 1957 the site was transferred to the Commonwealth of Australia. The site has been used for Department of Defence purposes as a radar installation since 1957 until prior to 2005.

No information was available for the residential properties located immediately adjacent to the Site.

### 4.2 Historical Aerial Photographs

Historical aerial photographs (**Appendix C**) were reviewed to assess potential historical land use practices undertaken within and surrounding the site.

- A summary of information obtained from the review is presented below.

Year	Description
1949 – Black and White	<ul style="list-style-type: none"> <li>■ <b>Site Area:</b> The Commonwealth land portion of the Site is comprised of vacant land the adjacent residential lands are occupied by private residences. The Site is moderately vegetated in the western portion and more scarcely vegetated across the remainder of the Site.</li> <li>■ <b>Surrounding Site Area:</b> The land directly west of the Site is densely vegetated. Thompsons Creek can be identified running along the eastern boundary of the Site and dense vegetation surrounds the creek. The remainder of the Site surroundings are sparsely vegetated.</li> </ul>
1955 – Black and White	<ul style="list-style-type: none"> <li>■ <b>Site Area:</b> A residential property has been constructed in the north-western portion of the Site within the area identified as adjacent residential land.</li> <li>■ <b>Surrounding Site Area:</b> An agricultural residence has been constructed approximately 20 m north of the Site.</li> </ul>
1965 – Black and White	<ul style="list-style-type: none"> <li>■ <b>Site Area:</b> Two industrial / commercial buildings and a group of residential buildings have been constructed in the centre of the Site (assumed to be Compound buildings and the Married Quarters). An industrial / commercial building has been constructed in the south-western portion of the Site. What appears to be a settlement pond is present in the western portion of the Site. Minor residential development has occurred within the South western portion of the site within the area identified as adjacent residential land.</li> <li>■ <b>Surrounding Site Area:</b> A large pond is present approximately 350 m southwest of the Site. Additional residential properties have been constructed approximately 20 m west of the Site.</li> </ul>
1978	<ul style="list-style-type: none"> <li>■ <b>Site Area:</b> Further residential development has occurred within the south western and north eastern portion of the Site within the area identified as adjacent residential land.</li> <li>■ <b>Surrounding Site Area:</b> No significant changes since previous aerial photography</li> </ul>
1982 – Colour	<ul style="list-style-type: none"> <li>■ <b>Site Area:</b> No significant changes since previous aerial photography.</li> <li>■ <b>Surrounding Site Area:</b> The pond present approximately 250 m southwest of the Site appears to have been extended to serve an agricultural purpose.</li> </ul>
	<ul style="list-style-type: none"> <li>■ <b>Site Area:</b> No significant changes since previous aerial photography.</li> <li>■ <b>Surrounding Site Area:</b> No significant changes since previous aerial photography.</li> </ul>
1991 – Colour	<ul style="list-style-type: none"> <li>■ <b>Site Area:</b> Additional structures are present in the centre of the Site and in the western portion of the Site.</li> <li>■ <b>Surrounding Site Area:</b> No significant changes since previous aerial photography.</li> </ul>

2005 - Colour	<ul style="list-style-type: none"> <li>■ <b>Site Area:</b> The structures identified in the centre of the Site in previous aerial photography have been demolished and replaced with two commercial / industrial buildings.</li> <li>■ <b>Surrounding Site Area:</b> Additional residential development has occurred approximately 70 m southwest of the Site.</li> </ul>
2019 – Colour	<ul style="list-style-type: none"> <li>■ <b>Site Area:</b> Disturbed land is present towards the centre of the Site, approximately 235 m southwest of the industrial / commercial buildings located in the centre of the Site.</li> <li>■ <b>Surrounding Site Area:</b> No significant changes since previous aerial photography.</li> </ul>

### 4.3 Historical Business Records

A search of historical business records for the surrounding area was undertaken from the 1930s to the 2010s. The following businesses were registered within the search buffer area

Business Activity	Premise	Year
Mixed Businesses	Restall, A. & J., Badgerys Creek Rd. Badgery's Creek	1970
Butchers-Retail	Shadlow, J., Badgerys Creek Rd. Badgery's Creek	1970
Mixed Businesses	Restall, A. & J., Badgerys Creek Rd., Badgery's Creek	1961
Butchers-Retail	Shadlow, J., Badgerys Creek Rd., Badgery's Creek	1961

## 5. PAST AND PRESENT POTENTIALLY CONTAMINATING ACTIVITIES

The following sections summarise the results desktop searches relating to past and present potentially contaminating activities.

### 5.1 NSW EPA Contaminated Land Search

A search of the NSW EPA contaminated land database under the CLM Act 1997 undertaken for the site and a 1 km buffer area did not identify any sites that have been notified to NSW EPA

### 5.2 NSW EPA Contaminated Lands Records of Notice

A search of the NSW EPA Contaminated Land Records of Notice data-base was undertaken for the site buffer area did not identify any sites that have been notified to NSW EPA.

### 5.3 NSW EPA Licenced Activities

A search of the NSW EPA record of licensed activities under the *Protection of the Environment Operations Act 1997* undertaken for the site and buffer area identified the following sites:

EPL #	Organisation	Address	Activity	Distance (m)	Direction
21247	Metro Trains Sydney Pty Ltd	Sydney Metro, Rouse Hill, Nsw 2155	Railway Systems Activities	0 m	Onsite
1808	PGH Bricks & Pavers Pty Limited	Lot 2 Greendale Road	Ceramics Production	655 m	South West
1808	PGH Bricks & Pavers Pty Limited	Lot 2 Greendale Road	Crushing, Grinding Or Separating	655 m	South West
1808	PGH Bricks & Pavers Pty Limited	Lot 2 Greendale Road	Land-Based Extractive Activity	655 m	South West
1808	PGH Bricks & Pavers Pty Limited	Lot 2 Greendale Road	Mining For Minerals	655 m	South West
20864	Lendlease Engineering Pty Limited	Northern Road And Bringelly Road Upgrade Stage 2, Bringelly, Nsw 2556	Crushing, Grinding Or Separating	711 m	South
20864	Lendlease Engineering Pty Limited	Northern Road And Bringelly Road Upgrade Stage 2, Bringelly, Nsw 2556	Land-Based Extractive Activity	711 m	South
20864	Lendlease Engineering Pty Limited	Northern Road And Bringelly Road Upgrade Stage 2, Bringelly, NSW 2556	Road Construction	711 m	South



## 5.4 Delicensed and/or Surrendered Licences Premises still Regulated by EPA, Licences Surrendered, Clean Up and Penalty Notices

A search of the NSW EPA record of licensed activities under the *Protection of the Environment Operations Act 1997* undertaken for the site and buffer area identified the following sites:

Licence No	Organisation	Location	Status	Issued Date	Activity	Distance (m)	Direction
4653	Luhrmann Environment Management Pty Ltd	Waterways Throughout NSW	Surrendered	06/09/2000	Other Activities / Non Scheduled Activity - Application Of Herbicides	0 m	Onsite
4838	Robert Orchard	Various Waterways Throughout New South Wales - Sydney NSW 2000	Surrendered	07/09/2000	Other Activities / Non Scheduled Activity - Application Of Herbicides	0 m	Onsite
5093	Camden Council	Waterways Of Camden Local Government Area, -, Camden	Surrendered	28/08/2000	Other Activities / Non Scheduled Activity - Application Of Herbicides	0 m	Onsite
5176	Liverpool City Council	Waterways Of Liverpool City	Surrendered	17/04/2001	Other Activities / Non Scheduled Activity - Application Of Herbicides	0 m	Onsite
6630	Sydney Weed & Pest Management Pty Ltd	Waterways Throughout NSW- Prospect, NSW, 2148	Surrendered	09/11/2000	Other Activities / Non Scheduled Activity - Application Of Herbicides	0 m	Onsite

## 5.5 Per- and polyfluoroalkyl Substances (PFAS) Investigation and Management Programs

### 5.5.1 NSW EPA PFAS Investigation Program

The Site and surrounding area are not recorded within the NSW EPA PFAS investigation program database.

### 5.5.2 Defence PFAS Investigation Programs

The Site and surrounding area are not recorded within the Department of Defence PFAS investigation program database.

### 5.5.3 Defence PFAS Management Program

The Site and surrounding area are not recorded within the Department of Defence PFAS management program database.

### 5.5.4 Airservices Australia National PFAS Management Program

The Site and surrounding area are not recorded within the Airservices Australia PFAS management program database.

## **5.6 Defence Sites**

While ERM notes that the Site is a former RAAF facility, the Site and surrounding area are not recorded within the Defence 3 year Regional Contamination Investigation Program (RCIP).

## **5.7 Mining and Exploration**

A search of NSW Department of Industry records did not identify any mining / exploration titles within the Site and surrounding buffer area.

### **5.7.1 Historical Mining and Exploration Titles**

A search of NSW Department of Industry records did not identify any historical mining / exploration titles within the Site and surrounding buffer area.

## **5.8 NSW State Environmental Planning Records**

A search of NSW Planning and Environment records did not identify any State Environment Planning Policy (SEPP) precinct within the Site or surrounding buffer area.

## **5.9 Other Potentially Contaminating Land uses**

A search of relevant databases did not identify the presence of current / historical potentially contaminating land uses including moto garages, dry cleaners, service stations, gasworks, waste management facilities or liquid fuel facilities within the Site or the surrounding search buffer area.

## 6. PREVIOUS INVESTIGATIONS

In undertaking the review of contamination issues for the Site, ERM undertook a review of the following previous reports:

- Environmental Resources Management Pty Ltd (2011) RAAF Bringelly Receiving Station NSW, Heritage Assessment, 18 April 2011 (ERM 2011);
- GHD (2011) Department of Defence Support Group, Bringelly RAAF Receiving Station, Infrastructure Assessment Report, April 2011 (GHD 2011);
- Golder Associates (2011) Detailed Site Investigation, Former RAAF Bringelly Receiving Station, October 2011 (Golder 2011)
- Golder Associates (2011a) Hazardous Building Materials Assessment, Former RAAF Bringelly Receiving Station, April 2011 (Golder 2011)
- Sweett Group Pty Ltd (2011) Bringelly RAAF Receiving Station, Bringelly, NSW. Stage 1 Overarching Report – Summary Outcomes of Due Diligence Investigations, August 2011 (Sweett 2011);
- GTek Pty Ltd (2011) Post Activity Report Unexploded Ordnance (UXO) Consultancy Services RAAF Receiving Station Site Bringelly, NSW, 13th January 2011 (GTek 2011);
- Golder Associates (2014) Remedial Action Plan, Former RAAF Bringelly Receiving Station, April 2014 (Golder 2014)
- Deloitte Pty Ltd (2015) Defence Housing Australia Bringelly RAAF Receiving Station, 13th March 2015 (Deloitte 2015);
- Western Environmental Pty Ltd (2019) 215 Badgerys Creek Road, Bringelly, NSW, Detailed Site Investigation Report, 12 December 2019 (Western Environmental 2019);
- Thuroona Services Pty Ltd (2019) Cost Estimate Report - 215 Badgerys Creek Road, Bringelly, NSW, 24 December 2019 (Thuroona 2019);
- Arup Australia Pty Ltd (2020) Sydney Metro Greater West Technical Paper 7: Groundwater, 4th June 2020 (Arup 2020);
- M2A Pty Ltd (2020) Sydney Metro Greater West Technical Paper 6: Flooding, Hydrology and Water Quality (M2A 2020); and
- M2A Pty Ltd (2020) Sydney Metro Greater West Technical paper 8: Contamination (M2A 2020a)
- Aerocon Australia Pty Ltd (2020) Western Sydney Aerotropolis Constraints and Land Capability Assessment – Stage 1 Report, September 2020 (Aurecon 2020);
- Sydney Water Pty Ltd (2020), Aerotropolis Initial Precincts Stormwater and Water Cycle Management Study Interim Report, September 2020 (Sydney Water 2020);

A summary of relevant information from the above investigations relating to potential contamination within the Site is presented within Section 7.1 (below):

## 6.1 Summary of Previous Investigations

Report	Details
<b>Sweett 2011</b>	<p>Sweett Group was engaged by the Department of Defence, Property Disposals, Defence Support Group as Project Manager / Contract Administrator to prepare a Stage 1 Overarching Report and manage sub-consultancies for the preparation of due diligence investigations for the Site.</p> <p>Based on the result of the Stage 1 Report, Sweett Group identified the following:</p> <ul style="list-style-type: none"> <li>■ The soil investigation program identified lead and C10-C36 Total Petroleum Hydrocarbons (TPH) above the adopted residential land use criteria at one location each. These concentrations were not considered to warrant further investigation or remediation;</li> <li>■ Exceedances of the provisional phytotoxicity based PILs for metals in surface or near surface soils were identified on the site; The locations exceeding the PILs were not considered to warrant further investigation or remediation;</li> <li>■ Soil sampling and groundwater samples collected from the vicinity of the Underground Storage Tanks (USTs) adjacent to Building 1 containing petrol and diesel were below the adopted site criteria for hydrocarbon fuel related contaminants. However, there is a potential for hydrocarbon contamination of backfill sand and UST pit walls associated with the USTs;</li> <li>■ Concentrations of cadmium, copper and zinc in groundwater exceeded the adopted site criteria. It was considered that the reported concentrations were indicative of background concentrations and that no further investigations of metals in groundwater is warranted; and</li> <li>■ Fragments of asbestos cement were identified on the ground in the former Married Quarters and in a stockpile of soil and demolition material located in the area of the former Barracks. A larger fragment of asbestos sheeting was observed on the ground surface between Badgerys Creek Road and the main section of the site. A suspected asbestos cement cable pit was observed on the eastern side of the Compound area.</li> <li>■ There was the potential for asbestos cement debris to be present elsewhere on the site.</li> </ul> <p><u>Recommendations:</u></p> <ul style="list-style-type: none"> <li>■ The report recommended that a Remedial Action Plan (RAP) be developed to manage or remove the asbestos onsite and to address disposal of the contents of the UST adjacent to Building 1 and the decommissioning or removal of the UST.</li> </ul> <p><u>Hazardous Materials:</u></p> <ul style="list-style-type: none"> <li>■ Asbestos was present throughout the Site in cement, assumed to be present in electrical distribution boards, vinyl tiles.</li> <li>■ Lead paint was present onsite in Building 1 and 5, and lead flashing of roof.</li> <li>■ PCBs were present in fluorescent lights.</li> <li>■ Potential Ozone Depleting Substances (ODS) used as refrigerants associated with air-conditioning plant.</li> <li>■ Mercury was present in fluorescent light tubes throughout buildings and in vapour lamps in Building 15.</li> </ul>
<b>GHD 2011</b>	<ul style="list-style-type: none"> <li>■ GHD identified a former fire hose shed (building 20) and stated that the sites firefighting infrastructure is designed to be independent from the Sydney Water Supply.</li> <li>■ ERM noted that there was no mention of firefighting foam storage areas or foam storage tanks etc. However as the site contained fuel storage, it is the opinion of ERM that it would be reasonable to assume that AFFF was stored onsite for firefighting purposes.</li> <li>■ Telstra pits and service infrastructure were mapped however ERM notes that there was no mention of materials type (i.e. potential asbestos pits).</li> </ul>

Report	Details
<b>G-tek, 2011</b>	<p>G-tek Australia Pty Limited (G-tek) was commissioned by the Department of Defence (Defence) to provide unexploded ordnance (UXO) consultancy services as part of overall environmental review and, if required, remediation of this Site prior to disposal. The report identified the following:</p> <ul style="list-style-type: none"> <li>■ No additional assessment or remediation works associated with UXO were required within this Site;</li> <li>■ No review or monitoring of any intrusive remedial works required to be conducted by other consultants is required;</li> <li>■ The risk of remnant ordnance related material within the eastern water easement is minimal;</li> <li>■ Defence has no legislative remediation or management obligations within the Site; and</li> <li>■ The Site is suitable for any future use or development.</li> </ul>
<b>Golder 2011</b>	<p>Golder was engaged to undertake a Detailed Site Investigation (DSI) of the Site including soil and groundwater assessment. Results of the DSI indicated the following:</p> <ul style="list-style-type: none"> <li>■ Soil analysis results were generally below the adopted site criteria. The soil investigation program identified lead and C10-C36 TPH above the adopted residential land use criteria at one location each. These concentrations were not considered to be significant, and not to warrant further investigation or remediation.</li> <li>■ Exceedances of the provisional phytotoxicity based PI Ls for metals in surface or near surface soils were identified on the site. The majority of the reported exceedances are located in the vicinity of the Compound area, and were considered to be of anthropogenic origin. The locations exceeding the PI Ls were not considered to warrant further investigation or remediation.</li> <li>■ Fragments of asbestos cement were identified on the ground surface in the former Married Quarters and in a stockpile of soil and demolition material located in the area of the former Barracks. A larger fragment of asbestos sheeting was observed on the ground surface between Badgerys Creek Road and the main section of the site. Free asbestos fibres were not identified in the soil or stockpile samples analysed during the investigation. A suspected asbestos cement cable pit was observed on the eastern side of the Compound area. Golder identified the potential for asbestos cement debris to be present elsewhere on the site.</li> <li>■ The results of soil sampling and groundwater samples collected from the vicinity of the USTs adjacent to Building 1 containing petrol and diesel were below the adopted site criteria for hydrocarbon fuel related contaminants. However, Golder concluded that there was the potential for hydrocarbon contamination of backfill sand and UST pit walls associated with the USTs</li> <li>■ TPH, Benzene, toluene, ethylbenzene and xylene (BTEX), Polycyclic Aromatic Hydrocarbons (PAH), Volatile Aromatic Hydrocarbons (VOC) and Semi Volatile Aromatic Hydrocarbons (SVOC) were not present in groundwater samples collected from the site. It was considered that the reported concentrations of cadmium, copper and zinc are indicative of background concentrations and that no further investigation of metals in groundwater is warranted</li> </ul> <p>Based on the outcomes of the DSI, Golder recommended that a RAP be prepared to address the following:</p> <ul style="list-style-type: none"> <li>■ Develop a strategy for management or removal of the asbestos cement impacted stockpile to the south of Building 1 and asbestos cement debris on the surface of the former Married Quarters;</li> <li>■ Prepare a methodology for the disposal of the contents of the USTs adjacent to Building 1 and the decommissioning or removal the USTs in accordance with NSW WorkCover and Australian Institute of Petroleum (AIP) guidance; and</li> <li>■ Preparation of an unexpected finds protocol to address the potential for e.g. asbestos containing materials, burial areas or UXO to be identified on the site in the future. The unexpected finds protocol could be included in environmental management plans for the future development of the site.</li> </ul>



Report	Details
<b>Golder 2011a</b>	<p>Golder was engaged to undertake a hazardous materials assessment of the Site. Results of the assessment indicated the following:</p> <ul style="list-style-type: none"> <li>■ Hazardous materials (asbestos, lead, PCBs, SMF, Mercury and Ozone Depleting Substances) were identified in a number of locations throughout the buildings located onsite site.</li> <li>■ Asbestos identified in eaves and ceiling liners.</li> <li>■ Asbestos debris within the area of the former “married quarters” and in a stockpile to the south of the compound</li> <li>■ Lead paint identified on various items around the site</li> <li>■ No inspection of service pits / conduits was undertaken. ERM notes the potential for additional asbestos to be present within underground service lines etc.</li> </ul>
<b>Golder 2014</b>	<p>Golder was engaged to prepare a RAP for the identified contaminated areas at the Site. While analysis from investigations undertaken within the site was generally below the adopted site criteria, the following remedial works were recommended:</p> <ul style="list-style-type: none"> <li>■ USTs – removal / in-situ abandonment followed by a soil vapour survey where USTs were abandoned in-situ;</li> <li>■ Former married quarters – emu pick of asbestos materials and surface scrape to 0.1 m bgl; and</li> <li>■ Stockpiled material – remove stockpiled materials and disposal at a licenced landfill facility</li> </ul>
<b>Deloitte, 2015</b>	<p>Defence Housing Australia (DHA) was considering the acquisition of the Site for potential future development. The vendor, Department of Defence, commissioned various reports on the Site prior to divestment in order to provide a degree of clarity to some of the Site’s potential issues. This report consolidated the key finding of these reports.</p> <ul style="list-style-type: none"> <li>■ Golder identified asbestos onsite as described in GA 2011.</li> <li>■ The Site contained two underground storage tanks (USTs) containing diesel and petrol. Golder noted that there was potential for hydrocarbon contamination of backfill sand and UST pit walls associated with the USTs. Golder noted that removal of the two USTs (and their associated pipework and infrastructure) would be undertaken, including the potential excavation of the backfill. No cost was provided for these works.</li> <li>■ A septic tank is located to the north of the compound area. Whilst it is possible to decommission the septic tank in-situ, Golder considered that removal of the septic tank was the preferred option as it will reduce associated environmental liabilities. No cost was provided for these works.</li> <li>■ Elevated concentrations of lead in paint were identified on the tower and the portable generator in the compound, and on the water tank to the west of the compound (med- high risk). Golder recommended that abatement of lead paint be performed as soon as practicable, such as: removal of the structure or item; paint removal; over-painting; or, encapsulation. No evidence of these measures were observed during the site visit.</li> </ul> <p><u>Hazardous materials:</u></p> <p><u>Asbestos:</u></p> <ul style="list-style-type: none"> <li>■ The risk assessment indicates that there is generally a low risk from ACM identified on the site. A medium risk was identified for the lining of the incinerator door located in the north western corner of the compound. It is recommended that ACM be identified by signage and that access to ACM is restricted (e.g. by installing a lock on the compound gate). It is also recommended that the incinerator lining be removed as soon as practicable.</li> <li>■ Disturbance of asbestos cement debris identified in the location of the former Married Quarters and in a stockpile to the south of the compound should be minimised until removal during site remediation works.</li> </ul>

Report	Details
	<p><u>Lead:</u></p> <ul style="list-style-type: none"> <li>■ Elevated concentrations of lead in paint were identified on the tower and the portable generator in the compound, and on the water tank to the west of the compound, which pose a medium to high risk. It is recommended that lead paints be identified by signage and that access to lead paint in poor condition is restricted. It is recommended that abatement of lead paint be performed as soon as practicable.</li> </ul> <p><u>Polychlorinated Biphenyls (PCBs), Synthetic Mineral Fibres (SMF) Ozone Depleting Substances (ODF) and Mercury</u></p> <ul style="list-style-type: none"> <li>■ Occurrences of these on Site were deemed unlikely to pose a health risk during any building assessment, stabilisation or management works prior to divestment.</li> <li>■ Building 6 is a brick flammables store with a metal roof. The interior of the fire door was damaged, with the insulating door core visible at the base of the door and the location of a former lock. Partially full 200 L drums of engine oil and isopropyl alcohol were stored in the building.</li> </ul>
<b>WE and Thuroona 2019</b>	<p>The Department of Infrastructure, Transport, Cities and Regional Development (DITCRD, the Department) engaged Thuroona Services (Thuroona) with Western Environmental Pty Ltd (WEPL) sub-contracted by Thuroona, to undertake a Detailed Site Investigation at the Site.</p> <p>Based on the results of the investigation, WE identified the following:</p> <ul style="list-style-type: none"> <li>■ <u>PFAS - Human health risk:</u> Concentrations of PFOS + PFHxS in soil exceed the screening risk criteria for residential land use at two surface soil locations (TP26 and TP27) near the chemical storage shed and USTs.</li> <li>■ <u>PFAS - Ecological risk:</u> Concentrations of PFOS in all six surface water samples collected on-site and off-site exceeded the PFAS NEMP Freshwater 99% Species Protection criteria. Concentrations were however below the NEMP Freshwater 95% species protection criteria, which applies to slightly to moderately disturbed systems. <ul style="list-style-type: none"> <li>○ ERM notes that due to the bioaccumulative nature of PFAS the 99% criteria should be used as the default screening criteria,</li> </ul> </li> <li>■ A review of the data indicates that surface water entering the Site has elevated PFAS concentrations above the NEMP Freshwater 99% Species Protection criteria, and these are commensurate with PFAS concentrations in surface water leaving the Site. This suggests that there is an off-site up-hydraulic gradient PFAS source, and that the Site itself is not contributing to observed PFAS concentrations in surface water.</li> <li>■ A review of identified surface water bodies in the area suggests that surface water entering the Site passes through areas further west, south-west and potentially northwest of the Site. Potential source sites exist in these areas; specifically, the Bringelly Fire Station (west / south-west of the Site) and the Bringelly Landfill (north-west of the Site). It is arguable that the surface water bodies should not be considered of such high ecological value given the current and proposed land use of the Site, and the regional setting of the Site. There is therefore little value in pursuing remediation or management of surface water at the Site.</li> <li>■ In terms of the current land use with livestock grazing occasionally occurring on Site, there is a potential risk given the exposure pathways via surface water and feed (i.e. grasses). A site-specific risk assessment could be undertaken to refine the likely degree of potential risk to livestock and subsequently the potential secondary risk to human health via consumption of milk and/or meat from these livestock.</li> <li>■ <u>Asbestos:</u> An area of stockpiled soil was observed south of the building Compound within the Site. At the time of the inspection the soil appeared to be relatively clear of demolition waste (the stockpile was largely covered in vegetation); however, fragments of asbestos containing material (ACM) have been noted to be present within the stockpile. The stockpile has a total estimated volume of approximately 1,600 m<sup>3</sup>.</li> </ul>

Report	Details
<b>M2A 2020:</b>	<p>This technical paper documented the potential impacts of the Western Sydney airport Project from contamination, salinity and acid sulfate soils (ASS). Potential existing areas of contamination were identified within the off airport construction footprint that could have an adverse impact on human or ecological health if disturbed during construction or remain during operation of the Project.</p> <p>The sources of contamination surrounding the airport area included past industrial land uses, former dry cleaners and service stations, landfills, defence activities, illegal waste dumping, fuel, oil or chemical storage and use and historical use of hazardous building materials. Areas of concern specifically relating to the Aerocore precinct (identified as AEC-48) included:</p> <ul style="list-style-type: none"> <li>■ Former fuel/oil and chemical storage;</li> <li>■ Underground Storage Tanks (IUSTs);</li> <li>■ Substation / power station;</li> <li>■ historical use of hazardous building materials in and around the OTC compound;</li> <li>■ ACM fragments in surface soils; and</li> <li>■ Potential historical use of AFFF on site or from up-gradient source.</li> </ul> <p>The paper estimated that during construction drawdown of groundwater within the Aerocore may occur between 10 metres at the deepest part of the excavation to 1 metre up to 315 metres from the excavation. Flow direction change from the north/ northwest towards Badgerys Creek to towards the excavation cutting.</p> <p>There were no potential significant sources of groundwater contamination identified within 500 m of the Aerotropolis Core Station construction site. The risk to changes in groundwater flow in context of groundwater contamination migration and impacts to sensitive receptors was considered to be low.</p>

## 6.2 Summary of Previously Identified Contamination

The following table summarises the occurrence and extent of contamination identified within the previous investigations reviewed by ERM. The location and extent of previously identified contamination is illustrated within Figure 10.

Item	Area of Environmental Concern	Comment
1	<b>On site fuel storage:</b>	<ul style="list-style-type: none"> <li>Groundwater monitoring undertaken to date has not identified elevated hydrocarbons within groundwater wells located within the vicinity of existing USTs.</li> <li>Reports indicate that onsite fuel tanks still contain diesel / petrol products with the last investigation undertaken in 2011.</li> <li>There is the potential for leaks of fuels to have occurred within the intervening period as tanks are unlikely to have been maintained during this period or assessed for loss / leaks.</li> <li>Fill materials adjacent to USTs identified to be stained (green colouring) and containing hydrocarbon odours.</li> </ul>
2	<b>Hazardous building materials:</b>	<ul style="list-style-type: none"> <li>Hazardous materials identified within building structures require removal / management and may have impacted localised surrounding surface soils (through degrading materials)</li> <li>Where buildings are to be demolished, removal of hazardous building materials as per relevant regulatory requirements (including validation of surrounding surface soils). Validation of successful removal and confirmation that additional impact to surface soils did not occur during removal works; and</li> <li>Where buildings are to be retained, removal and / or management of identified hazardous materials as per relevant guidelines / standards. Where materials are to remain onsite, update and maintain hazardous materials register for all future site users. Validation of surrounding soils may also be required to demonstrate the suitability of the site for the proposed development.</li> </ul>
3	<b>Married Quarters - Identified asbestos surface impact</b>	<ul style="list-style-type: none"> <li>Previous investigations identified surficial asbestos within the vicinity of the former married quarters.</li> <li>The identified asbestos impact at the site may differ from distribution within Golder investigation. Potential for additional impact from degrading building structures etc. Fill was observed to 0.5 m bgl therefore potential exists for deeper asbestos materials to be present.</li> </ul>
4	<b>Identified asbestos impacted stockpile:</b>	<ul style="list-style-type: none"> <li>Approximately 1600 m<sup>3</sup> of asbestos impacted fill has been identified within a stockpile located south of the administration building.</li> </ul>
5	<b>General Site Area - PFAS</b>	<ul style="list-style-type: none"> <li>Concentrations of PFOS + PFHxS in soil exceed the screening risk criteria for residential land use at two surface soil locations near the chemical storage shed and USTs.</li> <li>Concentrations of PFOS in all six surface water samples collected on-site and off-site exceeded the PFAS NEMP Freshwater 99% Species Protection criteria.</li> </ul>

## 6.3 Potential Additional Contamination Identified in Previous investigations

The following table summarises potential additional contamination / unexpected finds that based on current / historical land uses and may be present within the Site (Figure 10).

- ERM notes that the previous investigations have focused largely on the portion of the site identified as Commonwealth land.
- Potential contamination within the low density / rural residential properties located immediately adjacent to the Site is described within the site inspection undertaken by ERM and considered within the subsequent Conceptual Site Model.

Item	Area of Environmental Concern	Comment
6	Septic tank	<ul style="list-style-type: none"> <li>Previous investigation identified the presence of a septic tank within the compound portion of the Site. While ERM notes that results from previous investigations did not identify concentrations of CoPCs to exceed screening criteria, as the septic tank was not targeted during investigation works, the potential exists for contamination of surrounding soils etc. to have occurred.</li> </ul>
7	Soak Pit / Chemical Storage Infrastructure	<ul style="list-style-type: none"> <li>Previous investigation identified the presence of a soak pit and onsite chemical storage areas within the compound portion of the Site.</li> <li>As these areas were not targeted during investigation works, the potential exists for contamination of surrounding soils etc. to have occurred.</li> <li>Prior to investigation works, it would be beneficial to undertake a search of dangerous goods storage records to assess the potential nature of chemicals stored within the Site</li> </ul>
8	Asbestos service pits / conduits:	<ul style="list-style-type: none"> <li>Onsite service pits / conduits require a survey to be completed to assess the potential for additional asbestos to be present which may require management and / or remediation to enable the site to be suitable for the future proposed development.</li> </ul>
9	PFAS	<ul style="list-style-type: none"> <li>ERM notes that PFAS has been identified within soil, groundwater, surface water / sediment at relatively low concentrations throughout the Site.</li> <li>At the time of this report, there is no information detailing the potential sources of PFAS impact within the Site and as such the potential for additional non-delineated PFAS within the site requires consideration.</li> </ul>
10	Unexpected finds / buried waste / fill materials	<ul style="list-style-type: none"> <li>ERM notes the potential for additional fill materials to have been placed within the gully located within the southern portion of the Site.</li> <li>This area may require further assessment to assess the potential for site management / remediation requirements prior to the commencement of development.</li> </ul>
11	Adjacent Residential Dwellings	<ul style="list-style-type: none"> <li>ERM notes that residential blocks located adjacent to the Commonwealth portion of the Site were not inspected during works.</li> <li>The potential exists for contamination associated with residential land uses such as weed spraying, pesticides, fertilisers, septic tanks, etc., minor vehicle maintenance activities and degrading hazardous building materials (asbestos, lead paints etc).</li> <li>This area may require further assessment to assess the potential for site management / remediation requirements prior to the commencement of development.</li> </ul>

## 7. PROPOSED REDEVELOPMENT

The Draft Aerotropolis City Centre Master Plan Concept Plan Summary (December 2020) was produced to outline the potential redevelopment options for the Site.

In developing the concept plan the following key design moved were considered:

- Celebrating Thompsons Creek / Moore Gully;
- A green line linking ridge to creek;
- A connected city;
- Employment and innovation;
- A variety of distinct civic place; and
- A green loop connecting the city

To facilitate the above design considerations, the concept plan outlined the following key development aspects including:

- The Moore Gully Billabongs, Thompson Park and a Waterfront Precinct located within the southern portion of the Site;
- Educational facilities, a metro plaza, green gateways and sports fields located within the central portion of the Site; and
- Manufacturing / industrial lands, CSIRO facility, TAFE / multiversity and hotel located within the northern portion of the Site.

Proposed landscaping within the Site would include open water bodies for flood water storage / adaptive re-use, swimming and play area within the existing Moor Gully alignment and planted native vegetation throughout the Site.

Based on the proposed redevelopment, it is considered that due to the range of potential future land uses within the Site, the following exposure scenarios require consideration during future investigation / remediation works:

Media	Future Land uses / Exposure Scenario	Comment
Soil	■ Residential with garden / accessible soil	■ While the concept plan does not indicate low density residential development the potential exists for child care centres / pre-schools to be present within the Site,
	■ Public open space	■ Relevant for public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools (except for soil used for agricultural studies) and footpaths.
	■ Commercial / Industrial	■ Relevant for portions of the site identified to be redeveloped for commercial / industrial use
	■ Ecological Direct and Indirect Exposure	■ Due to the proposed significant planting of native vegetation within the Site including wetlands / billabongs etc.
Water	■ Ecological – Fresh Water	■ Redevelopment of wetlands and billabongs and subsequent improvement of ecological values
	■ Human Health – Drinking Water	■ While the concept plan does not consider re-use for drinking purposes, ERM considers the potential for drinking water re-use requires consideration unless specific planning instruments preclude the use.
	■ Human health – Recreation	■ Redevelopment of wetlands and billabongs for recreational uses (swimming, playing etc)

## 8. SITE INSPECTION

A site inspection was undertaken by an appropriately qualified and experienced ERM environmental scientist on 11 November 2020.

- Site features observed during the site inspection are presented on Figure 2. Photographs taken of key site features are presented within Appendix D

The Site is accessed within the western portion of the Site via a sealed road from Badgerys Creek Road. The access road leads directly to the former onsite building structure located within the centre of the site.

To the north of the access road, the former married quarters were located. Fill materials were observed on the surface of the site consistent with descriptions in previous investigations.

Former site infrastructure was located at the end of the access road within the central portion of the Site and was noted to comprise a centralised building structure, storage building, substation, fire pit and associated footings from previous structures. Former UST infrastructure was located immediately adjacent to the main building structure.

During the inspection of the central compound area, several concrete coverings / manholes were located on the ground surface. The specific use of these manholes is unknown.

ERM notes that during the site inspection the ground surface within the building compound area was primarily unsealed with no obvious signs of visual / olfactory indicators of contamination such as staining, odours etc. Small amounts of metal debris / wiring and other waste materials were noted on the Site surface.

The waste stockpile detailed within previous investigations to contain ACM impacted soils was located to the south of the compound area. The stockpile was comprised of soil, aggregates and other demolition wastes. Based on visual observations made during the Site inspection, the stockpile appeared to be consistent with the volumes of material presented within previous reports.

The northern portion of the Site was largely comprised of undeveloped cleared grassed area. During the site inspection, no evidence of illegal dumping / fly tipping was noted however scattered waste materials (wiring, electrical grounding cables, metal etc.) likely associated with historical site operations were present on the Site surface.

The area immediately adjacent to the western and south eastern portions of the Site were utilised for low density / rural residential dwellings. At the time of this inspection, a detailed inspection of these properties was not undertaken.

- ERM notes that land uses undertaken within adjacent residential properties visible from the Commonwealth portion of the Site included residential, garden beds, potential limited onsite mechanical maintenance of vehicles, low level agricultural uses (small herds of cows) and limited chemical storage (visible oil drums etc.).

The southern portion of the site was also comprised of undeveloped cleared grassed area with Moore Gully bisecting the Site from East to West. The southern portion of the Site was free from infrastructure etc. During the inspection, no evidence of staining or other visual / olfactory indicators of contamination were noted on the site surface.

During the inspection of Moore Gully, ERM noted the following:

- A rural dam was located within the eastern portion of Moore Gully. A dam wall was present on the eastern side of the dam containing backfill; some potential staining & rubbish (brick piping) within a small pile of fill and debris was located to the south east of the dam. Several small fill piles were located at the dam discharge point.
- An area of ground disturbance was noted slightly north of the dam, with visible fill containing plastics, wiring / cabling and building debris.

- Several concrete manholes were present adjacent to the central portion of Moore Gully. The specific use of these manholes was unclear at the time of the inspection.
- A concrete support structure was visible at the north-eastern end of Moore Gully. Disturbed ground including concrete debris was present at the surface of the site at the northern end; of Moore Gully.
- During the inspection, a dam located within and residential property was noted to be discharging to Moore Gully. At the time of the inspection, the water contained a strong organic odour.

Limited surface water was identified during the Site inspection, however based on the site conditions identified during the site inspection, it is the opinion of ERM that during periods of rainfall, surface waters are likely to flow towards onsite drainage lines / ephemeral watercourses (Moore Gully etc.) or infiltrate the site surface.

During the inspection, all vegetation within the Site and surrounding area appeared to be healthy and free from obvious signs of stress.



## 9. DATA QUALITY OBJECTIVES

Based on the results of previous investigations (Section 7.0) ERM developed the following data quality objectives for the purposes of undertaking an assessment of PFAS within surface water, sediment and groundwater.

ERM adopted quality assurance procedures to provide a consistent approach to evaluation of whether the DQOs required by the project have been achieved.

The approach will be consistent with NEPM DQO process, as outlined in Schedule B2 *Guideline on Site Characterisation*, in accordance with the ASC NEPM and the Australian Standard AS4482.1 Guide to the Sampling and Investigation of Potentially Contaminated Soil and Quality Control requirements detailed within the HEPA (2020) NEMP.

They will focus on assessment of the usability of the data in terms of accuracy and reliability in forming conclusions on the condition of the element of the environment being investigated.

The DQOs follow the seven-step process.

- Step 1 – State the Problem.
- Step 2 – Identify the Decision Statement.
- Step 3 – Identify Inputs into the Decision.
- Step 4 – Define the Study Boundaries.
- Step 5 – Develop the Decision Rule.
- Step 6 – Specify the Limits of Decision Error.
- Step 7 – Optimise the Design for Obtaining Data.

The DQO process has been tailored to suit the specific nature of the project and has been designed to be both consistent with the principles of DQO development and be fit for purpose (i.e. represent a logical rationale to inform and logically organise the data collection and implementation aspects of the project).

### 9.1 State the Problem

Previous investigations undertaken by Western Environmental (Section 7.0) identified detectable concentrations of PFAS within soil / groundwater within several locations throughout the Site.

While ERM notes that previous sampling identified there to be a low risk of harm to current on and offsite adjacent receptors WPCA required additional assessment to be undertaken to assess potential temporal variations in PFAS concentrations and aid in the refinement of the CSM presented in **Section 13.0**.

- ERM notes that this targeted assessment therefore relates to the assessment of PFAS from previously sampled locations only. Further investigation requirements for other CoPCs and the potential for PFAS impact within other areas of the Site will be detailed within the subsequent SAQP.

### 9.2 Step 2 – Identify the Decisions

Based upon the objectives of the investigation detailed **Section 1.3 and Section 1.4**, the decisions required to meet the objectives are discussed below:

- Are there any potential unacceptable risks to human health and / or ecological receptors from PFAS impacts in sediment, concrete structures, groundwater and / or surface water?
- Is there any evidence of, or potential for, migration of contaminants from the site?
- Is management or remediation of contamination, if identified, required?

- Is there sufficient information on the distribution and characteristics of contaminated soil and groundwater across the site to develop a Remedial Action Plan (RAP) or Environmental Management Plan (EMP) to (where necessary) remediate and/or manage site contamination?

### 9.3 Step 3 – Identify Information Inputs

The inputs to make the above decisions include:

- An understanding of the nature, type and distribution of contaminating activities that are currently and have historically occurred at the sites.
- Review of historical reports, including geological and hydrogeological data, lithological records and previously collected field and analytical data.
- Geological data and hydrogeological data.
- Further targeted investigations in previously sampled locations and / or key migration pathways of PFAS contamination that are considered to warrant further investigations.
- Representative sampling and analysis of sediments, groundwater and surface water to assess the nature, extent and magnitude of PFAS impacts within and moving off-site.
- Confirmation of acceptable data quality by assessment of data quality assurance / quality control by comparison against Data Quality Indicators (DQI).

### 9.4 Step 4 – Define the Study Boundaries

The boundaries of the investigation are identified as follows:

- Spatial boundaries – the investigation is limited to the site boundaries as illustrated within Figure 1 and the maximum depth of investigation at each location.
- Temporal boundaries – the temporal boundary is limited to the data collected during investigation works undertaken in December 2020.
- Constraints within the study boundaries: the following required consideration:
  - Access restrictions associated with site operations and site conditions (e.g. site boundary fencing, location of site infrastructure, adjacent residential dwellings etc.);
  - Possible presence of underground utilities; and
  - Presence of building structures (above ground components).

Proposed sample locations were selected taking into consideration the above factors.

### 9.5 Step 5 – Develop the Decision Rule

The decision rules adopted for this investigation are included in the table below.

Decision Required to be Made	Decision Rule
Are there any potential unacceptable risks to human health and / or ecological receptors from PFAS impacts in sediment, concrete structures, groundwater and / or surface water?	<p>Analytical data compared against adopted assessment criteria:</p> <ul style="list-style-type: none"> <li>■ If one or more concentrations of contaminants at one or more sampling locations are reported above the adopted assessment criteria and relate to a potentially complete pathway, the answer is 'Yes'.</li> <li>■ If all concentrations of contaminants are reported to be equal to or below the adopted assessment criteria, the answer is 'No'.</li> </ul>
Is there any evidence of, or potential for, migration of contaminants from the site?	<ul style="list-style-type: none"> <li>■ Where the assessment identifies the potential for unacceptable risks to off-Site receptors as a result of sites contamination conditions, the answer to the decision is 'Yes'.</li> <li>■ Otherwise, the answer to the decision is 'No'.</li> </ul>
Is management or remediation of contamination, if identified, required?	<ul style="list-style-type: none"> <li>■ If the answer to Decision 1 or 2 is 'Yes', then management or remediation of identified contamination may be required.</li> </ul>
Is there sufficient information on the distribution and characteristics of contaminated soil and groundwater across the site to develop a Remedial	<ul style="list-style-type: none"> <li>■ Is further assessment required to delineate the nature and extent of identified contamination within the site or migrating off-site?</li> <li>■ If no additional investigation is required, the answer to the decision is 'Yes'.</li> </ul>

Decision Required to be Made	Decision Rule
Action Plan (RAP) or Environmental Management Plan (EMP) to (where necessary) remediate and/or manage site contamination?	<ul style="list-style-type: none"> <li>Otherwise, the answer to the decision is 'No'.</li> </ul>

## 9.6 Step 6 – Specify Limits of Decision Error

This step establishes the decision maker's tolerable limits on decision errors, which provide performance goals for limiting uncertainty in the data. Data generated during this project must be appropriate to allow decisions to be made with confidence.

Specific limits for this project have been adopted in accordance with the appropriate guidance from the NEPM (2013), appropriate data quality indicators (DQIs) used to assess data quality assurance / quality control (QA/QC) and standard ERM procedures for field sampling and sample handling.

To assess the usability of the data prior to making decisions, the data will be assessed against pre-determined DQIs for precision, accuracy, representativeness, comparability and completeness.

The pre-determined DQIs established for the project are discussed below in relation to precision, accuracy, representativeness, comparability, completeness and sensitivity.

- **Precision** – measures the reproducibility of measurements under a given set of conditions. The precision of the laboratory data and sampling techniques is assessed by calculating the Relative Percent Difference (RPD) of duplicate samples.
- **Accuracy** – measures the bias in a measurement system. The accuracy of the laboratory data that are generated during this project is a measure of the closeness of the analytical results obtained by a method to the 'true' value. Accuracy is assessed by reference to the analytical results of laboratory control samples, laboratory spikes and analyses against reference standards.
- **Representativeness** – expresses the degree with which sample data accurately and precisely represent a characteristic of a population or an environmental condition. Representativeness is achieved by collecting samples on a representative basis across the site, and by using an adequate number of sample locations to characterise the site to the required accuracy.
- **Comparability** – expresses the confidence with which one data set can be compared with another. This is achieved through maintaining a level of consistency in sampling techniques, analytical techniques and reporting methods.
- **Completeness** – is defined as the percentage of measurements made which are judged to be valid measurements. The completeness goal is set at there being sufficient valid data generated during the study.
- **Sensitivity** – expresses the appropriateness of the chosen laboratory methods, including the limits of reporting, in producing reliable data in relation to the adopted assessment criteria.

If any of the DQIs are not met, further assessment will be necessary to assess whether the non-conformance will significantly affect the usefulness of the data. Corrective actions may include requesting further information from samplers and/or analytical laboratories, downgrading of the quality of the data or alternatively, re-collection of the data.

Data Quality Objectives	Frequency	Data Quality Indicator
<b>Precision</b>		
Blind duplicates (intra laboratory)	1 / 10 samples	<30% RPD
Blind duplicates (inter laboratory)	1 / 10 samples	<30% RPD
<b>Accuracy</b>		
Surrogate spikes	All organic samples	70-130%

Data Quality Objectives	Frequency	Data Quality Indicator
Laboratory control samples	1 per lab batch	70-130%
Matrix spikes	1 per lab batch	70-130% Lower recoveries may be acceptable for OCPs, OPPs, PCBs and phenols and will be assessed according to USEPA protocols.
<b>Representativeness</b>		
Sampling appropriate for media and analytes	NA	NA
Samples extracted and analysed within holding times.	NA	organics (14 days), inorganics (6 months)
Rinsate blank	1 per day where non-dedicated equipment is used. Samples are to be analysed for main COPCs other than asbestos	<LOR
Trip spike	1 per day (water samples; BTEX only)	70-130%
Method blank	1 per lab batch	<LOR
<b>Comparability</b>		
Standard operating procedures for sample collection & handling	All samples	All samples
Standard analytical methods used for all analyses	All samples	All samples
Consistent field conditions, sampling staff and laboratory analysis	All samples	All samples
<b>Completeness</b>		
Sample description and COCs completed and appropriate	All samples	All samples
Appropriate documentation	All samples	All samples
Satisfactory frequency and result for QC samples	All QC samples	-
Data from critical samples is considered valid	NA	Critical samples valid
<b>Sensitivity</b>		
Limits of reporting appropriate and consistent	All samples	All samples

## 9.7 Step 7 – Optimise the Design for Obtaining Data

ERM notes that this targeted assessment relates to the assessment of PFAS from previously sampled locations only, the results of this assessment will be used to inform and optimise the design of future sampling programmes.

## 10. ASSESSMENT CRITERIA

The following sections describe the assessment criteria based on the identified land use scenarios.

### 10.1 Soil Criteria

The adopted assessment screening criteria relevant to the different potential exposure scenarios and the range of land uses within the Site and adjacent properties are detailed in the following table.

- ERM notes that while soil samples were not collected, the use of soil criteria was adopted for collected sediment samples given the largely ephemeral nature of the watercourses identified on the site. Where future investigation works are undertaken, consideration should also be given to the use of the below soil criteria

Land use Scenario	Source and Rationale		
	PFOS and/or PFHxS	PFOA	Comment
<b>Health Based Guidance Values</b>			
Residential with garden / accessible soil (HIL A)	0.01 mg/kg	0.1 mg/kg	<ul style="list-style-type: none"> <li>Assumes home-grown produce provides up to 10% of fruit and vegetable intake (does not account for consumption of any eggs from home poultry, nor of milk or meat from stock on the premises). Also includes children's day care centres, preschools and primary schools. The HILs were derived using the methodology consistent with assumptions set out in the ASC NEPM for HIL A.</li> </ul>
Public open space (HIL C)	1 mg/kg	10 mg/kg	<ul style="list-style-type: none"> <li>Offsite recreational lands will be assessed against public open space criteria.</li> <li>ERM notes that the use of HIL-C also relates to ecological direct exposure scenarios (see below)</li> <li>Relevant for public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools (except for soil used for agricultural studies) and footpaths.</li> <li>Excludes undeveloped public open space (such as urban bushland and reserves), which should be subject to a site-specific assessment where appropriate</li> </ul>
Industrial/ commercial (HIL D)	20 mg/kg	50 mg/kg	<ul style="list-style-type: none"> <li>As the majority of the Site is classified as a commercial / industrial property risks to human health will be assessed against the relevant commercial / industrial criteria.</li> <li>The commercial / industrial criteria assumes 8 hours is spent indoors and 1 hour spent outdoors at a site such as a shop, office, factory or industrial site. If the typical exposure for a site is predominantly outdoors with significant earthen areas, recalculation of a site-specific value is recommended.</li> </ul>
<b>Ecological Guideline Values</b>			
Ecological Direct Exposure	1 mg/kg	10 mg/kg	<ul style="list-style-type: none"> <li>The NEPM states that 'future work is recommended to review available soil – ecological direct exposure criteria proposed by Australian research and industry organisations. As an interim, it is proposed that the human health screening value for Public open space be used.'</li> </ul>

Land use Scenario	Source and Rationale		
	PFOS and/or PFHxS	PFOA	Comment
Ecological Indirect Exposure	0.01 mg/kg	NA	<ul style="list-style-type: none"> <li>■ The guideline value is based on dietary exposure of a secondary consumer as the most sensitive exposure pathway assessed.</li> <li>■ This value may not be protective of specific animals relevant to Australia, including predatory native animals such as quolls, antechinus and reptiles.</li> <li>■ For intensively developed sites with no secondary consumers and minimal potential for indirect ecological exposure, a higher criterion of up to 0.14 mg/kg may be appropriate</li> </ul>

## 10.2 Biota Guideline Values

While biota sampling was not proposed to be undertaken within the initial stages of the investigation, where required the following guidance will be adopted to assess the potential risk to biota within subsequent project stages (if required).

Exposure Scenario	Sum of PFOS and PFHxS	Description
Ecological direct exposure for wildlife diet	■ 4.6 µg / kg	■ Mammalian diet - consumption of biota as wet weight food
	■ 8.2 µg / kg	■ Avian diet - consumption of biota as wet weight food
Ecological exposure protective of birds	■ 0.2 µg / g	■ Whole bird egg as wet weight

## 10.3 Sediment Criteria

There are no published health or ecological screening criteria for PFAS in sediment. The primary issues of concern associated with PFAS in sediment are as follows.

- Potential human health impacts due to direct contact exposure to sediment.
- The potential for sediment to act as a source of PFAS that may remobilise into the water column and/or aquatic food chains.
- The potential for sediment and / or sediment pore water concentrations to pose direct ecotoxicological effects.

In consideration of the primary risks / exposure scenarios, the following tier 1 screening criteria have been adopted.

- Health-based screening criteria for open space and residential soil (NEMP 2020) detailed within Section 7.1 have been adopted to assess potential health risks due to direct contact with sediment by human receptors.
  - ERM notes that while soil criteria are not derived with specific consideration of sediment exposure, the frequency and duration of exposure to sediments during recreational use of water bodies are much lower than those assumed for soil exposure in a residential setting. Use of residential soil criteria is therefore considered protective of potential risk due to sediment exposure.
- Ecological direct exposure and indirect exposure (NEMP 2020) detailed within Section 7.1 have been used to assess the potential ecological risks associated with direct / indirect contact with sediments.

- ERM notes that while the soil criteria have not been derived with specific consideration of sediment exposure the use of the guideline for screening purposes in conjunction with the surface water sampling is considered appropriate for the investigation
- Potential impacts on surface water and/or the aquatic food chain will be assessed by comparison of surface water concentrations to relevant screening levels.
- There is currently insufficient data regarding direct sediment toxicity to sediment dwelling organisms, thus no screening criteria are available for this pathway.
  - As an interim measure the NEMP recommends the human health value of 1 mg/kg be used to evaluate soil and this has been used to provide an indication the exposure of organisms to concentrations in sediment.

## 10.4 Groundwater

While ERM notes that an initial assessment of potential beneficial re-uses of groundwater within the area (**Section 3.0**) indicates that the beneficial use of groundwater within the vicinity of the site is unlikely, as a conservative measure, drinking water guidelines will be used as the primary screening criteria for this assessment. During completion of the DSI, where the CSM identifies assessment against less conservative / more appropriate screening criteria, consideration will be given to adopting alternative screening criteria where appropriate.

Details on screening criteria for groundwater will be adopted as per the below table.

Land use Scenario	Rationale and Adopted Groundwater Criteria		
	PFOS / PFHxS	PFOA	Comment
Ecological – Fresh Water	<ul style="list-style-type: none"> <li>■ 0.00023 µg/L (99% protection);</li> <li>■ 0.13 µg/L (95% protection);</li> <li>■ (PFOS only)</li> </ul>	<ul style="list-style-type: none"> <li>■ 19 µg/L (99% protection);</li> <li>■ 220 µg/L (95% protection);</li> </ul>	<ul style="list-style-type: none"> <li>■ Australian and New Zealand Guidelines for Fresh and Marine Water Quality - technical draft default guideline values for PFOS and PFOA.</li> <li>■ Note 1: The 99% species protection level for PFOS is close to the level of detection. Agencies may wish to apply a 'detect' threshold in such circumstances rather than a quantified measurement.</li> <li>■ Note 2: The draft guidelines do not account for effects which result from the biomagnification of toxicants in airbreathing animals or in animals which prey on aquatic organisms.</li> <li>■ Note 3: The WQGs advise 41 that the 99% level of protection be used for slightly to moderately disturbed systems. This approach is generally adopted for chemicals that bioaccumulate and biomagnify in wildlife. Regulators may specify or environmental legislation may prescribe the level of species protection required, rather than allowing for case-by-case assessments.</li> </ul>
Human Health – Drinking Water	<ul style="list-style-type: none"> <li>■ 0.07 µg/L (PFOS + PFHxS)</li> </ul>	<ul style="list-style-type: none"> <li>■ 0.56 µg/L</li> </ul>	<ul style="list-style-type: none"> <li>■ Values adopted from FSANZ (2017) Health Based Guidance Values for PFAS: For use in site investigations in Australia. Also referenced in the NEPM (2018)</li> </ul>
Human health – Recreation	<ul style="list-style-type: none"> <li>■ 2 µg/L (PFOS + PFHxS)</li> </ul>	<ul style="list-style-type: none"> <li>■ 10 µg/L</li> </ul>	<ul style="list-style-type: none"> <li>■ Recreational criteria has been sourced from the NHMRC 2019 guidance utilising refined estimates of water ingestion while swimming etc.</li> <li>■ ERM notes that the degree of conservatism in the drinking water and recreational water guidance values (90% attributed to other exposure pathways) means that exceeding these values does not constitute a risk if other pathways are controlled.</li> </ul>



## 10.5 Surface Water

For aquatic ecosystems, the level of protection that should be used to determine the objective is:

- 99% for 'largely unmodified', 'natural' and 'substantially natural' ecosystems.
- 95% for 'slightly to moderately modified' or 'modified' ecosystems.
- 90% for 'highly modified' or 'largely modified' ecosystems.

The above protection levels are relevant for assessment of direct toxicity to aquatic organisms. In accordance with ANZECC&ARMCANZ recommendations, the next higher protection level should be adopted for assessment of potential bioaccumulative / secondary poisoning effects where site-specific data on bioaccumulation are not available (e.g. the 99% level for slightly to moderately disturbed ecosystems).

Screening criteria of surface water will be adopted as per the table below.

Beneficial Use	Rationale and Source		
	PFOS / PFHxS	PFOA	
<b>Ecological Freshwater</b>	<ul style="list-style-type: none"> <li>■ 0.00023 µg/L (99% protection);</li> <li>■ 0.13 µg/L (95% protection);</li> <li>■ (PFOS only)</li> </ul>	<ul style="list-style-type: none"> <li>■ 19 µg/L (99% protection);</li> <li>■ 220 µg/L (95% protection);</li> </ul>	<ul style="list-style-type: none"> <li>■ Australian and New Zealand Guidelines for Fresh and Marine Water Quality - technical draft default guideline values for PFOS and PFOA.</li> <li>■ Note 1: The 99% species protection level for PFOS is close to the level of detection. Agencies may wish to apply a 'detect' threshold in such circumstances rather than a quantified measurement.</li> <li>■ Note 2: The draft guidelines do not account for effects which result from the biomagnification of toxicants in airbreathing animals or in animals which prey on aquatic organisms.</li> <li>■ Note 3: The WQGs advise 41 that the 99% level of protection be used for slightly to moderately disturbed systems. This approach is generally adopted for chemicals that bioaccumulate and biomagnify in wildlife. Regulators may specify or environmental legislation may prescribe the level of species protection required, rather than allowing for case-by-case assessments.</li> </ul>
<b>Human health – Recreation</b>	<ul style="list-style-type: none"> <li>■ 2 µg/L</li> <li>■ (PFOS + PFHxS)</li> </ul>	<ul style="list-style-type: none"> <li>■ 10 µg/L</li> </ul>	<ul style="list-style-type: none"> <li>■ Values adopted from FSANZ (2017) Health Based Guidance Values for PFAS: For use in site investigations in Australia. Also referenced in the NEPM (2018)</li> <li>■ Recreational criteria has been sourced from the NHMRC 2019 guidance utilising refined estimates of water ingestion while swimming etc</li> <li>■ ERM notes that the degree of conservatism in the drinking water and recreational water guidance values (90% attributed to other exposure pathways) means that exceeding these values does not constitute a risk if other pathways are controlled.</li> </ul>

## 10.6 Groundwater, Surface Water and Sediment Investigation

To aid in the assessment of potential liabilities / constraints associated with site contamination resulting from current and historical land use practices within the Site, during the site inspection, ERM undertook sample collection of surface water, sediment and groundwater within the Site as described within the table below.

Item	Description
Groundwater Investigation Works	<p>Groundwater investigation works were undertaken between the 9<sup>th</sup> and 11<sup>th</sup> December 2020 and comprised the following:</p> <ul style="list-style-type: none"> <li>■ Nine samples (MW1, BB116, MW2, BB01, BB02, BB03, BB114, D01_20201211, T01_20201211) were collected (Figure 2) via Hydrasleeve sampling methods.</li> <li>■ Groundwater parameters (DO, Ec, Redox, Temp and pH) were measured utilising an YSI Quatro Pro Plus water quality meter (10H100325).</li> <li>■ Samples were placed within laboratory-supplied jars and stored within a chilled cooler.</li> <li>■ Samples were transported under Chain of Custody (CoC) conditions to a NATA accredited laboratory for the required analysis.</li> </ul>
Surface Water / Sediment Sampling	<p>Surface water / sediment samples were collected from four locations within the property, and 7 off site locations.</p> <ul style="list-style-type: none"> <li>■ 11 surface water samples were collected via an extendable reach pole.</li> <li>■ Samples were placed within laboratory-supplied jars and stored within a chilled cooler.</li> <li>■ Samples were transported under Chain of Custody (CoC) conditions to a NATA accredited laboratory for the required analysis.</li> </ul>
Analytical Program	<p>Collected soil and surface water samples were analysed for a range of the following CoPCs</p> <ul style="list-style-type: none"> <li>■ Per- and polyfluoroalkyl substances (PFAS);</li> <li>■ ASLP PFAS</li> </ul>
QC Samples	<p>To assess the quality of the collected data set the following QAQC samples were collected:</p> <ul style="list-style-type: none"> <li>■ 1 x intra laboratory duplicate sample (D01_20201211)</li> <li>■ 1x inter laboratory triplicate sample (T01_20201211)</li> <li>■ 1x rinsate sample (R01_20201209)</li> </ul>

## 11. INVESTIGATION RESULTS

### 11.1 Field Observations

Figure 13 presents surface water, sediment and groundwater investigation locations. A photographic log illustrating conditions encountered during investigation works is presented within Appendix D.

During surface water / sediment sampling, no visual / olfactory indicators of contamination such as staining, odours, sheens etc. were observed within any sampling locations.

PID readings collected during sediment sampling, all returned concentrations of 0.00 ppm (isobutylene equivalent) indicating a low potential for volatile organic contamination to be present within the collected samples.

During groundwater sampling works groundwater was encountered at the following depths:

Well ID	Gauging Date	Total Measured Well Depth (mbTOC)	Depth to Water (mbTOC)
MW1	09-Dec-20	7.016	5.291
BB116	09-Dec-20	5.948	1.792
MW2	09-Dec-20	8.043	4.787
BB01	09-Dec-20	12.179	5.031
BB02	09-Dec-20	12.184	4.984
BB03	09-Dec-20	12.193	5.422
BB114	09-Dec-20	12.078	2.329

Water quality parameters collected during groundwater sampling indicated the following:

- Dissolved oxygen ranged from 2.41 (BB16) – 5.09 (BB03);
- pH ranged from 6.67 (BB03) – 6.87 (MW1) indicating marginally acidic conditions;
- Conductivity ranged from 16,233 us/cm (BB114) – 24,392 us/cm (MW1) indicating brackish conditions (reflecting the marine derived shale bedrock); and
- Redox ranged from 15.8 mV (BB03) – 111.7 mV (BB116)..

During groundwater sampling, no evidence of sheen, odour or other visual / olfactory indicators of anthropogenic contamination were noted.

### 11.2 Analytical Results

#### 11.2.1 Analytical Results - Sediment

Laboratory analysis of collected sediment samples reported concentrations of all CoPCs less than the LOR and / or adopted assessment criteria within all collected samples.

#### 11.2.2 Analytical Results – Surface Water

Laboratory analysis of collected surface water samples reported concentrations of all CoPCs less than the LOR and / or adopted assessment criteria within all collected samples with the exception of the following:

- SW2 – PFOS exceeding the adopted 99% freshwater criteria.
- SW8 – sum of PFHxS and PFOS exceeding the adopted drinking water criteria and PFOS exceeding the adopted 99% freshwater criteria.
- SW11 - sum of PFHxS and PFOS exceeding the adopted drinking water criteria and PFOS exceeding the adopted 99% freshwater criteria.

## 12. CONCEPTUAL SITE MODEL

### 12.1 Potential Sources of Contamination

Based on the site history and background data reviewed and ERM's professional experience, the Contaminants of Potential Concern (CoPC) associated with current and historical land uses undertaken in the general area are considered to include the following:

Potential Source	CoPC
On site fuel storage:	■ TRH, BTEX, PAH and Heavy Metals
Hazardous building materials:	■ Heavy Metals, PCBs and Asbestos
Married Quarters - Identified asbestos surface impact	■ Asbestos
Identified asbestos impacted stockpile:	■ Asbestos (Note: Stockpiled material will require further analysis for waste classification purposes)
General Site Area - PFAS	■ PFAS
Septic tank	■ Heavy Metals, Nutrients, Nitrates / Nitrites, Pathogens (E. Coli Faecal Coliforms etc)
Soak Pit / Chemical Storage Infrastructure	■ TRH, BTEX, PAH, OCP / OPP, Phenols, Chlorinated Solvents, Volatile Organic Compounds (VOCs) Semi Volatile Organic Compounds (SVOCs), PFAS and Heavy Metals
Asbestos service pits / conduits:	■ Asbestos
Unexpected finds / buried waste / fill materials (General Site Area including filled gully)	■ TRH, BTEX, PAH, OCP / OPP, Phenols, Chlorinated Solvents, VOCs, SVOCs, PFAS and Heavy Metals
Adjacent residential dwellings	■ Asbestos, TRH, BTEX, PAH, OCP / OPP, Phenols, Nutrients, Pathogens, Chlorinated Solvents, VOCs, SVOCs and Heavy Metals

### 12.2 Potential Pathways

The primary potential exposure pathways of concern at the site are:

- Inhalation of vapour (from soil and/or groundwater) and contaminated dust (from soils).
- Dermal contact and / or incidental ingestion with contaminated surface water and soils / sediments.
- Transport of contamination through surface water flows.
- Transport of contamination to underlying groundwater aquifers.
- Transport of contaminants through mechanical transport (i.e. excavation, tracking during vehicle movement etc.).

### 12.3 Potential Receptors

Key receptors have been identified as:

- Current site users (commercial / industrial).
- Future site users (residential, commercial / industrial and recreational).
- Groundwater beneath the site.
- Potential future users of groundwater (beneficial re-use for irrigation including reinjection of surface waters).
- Workers carrying out construction, installation or maintenance works within the site.
- Onsite and adjacent sensitive receptors e.g. adjacent residents, and ecological receptors.

## 12.4 Conceptual Site Model

Based on the results of the desktop assessment, site inspection and the potential sources, pathways and receptors identified above ERM developed the below Conceptual Site Model (CSM).

Potential Sources	Pathways	Potential Receptors	Risk of Potentially Complete Pollutant Linkage	Comment
<b>Onsite Fuel Storage</b>	<ul style="list-style-type: none"> <li>■ Dermal contact and / or incidental ingestion with contaminated soils.</li> </ul>	<ul style="list-style-type: none"> <li>■ Current and future site users.</li> <li>■ Workers carrying out development, installation or maintenance works within the site</li> </ul>	<ul style="list-style-type: none"> <li>■ Moderate</li> </ul>	<ul style="list-style-type: none"> <li>■ Former fuel storage infrastructure remains onsite and requires remediation and validation as per previous investigations / remedial plans.</li> <li>■ ERM notes that further investigation of surrounding soil may be warranted.</li> </ul>
	<ul style="list-style-type: none"> <li>■ Inhalation of contaminated dust.</li> </ul>	<ul style="list-style-type: none"> <li>■ Current and future site users</li> <li>■ Workers doing works involving movement / handling etc. of stockpiled materials</li> </ul>	<ul style="list-style-type: none"> <li>■ Moderate</li> </ul>	
	<ul style="list-style-type: none"> <li>■ Transport of contamination through surface water flows.</li> </ul>	<ul style="list-style-type: none"> <li>■ Adjacent sensitive ecological receptors.</li> <li>■ Current and future site users.</li> <li>■ Workers carrying out development, installation or maintenance works within the site.</li> </ul>	<ul style="list-style-type: none"> <li>■ Low - Moderate</li> </ul>	
	<ul style="list-style-type: none"> <li>■ Transport of contamination to underlying groundwater aquifers</li> </ul>	<ul style="list-style-type: none"> <li>■ Adjacent sensitive ecological receptors.</li> <li>■ Future potential on-site / offsite users of groundwater</li> </ul>	<ul style="list-style-type: none"> <li>■ Moderate</li> </ul>	
	<ul style="list-style-type: none"> <li>■ Transport of contaminants through mechanical transport</li> </ul>	<ul style="list-style-type: none"> <li>■ Workers carrying out development, installation or maintenance works within the site.</li> </ul>	<ul style="list-style-type: none"> <li>■ Moderate</li> </ul>	
<b>Hazardous building materials:</b>	<ul style="list-style-type: none"> <li>■ Dermal contact and / or incidental ingestion with contaminated soils.</li> </ul>	<ul style="list-style-type: none"> <li>■ Current and future site users.</li> <li>■ Workers carrying out development, installation or maintenance works within the site</li> </ul>	<ul style="list-style-type: none"> <li>■ Moderate</li> </ul>	<ul style="list-style-type: none"> <li>■ Hazardous building materials are known to have been used within the Site.</li> </ul>

Potential Sources	Pathways	Potential Receptors	Risk of Potentially Complete Pollutant Linkage	Comment
	<ul style="list-style-type: none"> <li>Inhalation of contaminated dust.</li> </ul>	<ul style="list-style-type: none"> <li>Current and future site users</li> <li>Workers doing works involving movement / handling etc. of stockpiled materials</li> </ul>	<ul style="list-style-type: none"> <li>High</li> </ul>	<ul style="list-style-type: none"> <li>Degraded materials may result in impacted surface soils adjacent to existing and former onsite structures.</li> <li>Further assessment of surface soils is recommended to assess the potential risk to identified receptors and aid in remedial planning for the Site.</li> </ul>
	<ul style="list-style-type: none"> <li>Transport of contamination through surface water flows.</li> </ul>	<ul style="list-style-type: none"> <li>Adjacent sensitive ecological receptors.</li> <li>Current and future site users.</li> <li>Workers carrying out development, installation or maintenance works within the site.</li> </ul>	<ul style="list-style-type: none"> <li>Low - Moderate</li> </ul>	
	<ul style="list-style-type: none"> <li>Transport of contamination to underlying groundwater aquifers</li> </ul>	<ul style="list-style-type: none"> <li>Adjacent sensitive ecological receptors.</li> <li>Future potential on-site / offsite users of groundwater</li> <li>Workers carrying out development, installation or maintenance works within the site.</li> </ul>	<ul style="list-style-type: none"> <li>Low</li> </ul>	
	<ul style="list-style-type: none"> <li>Transport of contaminants through mechanical transport</li> </ul>	<ul style="list-style-type: none"> <li>Adjacent sensitive ecological receptors.</li> <li>Future potential on-site / offsite users of groundwater</li> <li>Workers carrying out development, installation or maintenance works within the site.</li> </ul>	<ul style="list-style-type: none"> <li>Moderate</li> </ul>	
<b>Married Quarters - Identified asbestos surface impact</b>	<ul style="list-style-type: none"> <li>Dermal contact and / or incidental ingestion with contaminated soils.</li> </ul>	<ul style="list-style-type: none"> <li>Current and future site users.</li> <li>Workers carrying out development, installation or maintenance works within the site</li> <li>Current and future site users</li> <li>Workers doing works involving movement / handling etc. of stockpiled materials</li> </ul>	<ul style="list-style-type: none"> <li>Moderate</li> </ul>	<ul style="list-style-type: none"> <li>Fill materials within the former married quarters have been identified to contain asbestos and may require further assessment to quantify the specific volume of material requiring management and / or remediation.</li> <li>ERM notes that further assessment may also be required to facilitate offsite disposal and or</li> </ul>

Potential Sources	Pathways	Potential Receptors	Risk of Potentially Complete Pollutant Linkage	Comment
	■ Inhalation of contaminated dust.	<ul style="list-style-type: none"> <li>■ Current and future site users.</li> <li>■ Workers carrying out development, installation or maintenance works within the site</li> <li>■ Current and future site users</li> <li>■ Workers doing works involving movement / handling etc. of stockpiled materials</li> </ul>	■ High	determine the suitability for onsite management.
	■ Transport of contamination through surface water flows.	<ul style="list-style-type: none"> <li>■ .</li> <li>■ Current and future site users.</li> <li>■ Workers carrying out development, installation or maintenance works within the site.</li> </ul>	■ High	
	■ Transport of contamination to underlying groundwater aquifers	<ul style="list-style-type: none"> <li>■ .</li> <li>■ Future potential on-site / offsite users of groundwater</li> <li>■ Workers carrying out development, installation or maintenance works within the site.</li> </ul>	■ Low	
	■ Transport of contaminants through mechanical transport	<ul style="list-style-type: none"> <li>■ .</li> <li>■ Future potential on-site / offsite users of groundwater</li> <li>■ Workers carrying out development, installation or maintenance works within the site.</li> </ul>	■ High	
<b>Identified asbestos impacted stockpile:</b>	■ Dermal contact and / or incidental ingestion with contaminated soils.	<ul style="list-style-type: none"> <li>■ Current and future site users.</li> <li>■ Workers carrying out development, installation or maintenance works within the site</li> </ul>	■ Moderate - High	■ Stockpiled fill materials located to the south of the main compound area have been identified to contain asbestos and may require further assessment to quantify the specific volume of

Potential Sources	Pathways	Potential Receptors	Risk of Potentially Complete Pollutant Linkage	Comment
	■ Inhalation of contaminated dust.	■ Current and future site users ■ Workers doing works involving movement / handling etc. of stockpiled materials	■ High	<p>material requiring management and / or remediation.</p> <p>■ ERM notes that further assessment may also be required to facilitate offsite disposal and or determine the suitability or onsite management</p>
	■ Transport of contamination through surface water flows.	■ Adjacent sensitive ecological receptors. ■ Current and future site users. ■ Workers carrying out development, installation or maintenance works within the site.	■ Low	
	■ Transport of contamination to underlying groundwater aquifers	■ Adjacent sensitive ecological receptors. ■ Future potential on-site / offsite users of groundwater ■ Workers carrying out development, installation or maintenance works within the site.	■ Low	
	■ Transport of contaminants through mechanical transport	■ Adjacent sensitive ecological receptors. ■ Future potential on-site / offsite users of groundwater ■ Workers carrying out development, installation or maintenance works within the site.	■ High	
<b>General Site Area - PFAS</b>	■ Dermal contact and / or incidental ingestion with contaminated soils.	■ Current and future site users. ■ Workers carrying out development, installation or maintenance works within the site	■ Low - Moderate	<p>■ ERM notes that low levels of PFAS have been identified at various locations throughout the site in previous investigation undertaken by Western Environmental.</p> <p>■ Further assessment of PFAS should be undertaken to assess the i) potential source of PFAS within the Site and ii) the potential risk to current and future land uses.</p>
	■ Inhalation of contaminated dust.	■ Current and future site users ■ Workers doing works involving movement / handling etc. of stockpiled materials	■ Low	



Potential Sources	Pathways	Potential Receptors	Risk of Potentially Complete Pollutant Linkage	Comment
	■ Transport of contamination through surface water flows.	<ul style="list-style-type: none"> <li>■ Adjacent sensitive ecological receptors.</li> <li>■ Current and future site users.</li> <li>■ Workers carrying out development, installation or maintenance works within the site.</li> </ul>	■ Moderate	<ul style="list-style-type: none"> <li>■ ERM notes that concept planning for the site includes the adaptive reuse of surface waters for recreational purposes.</li> <li>■ Due to the identified PFAS this will require further assessment to assess the potential risk to future recreational users and any potential management requirements etc.</li> </ul>
	■ Transport of contamination to underlying groundwater aquifers	<ul style="list-style-type: none"> <li>■ Adjacent sensitive ecological receptors.</li> <li>■ Future potential on-site / offsite users of groundwater</li> </ul>	■ Moderate	
	■ Transport of contaminants through mechanical transport	<ul style="list-style-type: none"> <li>■ Workers carrying out development, installation or maintenance works within the site.</li> </ul>	■ Low	
Septic tank	■ Dermal contact and / or incidental ingestion with contaminated soils.	<ul style="list-style-type: none"> <li>■ Current and future site users.</li> <li>■ Workers carrying out development, installation or maintenance works within the site</li> </ul>	■ Low	<ul style="list-style-type: none"> <li>■ While generally a low risk to current receptors, further assessment of potential CoPCs associated with the onsite septic tank (microbes / pathogens etc.) should be undertaken to enable remedial planning for the Site to be finalised and (where necessary) enable offsite disposal of materials following excavation / removal of the septic tank.</li> </ul>
	■ Inhalation of contaminated dust.	<ul style="list-style-type: none"> <li>■ Current and future site users</li> <li>■ Workers doing works involving movement / handling etc. of stockpiled materials</li> </ul>	■ Low	
	■ Transport of contamination through surface water flows.	<ul style="list-style-type: none"> <li>■ Adjacent sensitive ecological receptors.</li> <li>■ Current and future site users.</li> <li>■ Workers carrying out development, installation or maintenance works within the site.</li> </ul>	■ Low	
	■ Transport of contamination to underlying groundwater aquifers	<ul style="list-style-type: none"> <li>■ Adjacent sensitive ecological receptors.</li> <li>■ Future potential on-site / offsite users of groundwater</li> <li>■ Workers carrying out development, installation or maintenance works within the site.</li> </ul>	■ Moderate	

Potential Sources	Pathways	Potential Receptors	Risk of Potentially Complete Pollutant Linkage	Comment
	<ul style="list-style-type: none"> <li>■ Transport of contaminants through mechanical transport</li> </ul>	<ul style="list-style-type: none"> <li>■ Adjacent sensitive ecological receptors.</li> <li>■ Future potential on-site / offsite users of groundwater</li> <li>■ Workers carrying out development, installation or maintenance works within the site.</li> </ul>	<ul style="list-style-type: none"> <li>■ Moderate</li> </ul>	
<b>Soak Pit / Chemical Storage Infrastructure</b>	<ul style="list-style-type: none"> <li>■ Dermal contact and / or incidental ingestion with contaminated soils.</li> </ul>	<ul style="list-style-type: none"> <li>■ Current and future site users.</li> <li>■ Workers carrying out development, installation or maintenance works within the site</li> </ul>	<ul style="list-style-type: none"> <li>■ Moderate</li> </ul>	<ul style="list-style-type: none"> <li>■ While previous investigations did not identify elevated concentrations of CoPCs within the main compound area during the assessment of groundwater further assessment of soil and groundwater within the former soak pit / chemical storage area should be undertaken in consideration of potential chemicals that may have been used / stored within the Site.</li> <li>■ Due to the identified PFAS within surface waters / sediments onsite PFAS should be considered within this portion of the Site as it may have been historically stored onsite.</li> </ul>
	<ul style="list-style-type: none"> <li>■ Inhalation of contaminated dust.</li> </ul>	<ul style="list-style-type: none"> <li>■ Current and future site users</li> <li>■ Workers doing works involving movement / handling etc. of stockpiled materials</li> </ul>	<ul style="list-style-type: none"> <li>■ Low - Moderate</li> </ul>	
	<ul style="list-style-type: none"> <li>■ Transport of contamination through surface water flows.</li> </ul>	<ul style="list-style-type: none"> <li>■ Adjacent sensitive ecological receptors.</li> <li>■ Current and future site users.</li> <li>■ Workers carrying out development, installation or maintenance works within the site.</li> </ul>	<ul style="list-style-type: none"> <li>■ Low - Moderate</li> </ul>	
	<ul style="list-style-type: none"> <li>■ Transport of contamination to underlying groundwater aquifers</li> </ul>	<ul style="list-style-type: none"> <li>■ Adjacent sensitive ecological receptors.</li> <li>■ Future potential on-site / offsite users of groundwater</li> </ul>	<ul style="list-style-type: none"> <li>■ Moderate</li> </ul>	
	<ul style="list-style-type: none"> <li>■ Transport of contaminants through mechanical transport</li> </ul>	<ul style="list-style-type: none"> <li>■ Workers carrying out development, installation or maintenance works within the site.</li> </ul>	<ul style="list-style-type: none"> <li>■ Moderate</li> </ul>	
<b>Asbestos service pits / conduits</b>	<ul style="list-style-type: none"> <li>■ Dermal contact and / or incidental ingestion with contaminated soils.</li> </ul>	<ul style="list-style-type: none"> <li>■ Current and future site users.</li> <li>■ Workers carrying out development, installation or maintenance works within the site</li> </ul>	<ul style="list-style-type: none"> <li>■ Moderate</li> </ul>	<ul style="list-style-type: none"> <li>■ Previous investigations identified the potential for ACM to be present within onsite service pits / conduits.</li> </ul>

Potential Sources	Pathways	Potential Receptors	Risk of Potentially Complete Pollutant Linkage	Comment
	■ Inhalation of contaminated dust.	■ Current and future site users ■ Workers doing works involving movement / handling etc. of stockpiled materials	■ Moderate	■ To aid in remedial planning for the Site, an assessment of onsite service conduits should be undertaken to assess the potential for hazardous materials (ACM) to be present within pits and underground pipes / conduits.
	■ Transport of contamination through surface water flows.	■ Adjacent sensitive ecological receptors. ■ Current and future site users. ■ Workers carrying out development, installation or maintenance works within the site.	■ Low	
	■ Transport of contamination to underlying groundwater aquifers	■ Adjacent sensitive ecological receptors. ■ Future potential on-site / offsite users of groundwater	■ Low	
	■ Transport of contaminants through mechanical transport	■ Workers carrying out development, installation or maintenance works within the site.	■ Moderate	
<b>Unexpected finds / buried waste / fill materials (General Site Area including filled gully)</b>	■ Dermal contact and / or incidental ingestion with contaminated soils.	■ Current and future site users. ■ Workers carrying out development, installation or maintenance works within the site	Moderate	■ Previous investigations and results from the site inspection undertaken as part of this assessment identified the potential for fill to be present within the Site including within Moore Gully located to the south of the Site. ■ Results from site observations made during this assessment, identified building rubble within fill located within Moore Gully and adjacent dams and as such the potential for additional ACM impacted soils should be considered. ■ Due to the potential future recreational uses of water within Moore Gully, ERM notes that further assessment of fill materials should be undertaken in consideration of a broad range
	■ Inhalation of contaminated dust.	■ Current and future site users ■ Workers doing works involving movement / handling etc. of stockpiled materials	Moderate	
	■ Transport of contamination through surface water flows.	■ Adjacent sensitive ecological receptors. ■ Current and future site users. ■ Workers carrying out development, installation or maintenance works within the site.	Moderate	

Potential Sources	Pathways	Potential Receptors	Risk of Potentially Complete Pollutant Linkage	Comment
	<ul style="list-style-type: none"> <li>Transport of contamination to underlying groundwater aquifers</li> </ul>	<ul style="list-style-type: none"> <li>Adjacent sensitive ecological receptors.</li> <li>Future potential on-site / offsite users of groundwater</li> </ul>	Moderate	of CoPCS to aid in the development of remedial planning for the Site and potential future management requirements to facilitate use of a portion of the Site.
	<ul style="list-style-type: none"> <li>Transport of contaminants through mechanical transport</li> </ul>	<ul style="list-style-type: none"> <li>Workers carrying out development, installation or maintenance works within the site</li> </ul>	Moderate	
Adjacent residential dwellings	<ul style="list-style-type: none"> <li>Dermal contact and / or incidental ingestion with contaminated soils.</li> </ul>	<ul style="list-style-type: none"> <li>Current and future site users.</li> <li>Workers carrying out development, installation or maintenance works within the site</li> </ul>	<ul style="list-style-type: none"> <li>Moderate</li> </ul>	<ul style="list-style-type: none"> <li>ERM notes that no assessment has been undertaken within the residential dwellings located immediately adjacent to the Site.</li> <li>ERM notes that as the risk of significant and / or widespread contamination within these properties is likely to be moderate, due to the age of the structures and the nature of rural residential landuse that may be undertaken, further assessment is recommended to assess the potential for contamination to be present.</li> <li>Consideration should be given to the range of potential land uses undertaken within these sites (agricultural / vehicle maintenance / chemical storage etc.) and the potential for hazardous building materials to be present.</li> </ul>
	<ul style="list-style-type: none"> <li>Inhalation of contaminated dust.</li> </ul>	<ul style="list-style-type: none"> <li>Current and future site users</li> <li>Workers doing works involving movement / handling etc. of stockpiled materials</li> </ul>	<ul style="list-style-type: none"> <li>Moderate</li> </ul>	
	<ul style="list-style-type: none"> <li>Transport of contamination through surface water flows.</li> </ul>	<ul style="list-style-type: none"> <li>Adjacent sensitive ecological receptors.</li> <li>Current and future site users.</li> <li>Workers carrying out development, installation or maintenance works within the site.</li> </ul>	<ul style="list-style-type: none"> <li>Moderate</li> </ul>	
	<ul style="list-style-type: none"> <li>Transport of contamination to underlying groundwater aquifers</li> </ul>	<ul style="list-style-type: none"> <li>Adjacent sensitive ecological receptors.</li> <li>Future potential on-site / offsite users of groundwater</li> <li>Workers carrying out development, installation or maintenance works within the site.</li> </ul>	<ul style="list-style-type: none"> <li>Moderate</li> </ul>	

Potential Sources	Pathways	Potential Receptors	Risk of Potentially Complete Pollutant Linkage	Comment
	<ul style="list-style-type: none"><li>■ Transport of contaminants through mechanical transport</li></ul>	<ul style="list-style-type: none"><li>■ Adjacent sensitive ecological receptors.</li><li>■ Future potential on-site / offsite users of groundwater</li><li>■ Workers carrying out development, installation or maintenance works within the site.</li></ul>	<ul style="list-style-type: none"><li>■ Moderate</li></ul>	

### 13. QUALITATIVE EVALUATION OF ENVIRONMENTAL RISK

As outlined within the CSM presented above, ERM considers there may be a potential risk to human health / ecological receptors due to the following potentially complete pollutant linkages identified at the site:

- On site fuel storage:
- Hazardous building materials:
- Married Quarters - Identified asbestos surface impact
- Identified asbestos impacted stockpile
- General Site Area – PFAS
- Septic tank
- Soak Pit / Chemical Storage Infrastructure

Based on information reviewed as part of this assessment, it is the opinion of ERM that further investigation is required to assess the potential risk to human health and sensitive ecological receptors associated with current land uses and potential future land uses detailed within the current concept design.

ERM recommends that a detailed site investigation (DSI) should be undertaken to assess the contamination status of the site, further characterise volumes of fill materials within the Site that may require management and / or remediation and aid in the planning for future development works (offsite disposal, site management requirements etc.).

While the specific requirements of the investigation are documented within the SAQP, ERM notes that the DSI should be undertaken in consideration of previous investigations undertaken within the Site and the identified contaminants of potential concern (CoPCs) and include an assessment of soil, sediment, surface water and groundwater as follows.

- a targeted sampling approach to assess potential point sources of contamination such as former fuel storage infrastructure, uncontrolled fill and contaminated soils / groundwater's associated identified onsite gully's / areas of fill etc.;
- a broad grid based approach throughout the site (in consideration of previous investigation locations) to supplement existing data sets;
- the collection of background samples to ensure collected results are assessed in consideration of naturally occurring conditions; and
- due to the potential for PFAS within surface water / sediments within Thompsons Creek and Moore Gully and the potential planned future re-use of surface water within the site for irrigation and recreational purposes future investigations should consider the potential use of surface waters in future development works.

## 14. CONCLUSIONS AND RECOMMENDATIONS

ERM was engaged by WPCA to undertake a PSI at the site identified as Stage 1 within the Aerotropolis Core Precinct Master Plan, located in Bringelly, NSW (the Site).

The objective of this assessment was to undertake a review of previously identified contamination issues and refine the current understanding of Site to aid WPCA in assessing potential liabilities and constraints associated with site contamination that may require consideration during master planning and subsequent development works.

Information provided to ERM as part of this investigation indicates that the current concept plan for the proposed redevelopment of the Site includes the following key features:

- The Moore Gully Billabongs, Thompson Park and a Waterfront Precinct located within the southern portion of the Site;
- Educational facilities, a metro plaza, green gateways and sports fields located within the central portion of the Site; and
- Manufacturing / industrial lands, CSIRO facility, TAFE / multiversity and hotel located within the northern portion of the Site.
- Proposed landscaping within the Site would include open water bodies for flood water storage / adaptive re-use, swimming and play area within the existing Moor Gully alignment and planted native vegetation throughout the Site.

To meet the project objective, ERM completed the following scope of works:

- Review of background information (previous investigations, relevant database searches relating to the site);
- Completion of targeted groundwater, surface water and sediment sampling to aid in refining the understanding of potential PFAS impacts;
- Development of a scope of works for future investigation works; and
- Development of initial Conceptual Remediation Costs.

The Site is located within an area surrounded by rural residential, low density residential and commercial / industrial development. At the time of this investigation the site was largely vacant with the exception of former Defence infrastructure located within the central portion of the Site.

- Information from previous investigations indicated that the current Commonwealth lands was first granted to private owners by the Crown in 1818. From this time until 1957 the site underwent various ownerships and was utilized for agricultural purposes. In 1957 the site was transferred to the Commonwealth of Australia. The site has been used for Department of Defence purposes as a radar installation since 1957 until prior to 2005.
- Results from the desktop assessment indicate that the site is primarily underlain by the Bringelly Shale and is described as shale, carbonaceous claystone, claystone, laminite, fine to medium grained lithic sandstone, rare coal and tuff from the Middle Triassic age. The remainder of the geology underlying the Site (along the south-eastern boundary of the Site) is described as fine-grained sand, silt and clay from the Quaternary age.
- Groundwater within the Site was identified during previous investigations and gauging undertaken as part of this investigation to be present at depths of approximately 2.5 – 7.5 m bgl.
- Previous investigations identified a range of potential contamination issues at the Site that require remediation and / or site management including former fuel storage USTs and asbestos impacted fill located within stockpiled fill to the south of the main compound and with the former married quarters.

- During the site inspection undertaken as part of this investigation, ERM noted the potential for additional fill material to be present within Moore Gully. Fill within this area was noted to contain bricks and other demolition wastes. ERM notes that no samples have been collected from this material to assess the potential for contamination to be present.
- Analytical results from collected sediment, surface water and groundwater samples as part of this investigation, returned concentrations of PFAS compounds less than LOR and / or the adopted assessment criteria with the exception of surface water samples SW2, SW8 and SW11 (located within the eastern portion of the Site) which exceeding the adopted drinking water criteria and the adopted 99% freshwater criteria.
- It is the opinion of ERM that these results are consistent with previous investigations of PFAS undertaken within the Western Environmental (2020) investigation. While the specific source of PFAS was unclear, the results of this investigation indicate the potential for PFAS to be migrating from offsite sources.
- ERM notes that further assessment of potential PFAS should be undertaken within the site to assess the potential for historical sources of PFAS to be located within the main compound area of the Site (chemical storage area / firefighting system etc.).

As outlined within the CSM, ERM considers there may be a potential risk to human health / ecological receptors due to a number of potentially complete pollutant linkages identified at the site.

- Based on information reviewed as part of this assessment, it is considered that further investigation is required to assess the potential risk to human health and sensitive ecological receptors associated with current land uses and potential future land uses detailed within the current concept design.
- ERM recommends that a detailed site investigation (DSI) should be undertaken to assess the contamination status of the site, further characterise volumes of fill materials within the Site that may require management and / or remediation and aid in the planning for future development works (offsite disposal, site management requirements etc.).

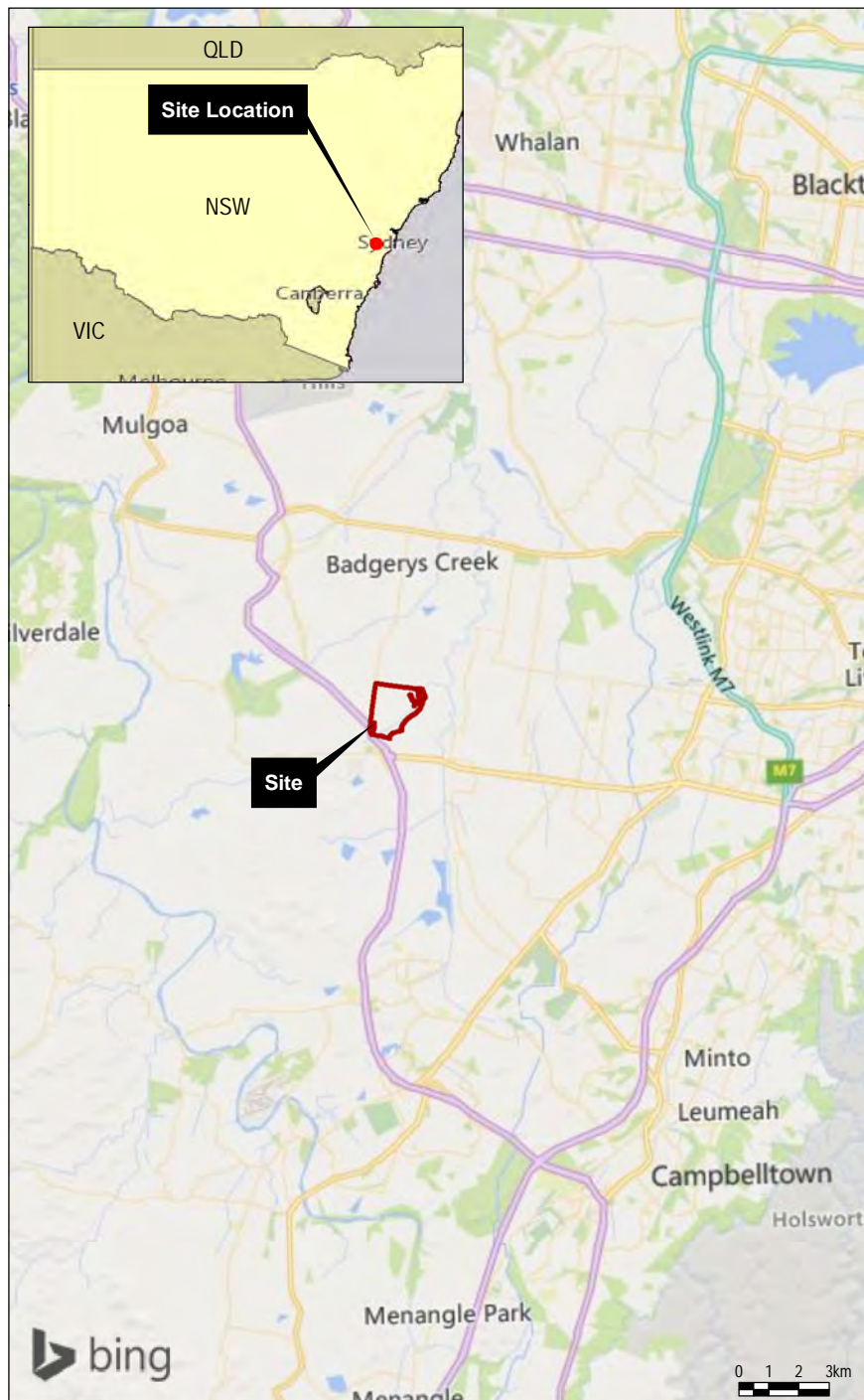
ERM notes that the DSI should be undertaken in consideration of previous investigations undertaken within the Site and the identified contaminants of potential concern (CoPCs) and include an assessment of soil, sediment, surface water and groundwater as follows.

- a targeted sampling approach to assess potential point sources of contamination such as former fuel storage infrastructure, uncontrolled fill and contaminated soils / groundwater's associated identified onsite gully's / areas of fill etc.;
- a broad grid based approach throughout the site (in consideration of previous investigation locations) to supplement existing data sets;
- the collection of background samples to ensure collected results are assessed in consideration of naturally occurring conditions; and
- due to the potential for PFAS within surface water / sediments within Thompsons Creek and Moore Gully and the potential planned future re-use of surface water within the site for irrigation and recreational purposes future investigations should consider the potential use of surface waters in future development works.

Based on the outcomes of this assessment, including the review of previous investigations, previous approved remediation plans and site audit statements, it is considered that the Site can be made suitable for the proposed development following further investigations and completion of any subsequent required remedial / site management works.



## **APPENDIX A      FIGURES**



#### Legend

- 215 Badgerys Creek Road (Commonwealth Land)
- Adjacent Residential Land
- Site Lots (Current)

Source:  
NSW DFSI - DCDB / DTDB  
Nearmap Imagery : Dec 2020

#### Site Location

Drawing No: 0571466m\_RoC\_G001\_R1.mxd  
Date: 03/02/2021  
Drawn By: GR / GC

Drawing Size: A4  
Reviewed By: IB

Coordinate System: GDA 1994 MGA Zone 56

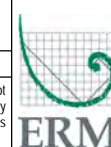
Western Sydney Aerotropolis Core Precinct  
Review of Contamination Issues

Client: Western Sydney Parkland Authority

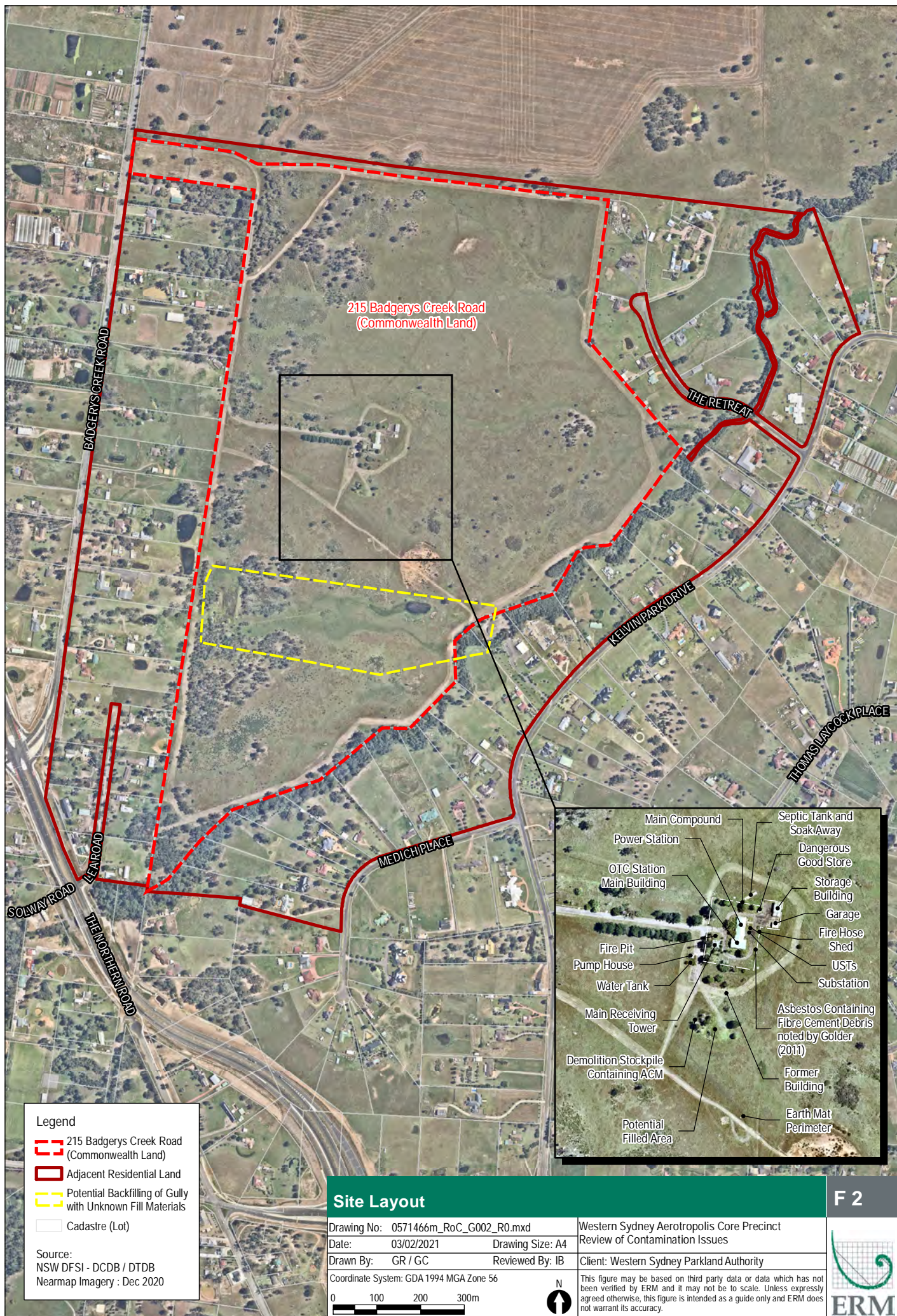
This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.



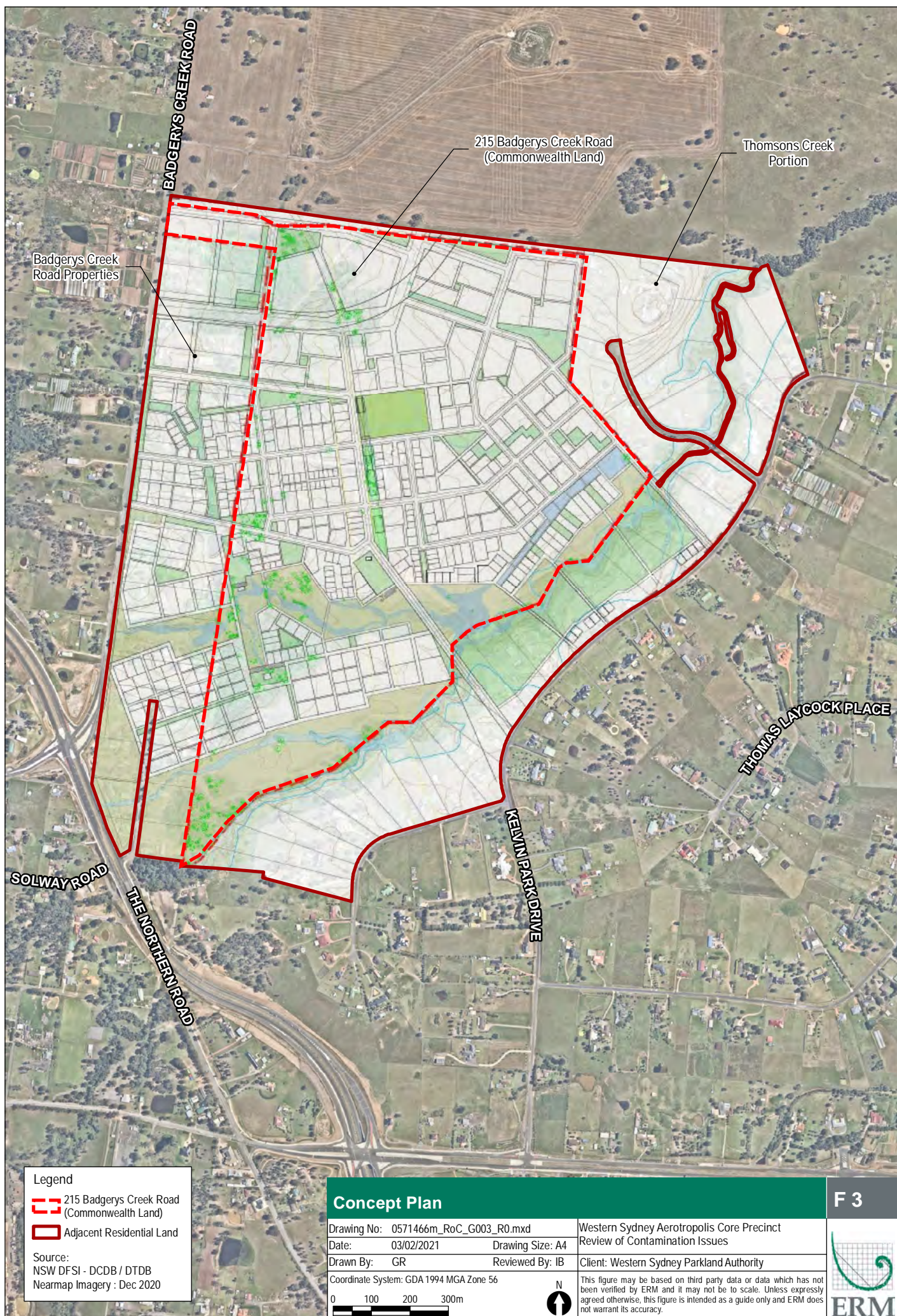
F 1





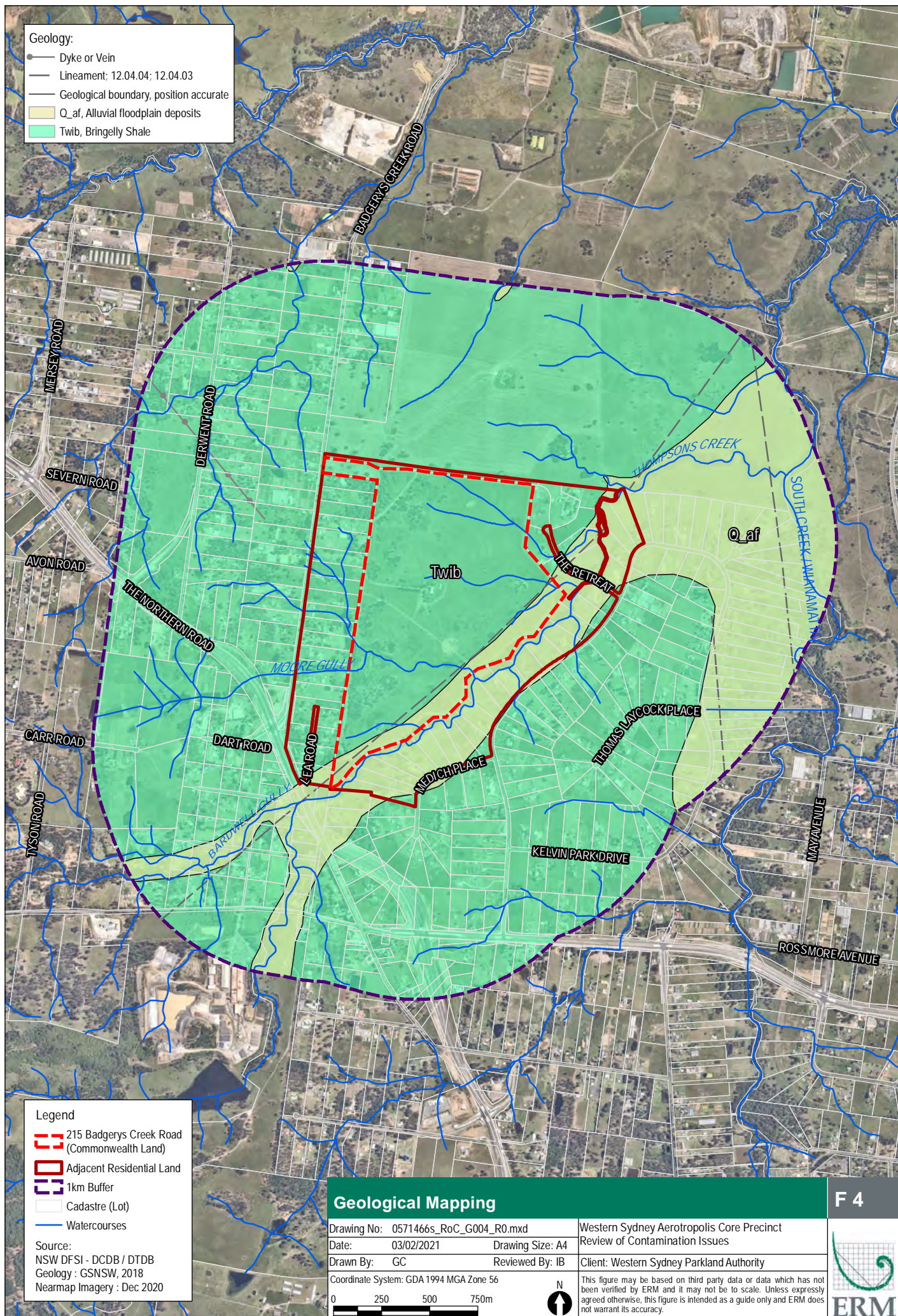




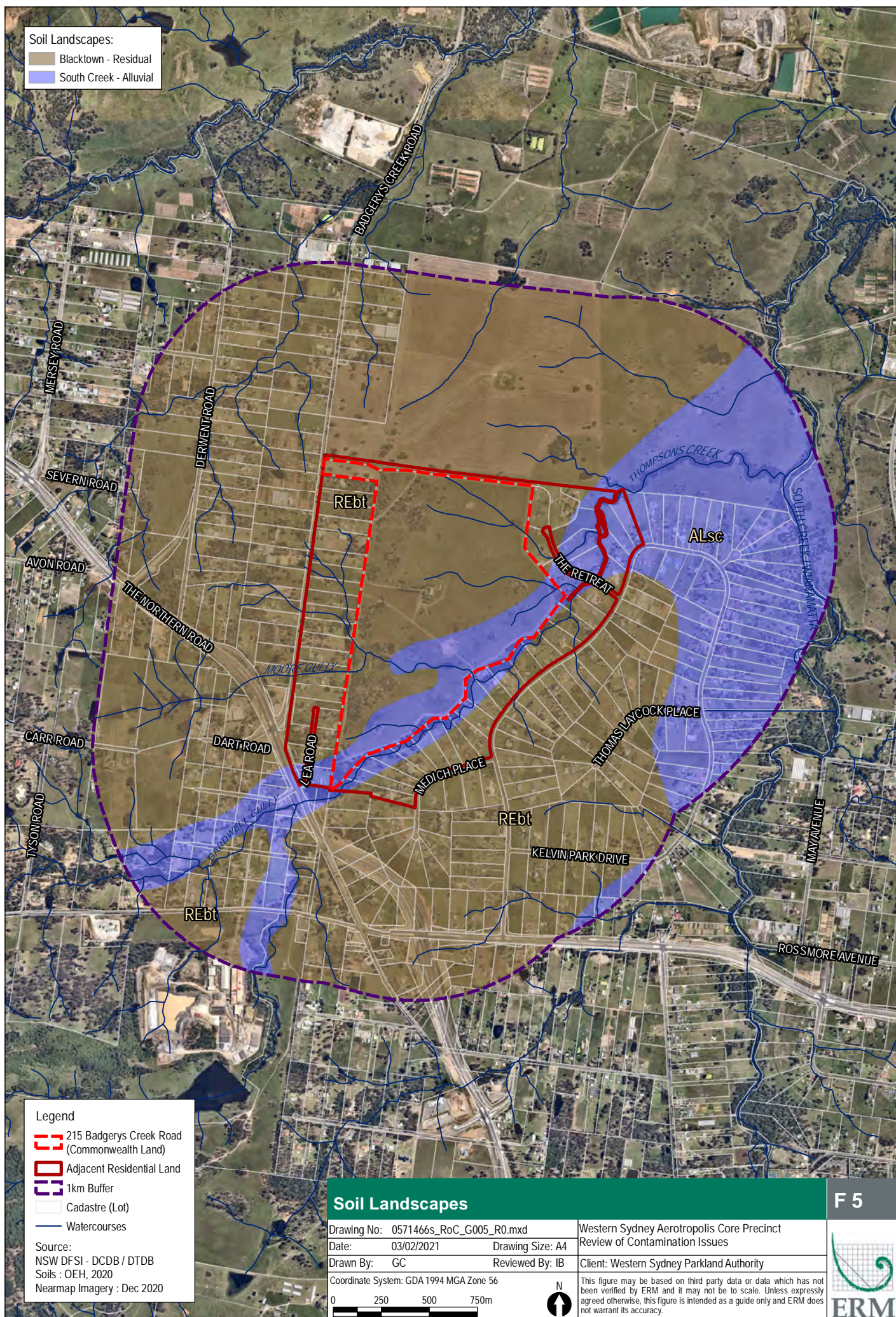


F 3









Soil Landscapes:

- Blacktown - Residual
- South Creek - Alluvial

#### Legend

- 215 Badgerys Creek Road (Commonwealth Land)
- Adjacent Residential Land
- 1km Buffer
- Cadastre (Lot)
- Watercourses

Source:  
NSW DFSI - DCDB / DTDB  
Soils : OEH, 2020  
Nearmap Imagery : Dec 2020

#### Soil Landscapes

Drawing No: 0571466s\_RoC\_G005\_R0.mxd

Date: 03/02/2021

Drawn By: GC

Coordinate System: GDA 1994 MGA Zone 56

0 250 500 750m

Drawing Size: A4

Reviewed By: IB

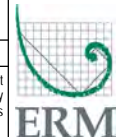


Western Sydney Aerotropolis Core Precinct  
Review of Contamination Issues

Client: Western Sydney Parkland Authority

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F 5







F 6





#### Legend

- 215 Badgerys Creek Road (Commonwealth Land)
- Adjacent Residential Land
- 1km Buffer
- Cadastral (Lot)
- Watercourses
- Water Areas

Source:  
NSW DFSI - DCDB / DTDB  
Nearmap Imagery : Dec 2020

#### Hydrology

Drawing No: 0571466s\_RoC\_G007\_R0.mxd

Date: 03/02/2021

Drawn By: GC

Drawing Size: A4

Reviewed By: IB

Coordinate System: GDA 1994 MGA Zone 56

0 250 500 750m

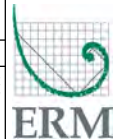


Western Sydney Aerotropolis Core Precinct  
Review of Contamination Issues

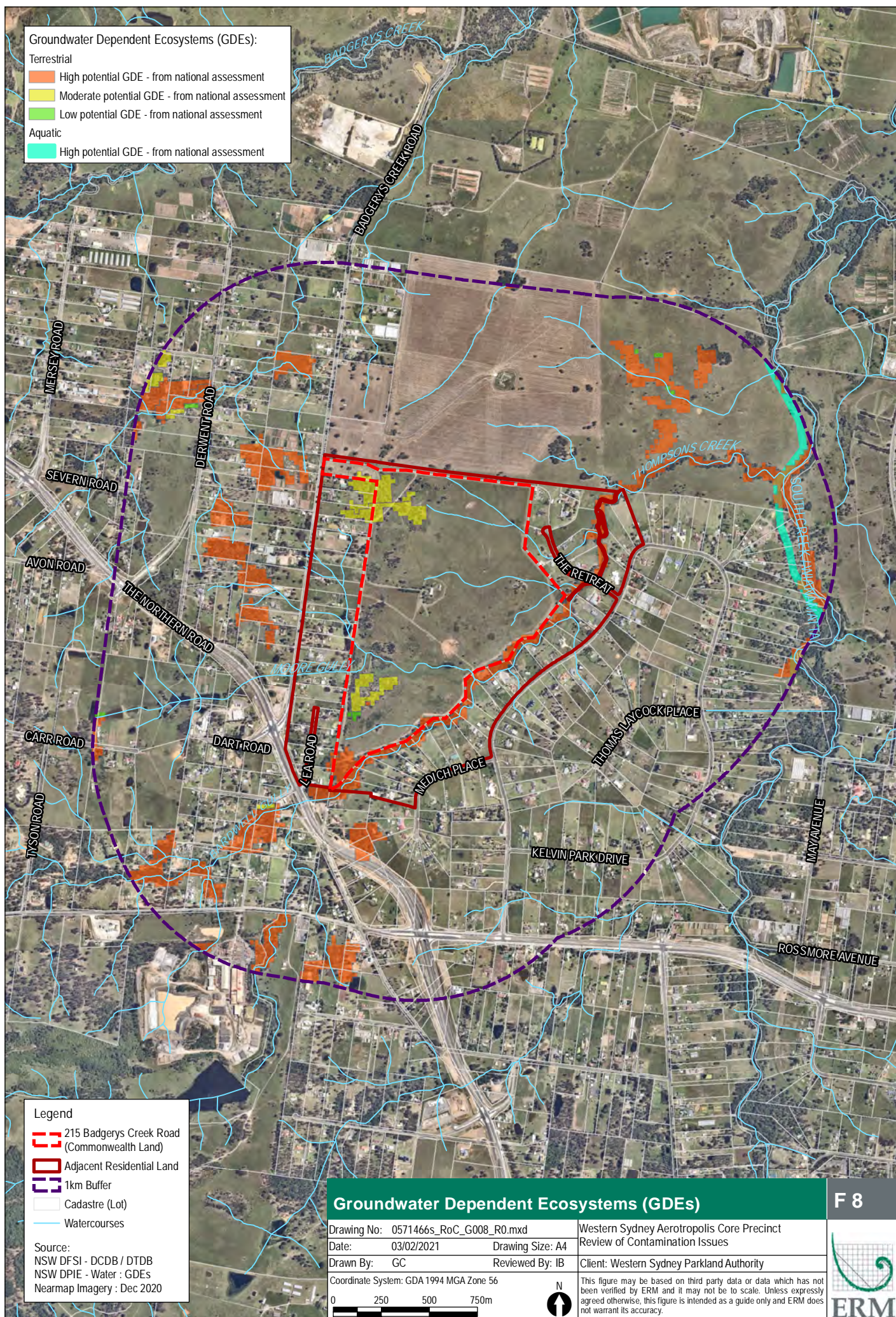
Client: Western Sydney Parkland Authority

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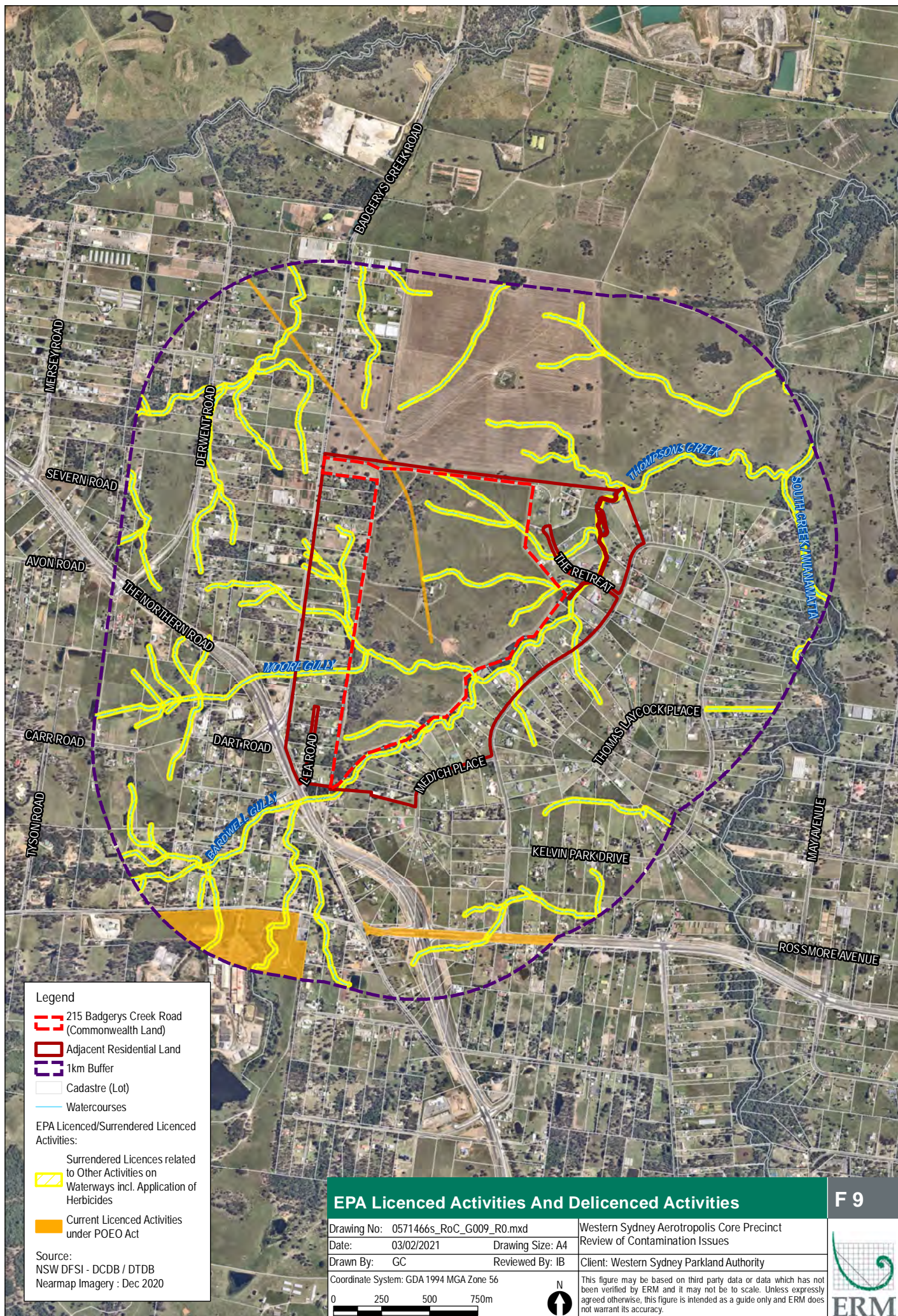
F 7



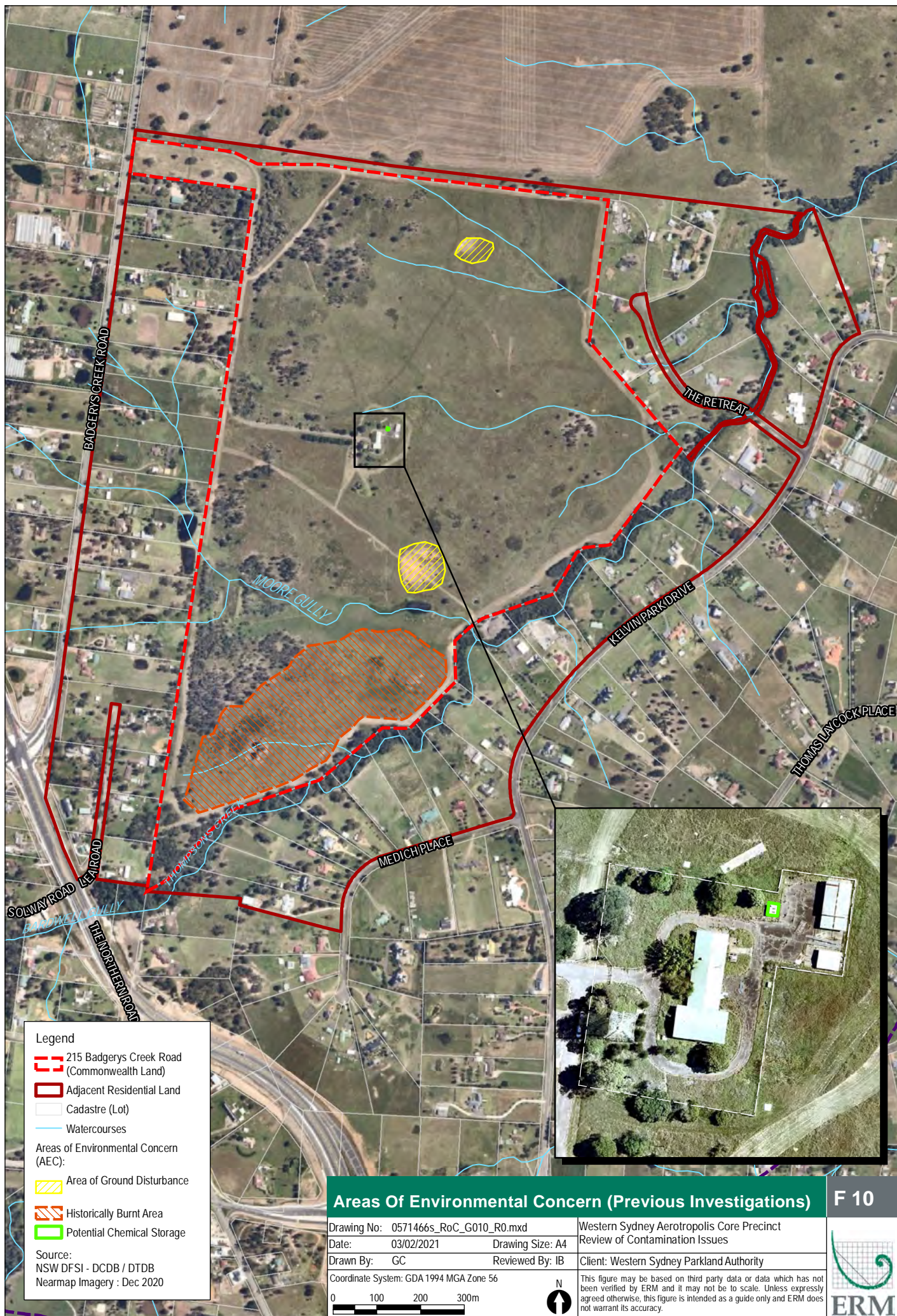




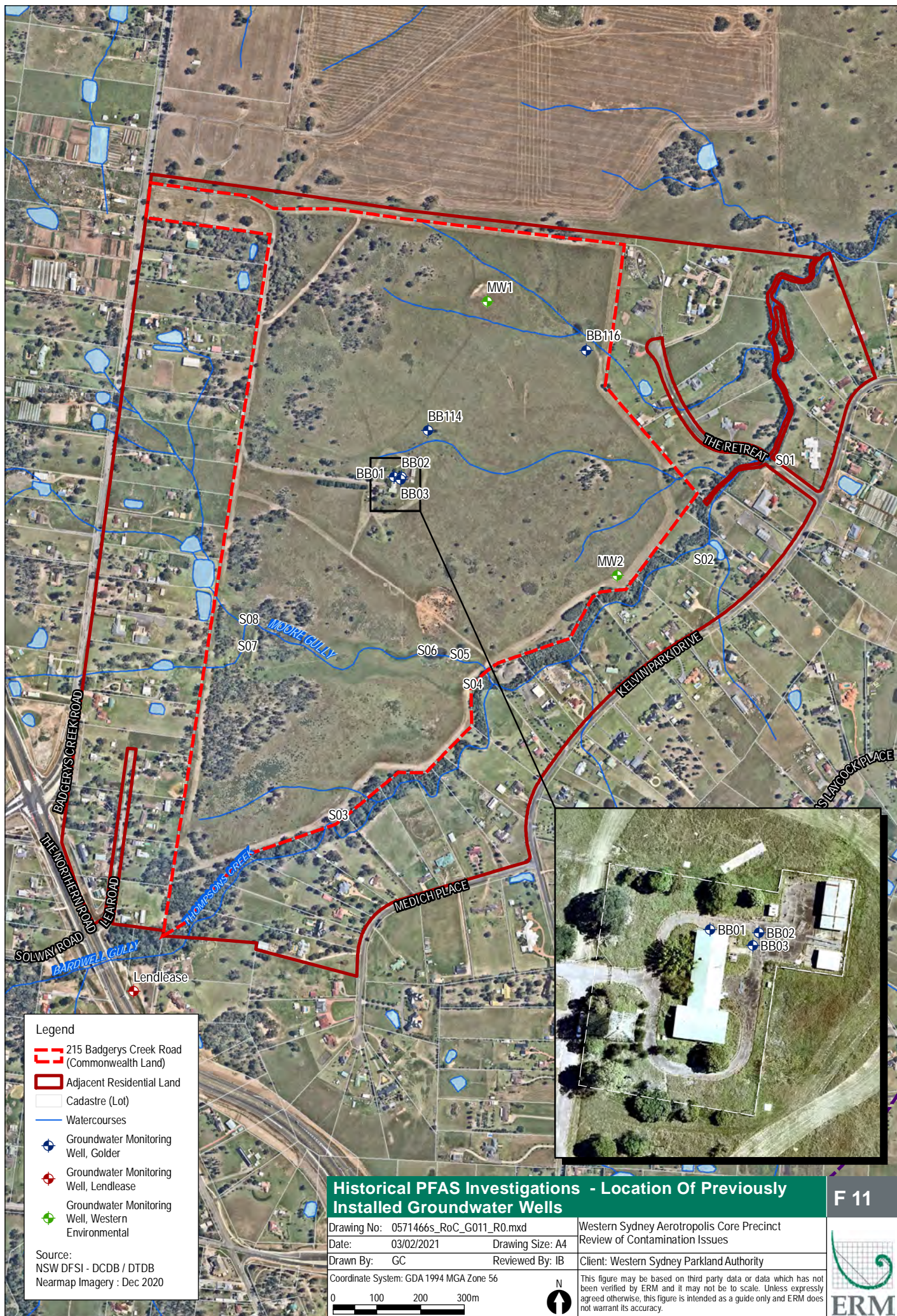




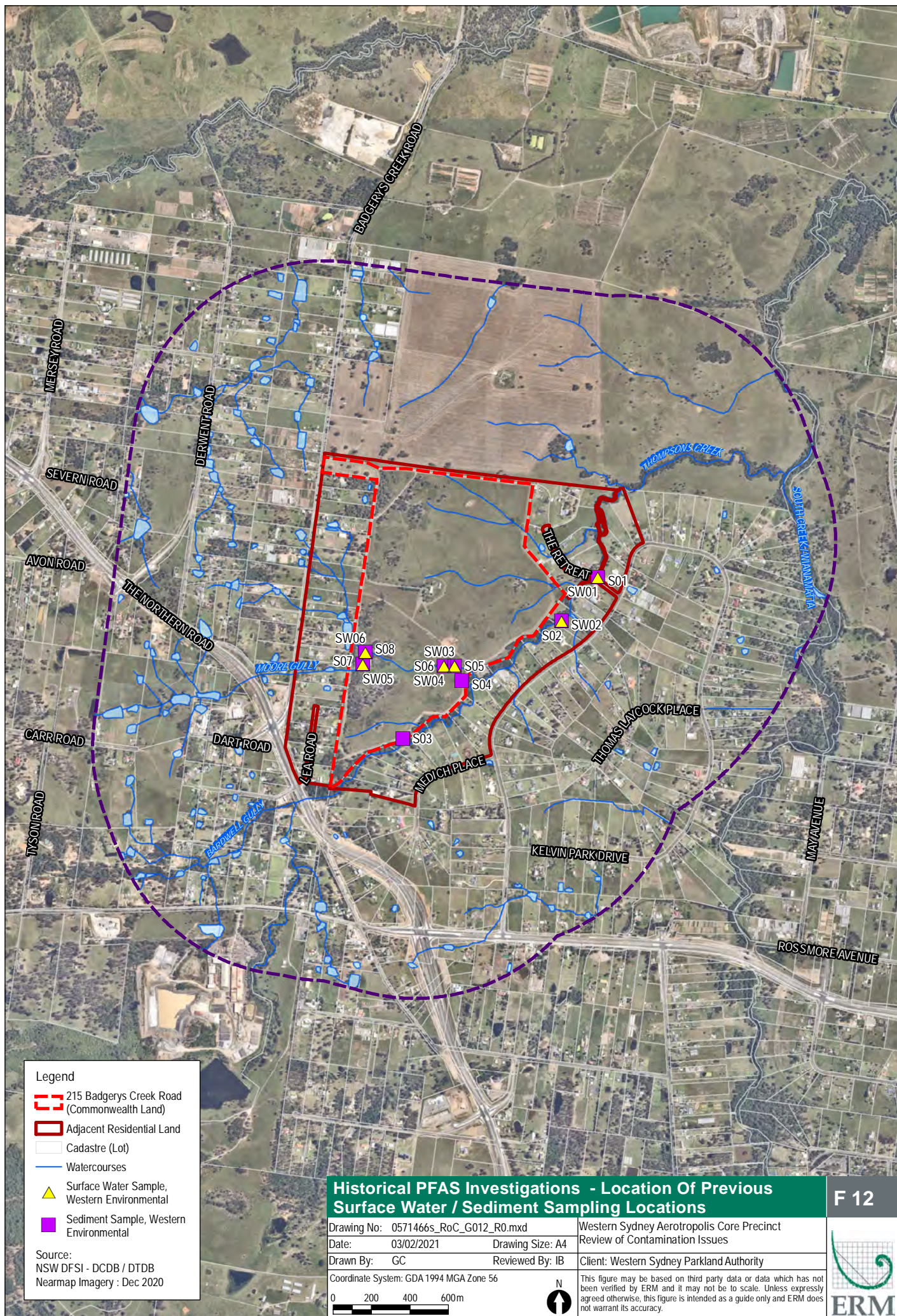




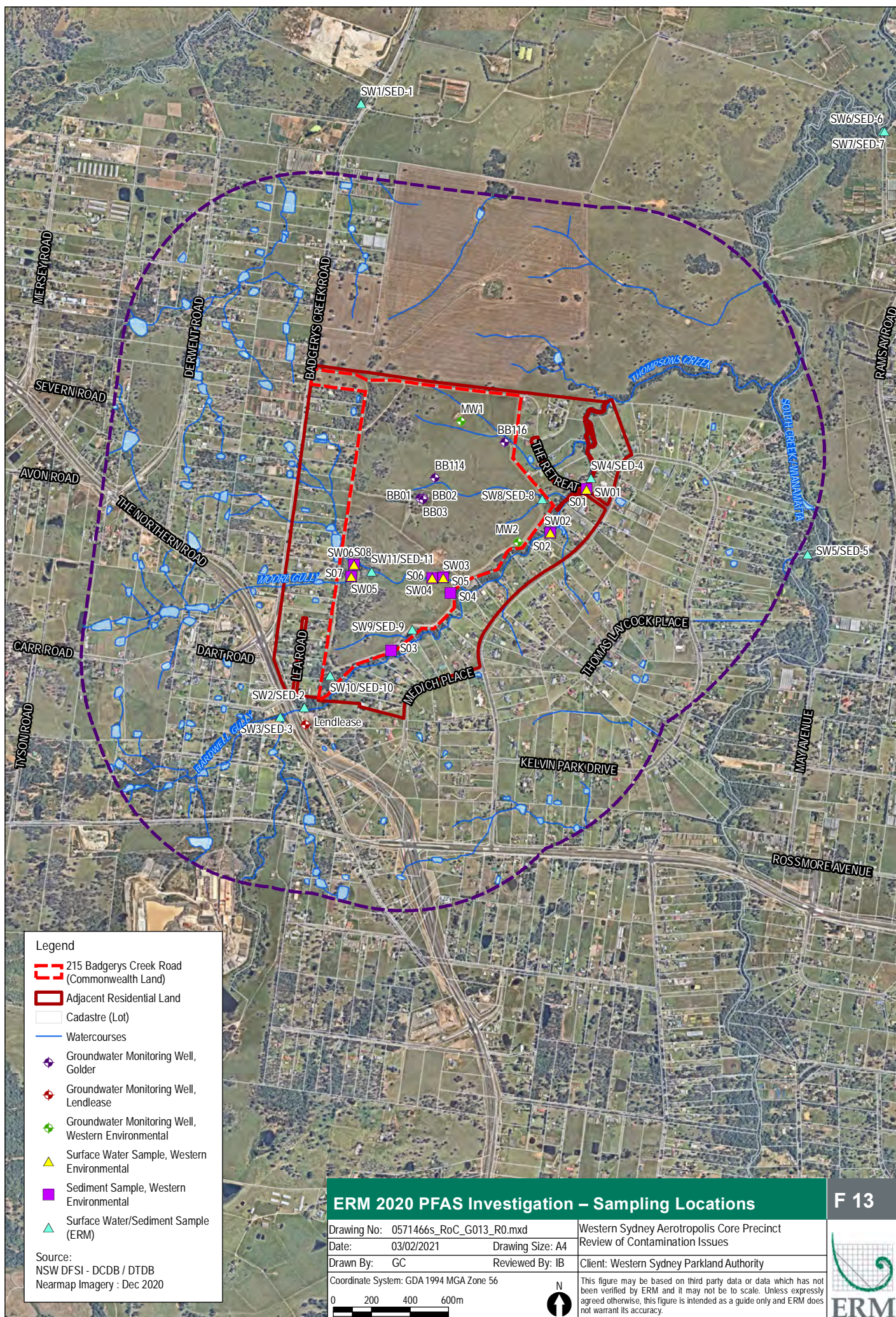




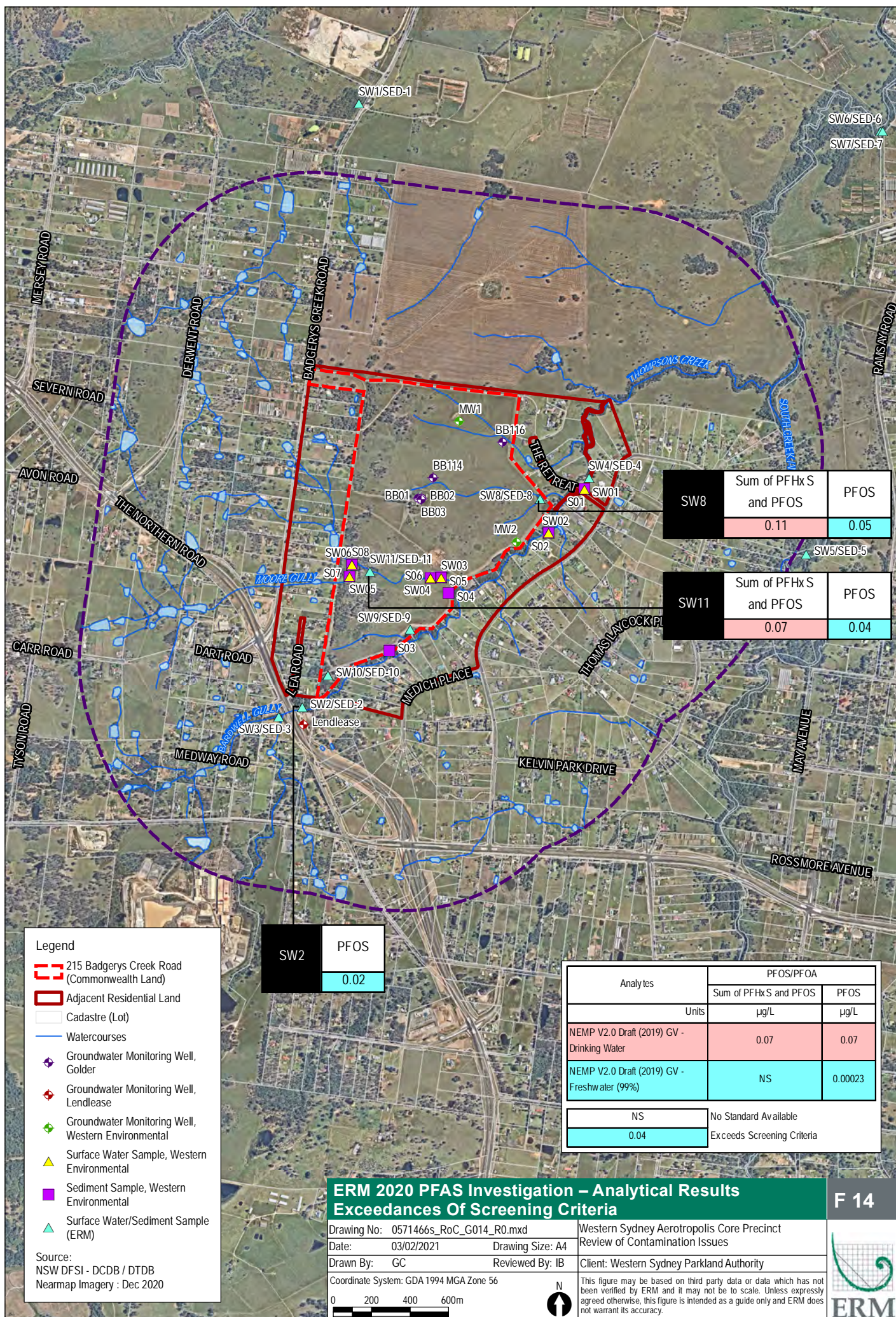












SW8	Sum of PFHx S and PFOS	PFOS
	0.11	0.05

SW11	Sum of PFHx S and PFOS	PFOS
	0.07	0.04

SW2	PFOS
	0.02

Analytes	PFOS/PFOA	
	Sum of PFHx S and PFOS	PFOS
Units	µg/L	µg/L
NEMP V2.0 Draft (2019) GV - Drinking Water	0.07	0.07
NEMP V2.0 Draft (2019) GV - Freshwater (99%)	NS	0.00023
NS	No Standard Available	
0.04	Exceeds Screening Criteria	

## ERM 2020 PFAS Investigation – Analytical Results Exceedances Of Screening Criteria

F 14

Drawing No: 0571466s\_RoC\_G014\_R0.mxd

Date: 03/02/2021

Drawn By: GC

Coordinate System: GDA 1994 MGA Zone 56

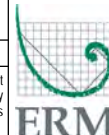
Drawing Size: A4

Reviewed By: IB

Western Sydney Aerotropolis Core Precinct  
Review of Contamination Issues

Client: Western Sydney Parkland Authority

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### Legend

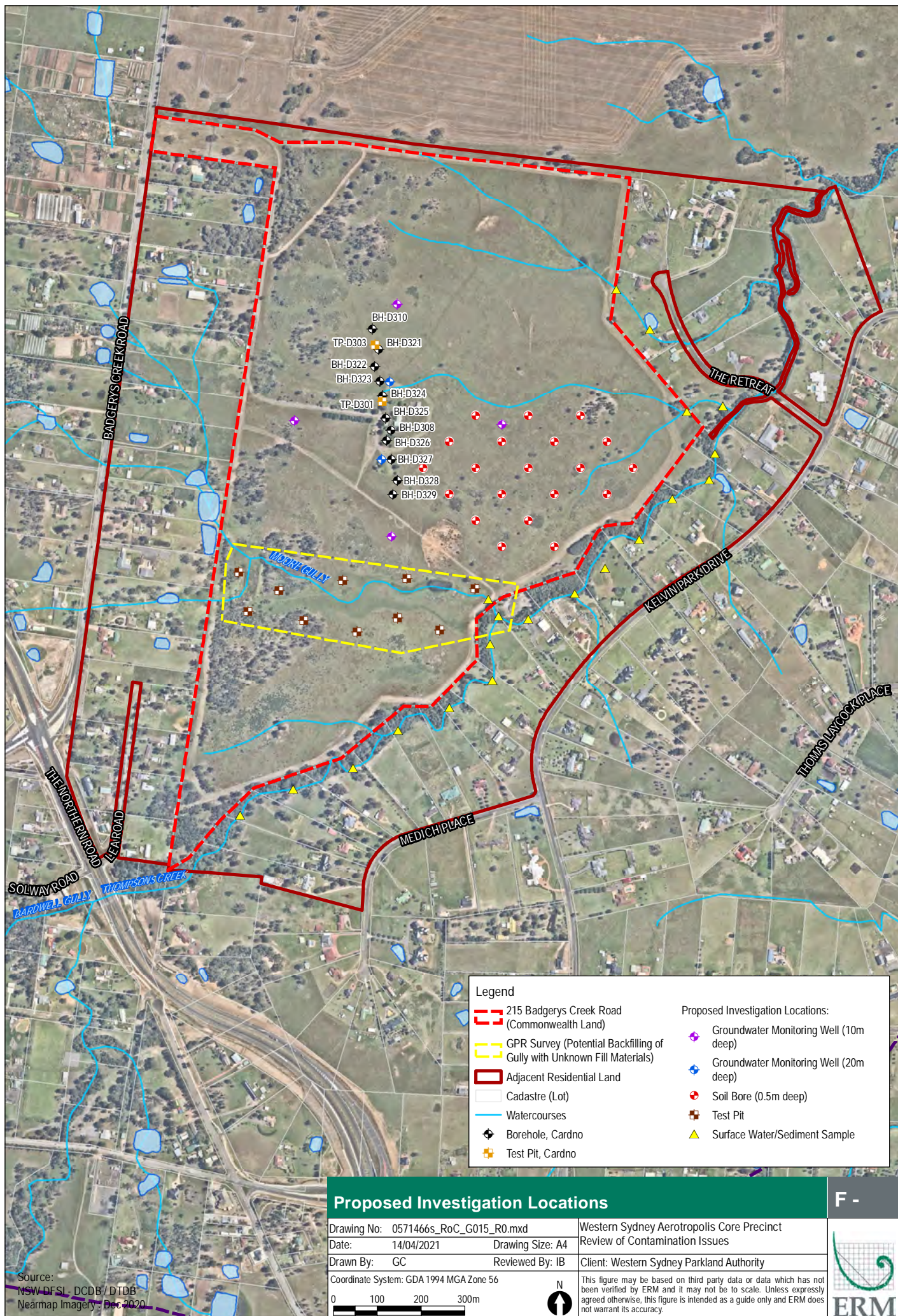
- 215 Badgerys Creek Road (Commonwealth Land)
- Adjacent Residential Land
- Cadastral (Lot)
- Watercourses
- Groundwater Monitoring Well, Golder
- Groundwater Monitoring Well, Lendlease
- Groundwater Monitoring Well, Western Environmental
- Surface Water Sample, Western Environmental
- Sediment Sample, Western Environmental
- Surface Water/Sediment Sample (ERM)

Source:  
NSW DFSI - DCDB / DTDB  
Nearmap Imagery : Dec 2020

0 200 400 600m









Point ID	Easting	Northing
1	290818.07	6243293.44
2	290805.98	6243281.13
3	290775.98	6243281.50
4	290743.53	6243281.90
5	290701.30	6243246.81
6	290623.67	6243182.29
7	290601.29	6243163.70
8	290510.10	6243132.41
9	290400.86	6243094.92
10	290397.61	6243091.80
11	290334.95	6243031.87
12	290324.38	6243021.76
13	290282.20	6242970.99
14	290253.02	6242935.87
15	290204.76	6242907.64
16	290206.83	6242920.49
17	290222.21	6243019.92
18	290237.58	6243119.29
19	290252.95	6243218.66
20	290268.32	6243318.03
21	290274.51	6243357.95
22	290286.25	6243433.71
23	290304.25	6243550.05
24	290315.66	6243623.73
25	290327.00	6243697.02
26	290338.29	6243769.93
27	290349.52	6243842.46
28	290360.70	6243914.67
29	290371.81	6243986.47
30	290382.87	6244057.90
31	290393.87	6244128.98
32	290406.88	6244213.00
33	290409.49	6244230.95
34	290419.75	6244301.42
35	290429.98	6244371.69
36	290440.19	6244441.81
37	290450.37	6244511.74
38	290166.03	6244550.15
39	290176.80	6244629.77
40	290402.29	6244599.09
41	290459.12	6244571.08
42	290601.84	6244570.54
43	290761.04	6244547.30
44	291227.24	6244492.77
45	291260.17	6244489.09
46	291232.14	6244281.29
47	291216.49	6244165.26
48	291299.10	6244068.83
49	291426.78	6243919.48
50	291396.94	6243879.35
51	291333.69	6243794.25
52	291329.89	6243789.18
53	291285.96	6243730.04
54	291264.00	6243700.50
55	291205.58	6243694.85
56	291193.26	6243686.30
57	291187.16	6243682.06
58	291135.13	6243588.18
59	291020.08	6243548.84
60	290972.17	6243532.46
61	290947.04	6243515.06
62	290942.05	6243510.62
63	290909.22	6243481.39
64	290910.80	6243388.01
65	290845.22	6243321.13

#### Legend

- 215 Badgerys Creek Road (Commonwealth Land)
- Adjacent Residential Land
- Potential Backfilling of Gully with Unknown Fill Materials
- Cadastre (Lot)

Source:  
NSW DFSI - DCDB / DTDB  
Nearmap Imagery : Dec 2020

#### Site Layout

Drawing No: 0571466s\_RoC\_G016\_R0.mxd  
Date: 17/06/2021  
Drawn By: GC  
Coordinate System: GDA 1994 MGA Zone 56

Drawing Size: A4  
Reviewed By: IB

Western Sydney Aerotropolis Core Precinct  
Client: Western Sydney Parkland Authority

0 100 200 300m



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F 1



## **APPENDIX B      TABLES**





Table X. [Matrix\_Type] Summary - [Analytes]  
WPCA Badgerys Creek Rd  
WPCA Monitoring 2020 - [Project\_ID]

					PFOS/PFOA																																	Inorganics			
					10:2 Fluorotelomer sulfonic acid (10:2 FTS)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	N-ethyl-perfluorooctanesulfonamidoacetic acid	N-methyl-perfluorooctane sulfonamidoacetic acid	N-Methyl-perfluorooctanesulfonamidoethanol	Perfluorobutanoic acid (PFBA)	Perfluorodecanesulfonic acid (PFDS)	Perfluorohexane sulfonic acid (PFHpS)	Perfluorononanesulfonic acid (PFNS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluoropentanoic acid (PFPeA)	Perfluoropropanesulfonic acid (PFPrS)	Sum of PFAS	Sum of PFAS (WA DER List)	Sum of PFHxS and PFOS	Perfluorodecanoic acid (PFDA)	Perfluorohexanoic acid (PFHxA)	N-Ethyl perfluorooctane sulfonamide (NEFOSA)	N-ethyl-perfluorooctanesulfonamidoethanol (NEHFOSE)	N-Methyl perfluorooctane sulfonamide (NMeFOSA)	Perfluorobutane sulfonic acid (PFBS)	Perfluorooctanesulfonic acid (PFOS)	Perfluorododecanoic acid (PFDoDA)	Perfluorohexanoic acid (PFHpA)	Perfluorohexane sulfonic acid (PFHxS)	Perfluorononanoic acid (PFNA)	Perfluorooctane sulfonamide (PFOSA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTriDA)	Perfluoroundecanoic acid (PFUnDA)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	Perfluorooctanoic acid (PFOA)	Moisture Content (dried @ 103°C)			
					ug/kg	ug/kg	ug/kg	ug/kg	mg/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	%		
EQL					5	5	10	10	0.005	5	5	5	5	5	5	5	50	10	20000	5	5	5	5	5	0.005	0.005	5	5	5	5	5	5	5	5	5	5	0.005	0.01	0.005	1	
NEMP V2.0 Draft (2019) HGV - Industrial/commercial																		20000																			50				
NEMP V2.0 Draft (2019) HGV - Public open space																		1000																			10				
Field ID	LocCode	Sample Depth Range	Sampled Date-Time	Lab Report Number	<5	<5	<10	<10	<0.005	<5	<5	<5	<5	<5	<5	<5	<50	<10	<5	<5	<5	<5	<5	<0.005	<0.005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<0.005	<0.01	<0.005	12		
D02_20201210	SED-6		10/12/2020	763324	<5	<5	<10	<10	<0.005	<5	<5	<5	<5	<5	<5	<5	<50	<10	<5	<5	<5	<5	<5	<0.005	<0.005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<0.005	<0.01	<0.005	56	
SED-1	SED-1		10/12/2020	763324	<5	<5	<10	<10	<0.005	<5	<5	<5	<5	<5	<5	<5	<50	<10	<5	<5	<5	<5	<5	<0.005	<0.005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<0.005	<0.01	<0.005	69	
SED-10	SED-10		11/12/2020	763324	<5	<5	<10	<10	<0.005	<5	<5	<5	<5	<5	<5	<5	<50	<10	<5	<5	<5	<5	<5	<0.005	<0.005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<0.005	<0.01	<0.005	43	
SED-2	SED-2		10/12/2020	763324	<5	<5	<10	<10	<0.005	<5	<5	<5	<5	<5	<5	<5	<50	<10	<5	<5	<5	<5	<5	<0.005	<0.005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<0.005	<0.01	<0.005	48	
SED-3	SED-3		10/12/2020	763324	<5	<5	<10	<10	<0.005	<5	<5	<5	<5	<5	<5	<5	<50	<10	<5	<5	<5	<5	<5	<0.005	<0.005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<0.005	<0.01	<0.005	58	
SED-4	SED-4		10/12/2020	763324	<5	<5	<10	<10	<0.005	<5	<5	<5	<5	<5	<5	<5	<50	<10	<5	<5	<5	<5	<5	<0.005	<0.005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<0.005	<0.01	<0.005	69	
SED-5	SED-5		10/12/2020	763324	<5	<5	<10	<10	<0.005	<5	<5	<5	<5	<5	<5	<5	<50	<10	<5	<5	<5	<5	<5	<0.005	<0.005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<0.005	<0.01	<0.005	72	
SED-6	SED-6		10/12/2020	763324	<5	<5	<10	<10	<0.005	<5	<5	<5	<5	<5	<5	<5	<50	<10	<5	<5	<5	<5	<5	<0.005	<0.005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<0.005	<0.01	<0.005	24	
SED-7	SED-7		10/12/2020	763324	<5	<5	<10	<10	<0.005	<5	<5	<5	<5	<5	<5	<5	<50	<10	<5	<5	<5	<5	<5	<0.005	<0.005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<0.005	<0.01	<0.005	38	
SED-8	SED-8		10/12/2020	763324	<5	<5	<10	<10	<0.005	<5	<5	<5	<5	<5	<5	<5	<50	<10	<5	<5	<5	<5	<5	<0.005	<0.005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<0.005	<0.01	<0.005	43	
SED-9	SED-9		10/12/2020	763324	<5	<5	<10	<10	<0.005	<5	<5	<5	<5	<5	<5	<5	<50	<10	<5	<5	<5	<5	<5	<0.005	<0.005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<0.005	<0.01	<0.005	43	
Statistical Summary																																									
Number of Results					11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11		
Number of Detects					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	
Minimum Concentration					<5	<5	<10	<10	<0.005	<5	<5	<5	<5	<5	<5	<5	<5	<50	<10	<5	<5	<5	<5	<5	<0.005	<0.005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<0.005	<0.01	<0.005	12	
Minimum Detect					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	12
Maximum Concentration					<5	<5	<10	<10	<0.005	<5	<5	<5	<5	<5	<5	<5	<5	<50	<10	<5	<5	<5	<5	<5	<0.005	<0.005	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<0.005	<0.01	<0.005	72	
Maximum Detect					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	72
Average Concentration					2.5	2.5	5	5	0.0025	2.5	2.5	2.5	2.5	2.5	2.5	2.5	25	5	2.5	2.5	2.5	2.5	2.5	2.5	0.0025	0.0025	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0025	0.005	0.0025	48	
Median Concentration					2.5	2.5	5	5	0.0025	2.5	2.5	2.5	2.5	2.5	2.5	25	5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0025	0.0025	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	0.0025	0.005	0.0025	48	
Standard Deviation					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19		
Number of Guideline Exceedances					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Number of Guideline Exceedances(Detects Only)					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		



Table X. [Matrix\_Type] Summary - [Analytes]  
WPCA Badgerys Creek Rd  
WPCA Monitoring 2020 - [Project\_ID]

[illegible][illegible][illegible]



Table X. [Matrix\_Type] Summary - [Analytes]  
WPCA Badgerys Creek Rd  
WPCA Monitoring 2020 - [Project\_ID]

			PFOS/PFOA																					
	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	Sum of US EPA PFAS (PFOS + PFOA)*	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	N-ethyl-perfluorooctanesulfonamidoacetic acid	N-methylperfluorooctane sulfonamidoacetic acid	N-Methylperfluorooctanesulfonamidoethanol	Perfluorobutanoic acid (PFBA)	Perfluorodecanesulfonic acid (PFDS)	Perfluorooheptane sulfonic acid (PFHpS)	Perfluorononanesulfonic acid (PFNS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluoropentanoic acid (PFPeA)	Perfluoropropanesulfonic acid (PFPrS)	Sum of PFAS	Sum of PFAS (WA DER List)	Sum of PFHxS and PFOS	Perfluorodecanoic acid (PFDA)	Perfluorohexanoic acid (PFHxA)	N-Ethyl perfluorooctane sulfonamide (NEFOSA)	N-ethylperfluorooctanesulfonamidoethanol (NEHFOSE)	N-Methyl perfluorooctane sulfonamide (NMeFOSA)	Perfluorobutane sulfonic acid (PFBS)	Perfluorooctanesulfonic acid (PFOS)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
EQL	0.01	0.01	0.01	0.01	0.05	0.05	0.05	0.05	0.01	0.01	0.00001	0.01	0.01	0.00001	0.1	0.05	0.01	0.01	0.01	0.05	0.05	0.05	0.01	0.00001

Field ID LocCode Sample Depth Range Sampled Date-Time Lab Report Number

SED-10	SED-10		10/12/2020	763324	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0	<0.01	<0.01	<0	<0.1	<0.05	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.01	<0
SED-11	SED-11		11/12/2020	763324	0.03	0.03	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0	<0.01	<0.01	<0	<0.1	<0.05	0.03	<0.01	<0.01	<0.05	<0.05	<0.05	<0.01	0
SED-2	SED-2		10/12/2020	763324	0.02	0.02	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0	<0.01	0.01	<0	<0.1	0.06	0.02	<0.01	0.03	<0.05	<0.05	<0.05	<0.01	0
SED-4	SED-4		10/12/2020	763324	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0	<0.01	<0.01	<0	<0.1	<0.05	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.01	<0
SED-6	SED-6		10/12/2020	763324	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0	<0.01	<0.01	<0	<0.1	<0.05	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.01	<0

Statistical Summary

Number of Results	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Number of Detects	2	2	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0	1	0	0	0	0	2
Minimum Concentration	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0	<0.01	<0.01	<0	<0.1	<0.05	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.01	<0
Minimum Detect	0.02	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	ND	ND	0.06	0.02	ND	0.03	ND	ND	ND	ND	ND
Maximum Concentration	0.03	0.03	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	0	<0.01	0.01	0	<0.1	0.06	0.03	<0.01	0.03	<0.05	<0.05	<0.05	<0.01	0
Maximum Detect	0.03	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	ND	ND	0.06	0.03	ND	0.03	ND	ND	ND	ND	ND
Average Concentration	0.013	0.013	0.005	0.005	0.025	0.025	0.025	0.025	0.005	0.005	0	0.005	0.006	0	0.05	0.032	0.013	0.005	0.01	0.025	0.025	0.025	0.005	0
Median Concentration	0.005	0.005	0.005	0.005	0.025	0.025	0.025	0.025	0.005	0.005	0	0.005	0.005	0	0.05	0.025	0.005	0.005	0.005	0.025	0.025	0.025	0.005	0
Standard Deviation	0.012	0.012	0	0	0	0	0	0	0	0	0	0	0	0.0022	0	0	0.016	0.012	0	0.011	0	0	0	0
Number of Guideline Exceedances	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Table X. [Matrix\_Type] Summary - [Analytes]  
WPCA Badgers Creek Rd  
WPCA Monitoring 2020 - [Project\_ID]

						Inorganics
				Perfluorododecanoic acid (PFDoDA)	µg/L	
				Perfluoroheptanoic acid (PFHpA)	µg/L	
				Perfluorohexane sulfonic acid (PFHxS)	µg/L	
				Perfluorononanoic acid (PFNA)	µg/L	
				Perfluorooctane sulfonamide (PFOSA)	µg/L	
				Perfluorotetradecanoic acid (PFTeDA)	µg/L	
				Perfluorobridgedecanoic acid (PFTrDA)	µg/L	
				Perfluoroundecanoic acid (PFUnDA)	µg/L	
				8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/L	
				6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/L	
				Perfluorooctanoic acid (PFOA)	mg/L	
EQL						COMMENT

Field ID	LocCode	Sample Depth Range	Sampled Date-Time	Lab Report Number												
SED-10	SED-10		10/12/2020	763324	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0	<0	<0	1
SED-11	SED-11		11/12/2020	763324	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0	<0	<0	4
SED-2	SED-2		10/12/2020	763324	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0	<0	<0	1
SED-4	SED-4		10/12/2020	763324	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0	<0	<0	1
SED-6	SED-6		10/12/2020	763324	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0	<0	<0	1

### Statistical Summary

[illegible]

Field Blanks (WATER)  
Filter: Lab\_Report\_Number in('763324')

Lab Report Number	763324	763324	763324	763325	763326
Field ID	R01_20201209	TB01	TB02	TB03	TB04
Sampled_Date/Time	9/12/2020	11/12/2020	11/12/2020	12/12/2020	13/12/2020
Sample Type	Rinsate	Trip_B	Trip_B	TS	TS

Chem_Group	ChemName	Units	EQL					
	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	µg/L	0.01	<0.02	<0.02	<0.02		
	Sum of US EPA PFAS (PFOS + PFOA)*	µg/L	0.01	<0.02	<0.02	<0.02		
PFOS/PFOA	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.01	<0.01	<0.01	134	
	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.01	<0.01	<0.01	125	
	N-ethyl-perfluorooctanesulfonamidoacetic acid	µg/L	0.05	<0.05	<0.05	<0.05	124	
	N-methylperfluorooctane sulfonamidoacetic acid	µg/L	0.05	<0.05	<0.05	<0.05	129	
	N-Methylperfluorooctanesulfonamidoethanol	µg/L	0.05	<0.05	<0.05	<0.05	144	
	Perfluorobutanoic acid (PFBA)	µg/L	0.05	<0.05	<0.05	<0.05	121	
	Perfluorodecanesulfonic acid (PFDS)	µg/L	0.01	<0.01	<0.01	<0.01	132	
	Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.01	<0.01	<0.01	99	
	Perfluorononanesulfonic acid (PFNS)	mg/l	0.00001	<0.00001	<0.00001	<0.00001	102	
	Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	<0.01	<0.01	<0.01	135	
	Perfluoropentanoic acid (PFPeA)	µg/L	0.01	<0.01	<0.01	<0.01	135	
	Perfluoropropanesulfonic acid (PFPrS)	mg/l	0.00001	<0.00001	<0.00001	<0.00001	112	
	Sum of PFAS	µg/L	0.1	<0.1	<0.1	<0.1		
	Sum of PFAS (WA DER List)	µg/L	0.05	<0.05	<0.05	<0.05		
	Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	<0.01		
	Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.01	<0.01	<0.01	141	
	Perfluorohexanoic acid (PFHxA)	µg/L	0.01	<0.01	<0.01	<0.01	141	
	N-Ethyl perfluorooctane sulfonamide (NEtFOSA)	µg/L	0.05	<0.05	<0.05	<0.05	123	
	N-ethylperfluorooctanesulfonamidoethanol (NEtFOSE)	µg/L	0.05	<0.05	<0.05	<0.05	122	
	N-Methyl perfluorooctane sulfonamide (NMeFOSA)	µg/L	0.05	<0.05	<0.05	<0.05	105	
	Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	<0.01	<0.01	<0.01	124	
	Perfluorooctanesulfonic acid (PFOS)	mg/l	0.00001	<0.00001	<0.00001	<0.00001	133	
	Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.01	<0.01	<0.01	144	
	Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	<0.01	<0.01	<0.01	124	
	Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01	<0.01	132	
	Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.01	<0.01	<0.01	126	
	Perfluorooctane sulfonamide (PFOSA)	µg/L	0.05	<0.05	<0.05	<0.05	131	
	Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.01	<0.01	<0.01	127	
	Perfluorotridecanoic acid (PFTriDA)	µg/L	0.01	<0.01	<0.01	<0.01	135	
	Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.01	<0.01	<0.01	133	
	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/l	0.00001	<0.00001	<0.00001	<0.00001	139	
	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/l	0.00005	<0.00005	<0.00005	<0.00005	139	
	Perfluorooctanoic acid (PFOA)	mg/l	0.00001	<0.00002	<0.00002	<0.00002	125	

## **APPENDIX C**

## **DESKTOP SEARCH RESULTS**





# LOTSEARCH

LOTSEARCH ENVIRO PROFESSIONAL

**Date: 28 Oct 2020 08:32:18**

**Reference: LS015658 EP**

**Address: Badgerys Creek Road, Bringelly, NSW 2556**

**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.

## 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	NSW Department of Finance, Services & Innovation	02/06/2020	02/06/2020	Quarterly	-	-	-	-
Topographic Data	NSW Department of Finance, Services & Innovation	25/06/2019	25/06/2019	As required	-	-	-	-
List of NSW contaminated sites notified to EPA	Environment Protection Authority	22/10/2020	22/10/2020	Monthly	1000	0	0	0
Contaminated Land Records of Notice	Environment Protection Authority	28/09/2020	28/09/2020	Monthly	1000	0	0	0
Former Gasworks	Environment Protection Authority	29/09/2020	11/10/2017	Monthly	1000	0	0	0
National Waste Management Facilities Database	Geoscience Australia	15/05/2020	07/03/2017	Quarterly	1000	0	0	0
National Liquid Fuel Facilities	Geoscience Australia	12/08/2020	13/07/2012	Quarterly	1000	0	0	0
EPA PFAS Investigation Program	Environment Protection Authority	12/10/2020	07/05/2020	Monthly	2000	0	0	0
Defence PFAS Investigation & Management Program - Investigation Sites	Department of Defence	14/10/2020	14/10/2020	Monthly	2000	0	0	0
Defence PFAS Investigation & Management Program - Management Sites	Department of Defence	14/10/2020	14/10/2020	Monthly	2000	0	0	0
Airservices Australia National PFAS Management Program	Airservices Australia	28/09/2020	28/09/2020	Monthly	2000	0	0	0
Defence 3 Year Regional Contamination Investigation Program	Department of Defence	14/10/2020	14/10/2020	Monthly	2000	0	0	0
EPA Other Sites with Contamination Issues	Environment Protection Authority	04/02/2020	13/12/2018	Annually	1000	0	0	0
Licensed Activities under the POEO Act 1997	Environment Protection Authority	25/09/2020	25/09/2020	Monthly	1000	1	1	8
Delicensed POEO Activities still regulated by the EPA	Environment Protection Authority	25/09/2020	25/09/2020	Monthly	1000	0	0	0
Former POEO Licensed Activities now revoked or surrendered	Environment Protection Authority	25/09/2020	25/09/2020	Monthly	1000	5	5	5
UBD Business Directories (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business Directories (Road & Area Matches)	Hardie Grant			Not required	150	-	4	4
UBD Business Directory Dry Cleaners & Motor Garages/Service Stations (Premise & Intersection Matches)	Hardie Grant			Not required	500	0	0	0
UBD Business Directory Dry Cleaners & Motor Garages/Service Stations (Road & Area Matches)	Hardie Grant			Not required	500	-	0	0
Points of Interest	NSW Department of Finance, Services & Innovation	30/03/2020	30/03/2020	Quarterly	1000	0	0	16
Tanks (Areas)	NSW Department of Customer Service - Spatial Services	30/03/2020	30/03/2020	Quarterly	1000	0	0	0
Tanks (Points)	NSW Department of Customer Service - Spatial Services	30/03/2020	30/03/2020	Quarterly	1000	0	0	0
Major Easements	NSW Department of Finance, Services & Innovation	30/03/2020	30/03/2020	Quarterly	1000	0	0	0
State Forest	Forestry Corporation of NSW	18/01/2018	18/01/2018	As required	1000	0	0	0
NSW National Parks and Wildlife Service Reserves	NSW Office of Environment & Heritage	21/01/2020	30/09/2019	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
Temporary Water Restriction (Botany Sands Groundwater Source) Order 2018	NSW Department of Planning, Industry and Environment	26/10/2020	21/02/2018	As required	1000	0	0	0

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	Dataset Buffer (m)	No. Features Onsite	No. Features within 100m	No. Features within Buffer
Groundwater Boreholes	NSW Dept. of Primary Industries - Water NSW; Commonwealth of Australia (Bureau of Meteorology)	24/07/2018	23/07/2018	Annually	2000	5	7	13
Geological Units 1:100,000	NSW Department of Planning, Industry and Environment	20/08/2014		None planned	1000	2	-	2
Geological Structures 1:100,000	NSW Department of Planning, Industry and Environment	20/08/2014		None planned	1000	1	-	4
Naturally Occurring Asbestos Potential	NSW Dept. of Industry, Resources & Energy	04/12/2015	24/09/2015	Unknown	1000	0	0	0
Atlas of Australian Soils	Australian Bureau of Agriculture and Resource Economics and Sciences (ABARES)	19/05/2017	17/02/2011	As required	1000	1	1	2
Soil Landscapes	NSW Department of Planning, Industry and Environment	12/08/2014		None planned	1000	2	-	2
Environmental Planning Instrument Acid Sulfate Soils	NSW Department of Planning, Industry and Environment	01/10/2020	03/07/2020	Monthly	500	0	-	-
Atlas of Australian Acid Sulfate Soils	CSIRO	19/01/2017	21/02/2013	As required	1000	1	1	1
Dryland Salinity - National Assessment	National Land and Water Resources Audit	18/07/2014	12/05/2013	None planned	1000	1	1	1
Dryland Salinity Potential of Western Sydney	NSW Department of Planning, Industry and Environment	12/05/2017	01/01/2002	None planned	1000	6	6	9
Mining Subsidence Districts	NSW Department of Customer Service - Subsidence Advisory NSW	30/03/2020	30/03/2020	Quarterly	1000	0	0	0
Current Mining Titles	NSW Department of Industry	29/07/2020	29/07/2020	Monthly	1000	1	1	2
Mining Title Applications	NSW Department of Industry	29/07/2020	29/07/2020	Monthly	1000	0	0	0
Historic Mining Titles	NSW Department of Industry	29/07/2020	29/07/2020	Monthly	1000	13	15	19
Environmental Planning Instrument SEPP State Significant Precincts	NSW Department of Planning, Industry and Environment	01/10/2020	07/12/2018	Monthly	1000	0	0	0
Environmental Planning Instrument Land Zoning	NSW Department of Planning, Industry and Environment	01/10/2020	25/09/2020	Monthly	1000	4	7	20
Commonwealth Heritage List	Australian Government Department of the Agriculture, Water and the Environment	18/08/2020	20/11/2019	Quarterly	1000	0	0	0
National Heritage List	Australian Government Department of the Agriculture, Water and the Environment	18/08/2020	20/11/2019	Quarterly	1000	0	0	0
State Heritage Register - Curtilages	NSW Department of Planning, Industry and Environment	24/07/2020	02/07/2020	Quarterly	1000	0	1	1
Environmental Planning Instrument Heritage	NSW Department of Planning, Industry and Environment	01/10/2020	11/09/2020	Monthly	1000	0	1	4
Bush Fire Prone Land	NSW Rural Fire Service	19/10/2020	14/12/2019	Weekly	1000	2	2	3
Remnant Vegetation of the Cumberland Plain	NSW Office of Environment & Heritage	07/10/2014	04/08/2011	Unknown	1000	6	6	6
Ramsar Wetlands of Australia	Department of the Agriculture, Water and the Environment	08/10/2014	24/06/2011	As required	1000	0	0	0
Groundwater Dependent Ecosystems	Bureau of Meteorology	14/08/2017	15/05/2017	Unknown	1000	4	4	4
Inflow Dependent Ecosystems Likelihood	Bureau of Meteorology	14/08/2017	15/05/2017	Unknown	1000	6	6	7
NSW BioNet Species Sightings	NSW Office of Environment & Heritage	27/10/2020	27/10/2020	Weekly	10000	-	-	-



Site Diagram

Badgerys Creek Road, Bringelly, NSW 2556



<div>Legend</div> <div><div></div> Site Boundary</div> <div><div></div> Internal Parcel Boundaries</div>	<div>Total Area:1.58km<sup>2</sup></div> <div>Total Perimeter:5352m</div> <div>Disclaimers:</div> <div>Measurements are approximate only and may have been simplified or smaller lengths removed for readability.</div> <div>Parcels that make up a small percentage of the total site area have not been labelled for increased legibility.</div>	<div>Scale:<div><div></div><div>02550100150200250</div><div>Meters</div></div></div>
		<div>Data Sources: Aerial Imagery © Aerometrex Pty Ltd</div>
		<div>Coordinate System:<div>GDA 1994 MGA Zone 56</div></div> <div>Date: 28 October 2020</div>



# Contaminated Land

Badgerys Creek Road, Bringelly, NSW 2556

## 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
N/A	No records in buffer								

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

Badgerys Creek Road, Bringelly, NSW 2556

### 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

## Waste Management & Liquid Fuel Facilities

Badgerys Creek Road, Bringelly, NSW 2556

### National Waste Management Site Database

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

Site Id	Owner	Name	Address	Suburb	Class	Landfill	Reprocess	Transfer	Comments	Loc Conf	Dist (m)	Direction
N/A	No records in buffer											

Waste Management Facilities Data Source: Geoscience Australia

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### National Liquid Fuel Facilities

National Liquid Fuel Facilities within the dataset buffer:

Map Id	Owner	Name	Address	Suburb	Class	Operational Status	Operator	Revision Date	Loc Conf	Dist (m)	Direction
N/A	No records in buffer										

National Liquid Fuel Facilities Data Source: Geoscience Australia

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# PFAS Investigation & Management Programs

Badgerys Creek Road, Bringelly, NSW 2556

## EPA PFAS Investigation Program

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

Id	Site	Address	Loc Conf	Dist	Dir
N/A	No records in buffer				

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

## Defence PFAS Investigation Program

Sites being investigated by the Department of Defence for PFAS contamination within the dataset buffer:

Map ID	Base Name	Address	Loc Conf	Dist	Dir
N/A	No records in buffer				

Defence PFAS Investigation Program Data Custodian: Department of Defence, Australian Government

## Defence PFAS Management Program

Sites being managed by the Department of Defence for PFAS contamination within the dataset buffer:

Map ID	Base Name	Address	Loc Conf	Dist	Dir
N/A	No records in buffer				

Defence PFAS Management Program Data Custodian: Department of Defence, Australian Government

## Airservices Australia National PFAS Management Program

Sites being investigated or managed by Airservices Australia for PFAS contamination within the dataset buffer:

Map ID	Site Name	Impacts	Loc Conf	Dist	Dir
N/A	No records in buffer				

Airservices Australia National PFAS Management Program Data Custodian: Airservices Australia



## Defence Sites

Badgerys Creek Road, Bringelly, NSW 2556

### Defence 3 Year Regional Contamination Investigation Program

Sites which have been assessed as part of the Defence 3 Year Regional Contamination Investigation Program within the dataset buffer:

Property ID	Base Name	Address	Known Contamination	Loc Conf	Dist	Dir
N/A	No records in buffer					

Defence 3 Year Regional Contamination Investigation Program, Data Custodian: Department of Defence, Australian Government

## EPA Other Sites with Contamination Issues

Badgerys Creek Road, Bringelly, NSW 2556

### EPA Other Sites with Contamination Issues

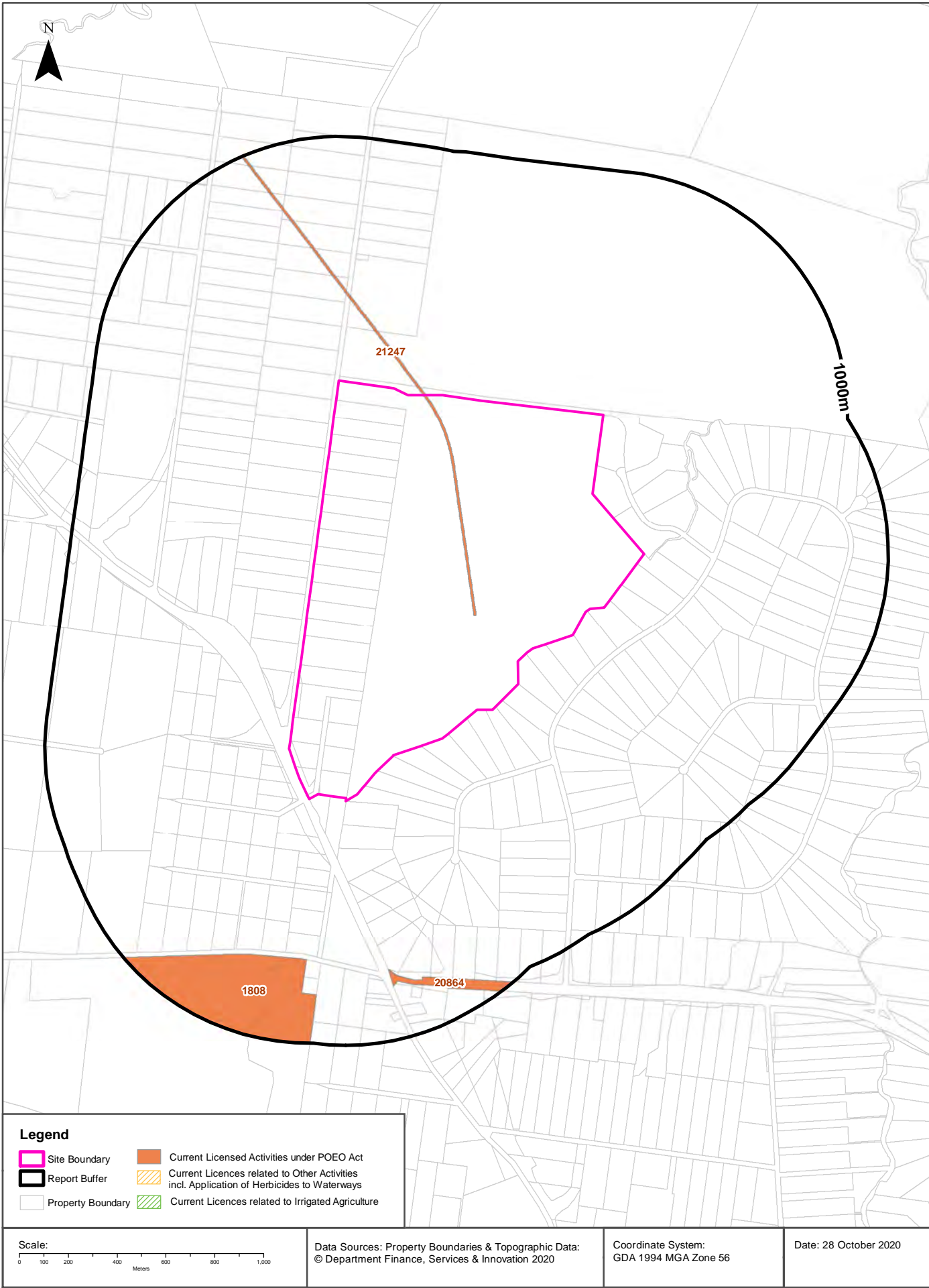
This dataset contains other sites identified on the EPA website as having contamination issues. This dataset currently includes:

- James Hardie asbestos manufacturing and waste disposal sites
- Radiological investigation sites in Hunter's Hill
- Pasminco Lead Abatement Strategy Area

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



## EPA Activities

Badgerys Creek Road, Bringelly, NSW 2556

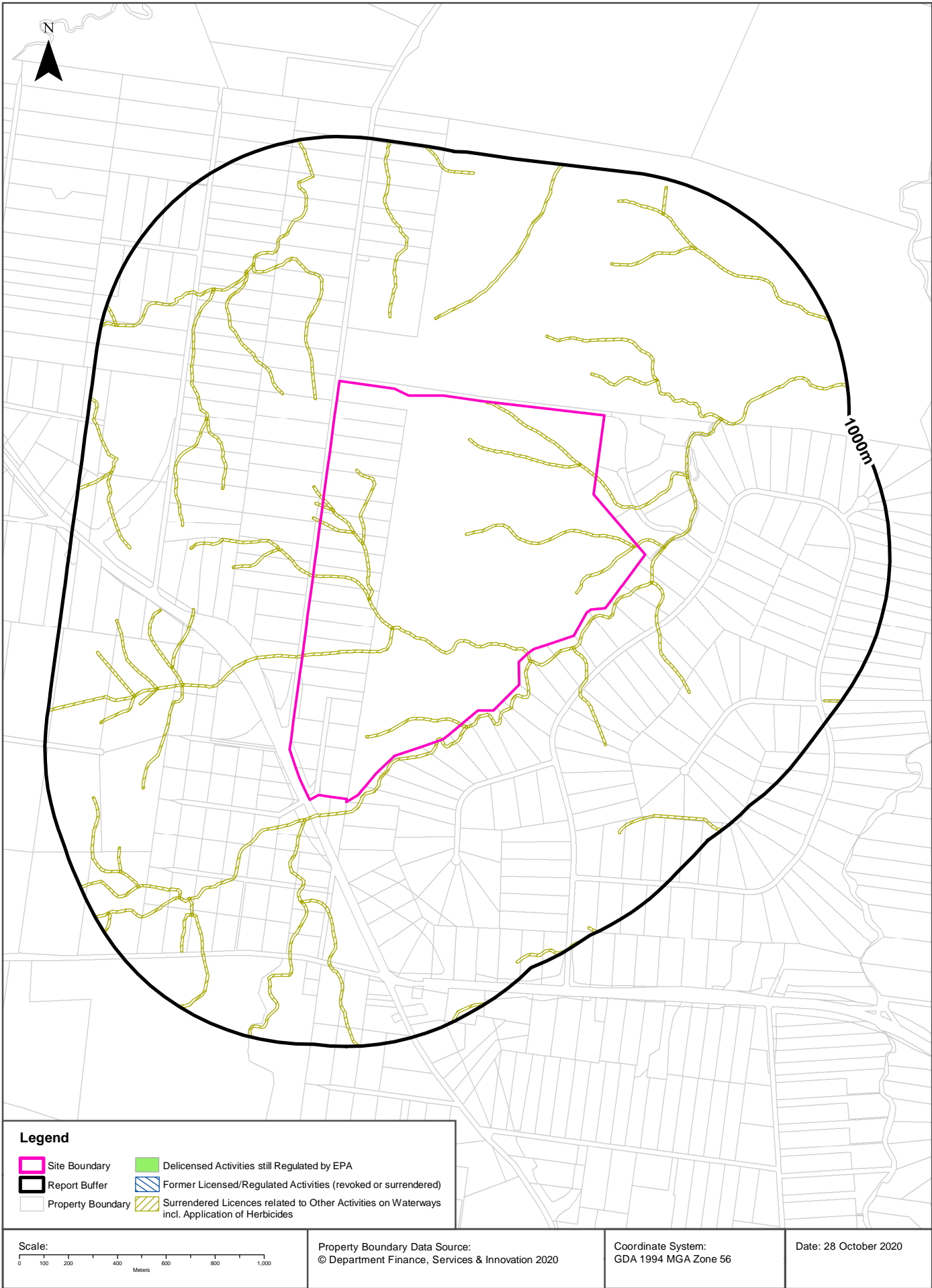
## Licensed Activities under the POEO Act 1997

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
21247	Metro Trains Sydney Pty Ltd		SYDNEY METRO, ROUSE HILL, NSW 2155		Railway systems activities	Network of Features	0m	Onsite
1808	PGH BRICKS & PAVERS PTY LIMITED	BORAL BRICKS PTY LTD	LOT 2 GREENDALE ROAD	BRINGELLY	Ceramics production	Premise Match	655m	South West
1808	PGH BRICKS & PAVERS PTY LIMITED	BORAL BRICKS PTY LTD	LOT 2 GREENDALE ROAD	BRINGELLY	Crushing, grinding or separating	Premise Match	655m	South West
1808	PGH BRICKS & PAVERS PTY LIMITED	BORAL BRICKS PTY LTD	LOT 2 GREENDALE ROAD	BRINGELLY	Land-based extractive activity	Premise Match	655m	South West
1808	PGH BRICKS & PAVERS PTY LIMITED	BORAL BRICKS PTY LTD	LOT 2 GREENDALE ROAD	BRINGELLY	Mining for minerals	Premise Match	655m	South West
20864	LENDLEASE ENGINEERING PTY LIMITED		Northern Road and Bringelly Road Upgrade Stage 2, BRINGELLY, NSW 2556		Crushing, grinding or separating	Road Match	711m	South
20864	LENDLEASE ENGINEERING PTY LIMITED		Northern Road and Bringelly Road Upgrade Stage 2, BRINGELLY, NSW 2556		Land-based extractive activity	Road Match	711m	South
20864	LENDLEASE ENGINEERING PTY LIMITED		Northern Road and Bringelly Road Upgrade Stage 2, BRINGELLY, NSW 2556		Road construction	Road Match	711m	South

POEO Licence Data Source: Environment Protection Authority

© State of New South Wales through the Environment Protection Authority



## EPA Activities

Badgerys Creek Road, Bringelly, NSW 2556

### 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

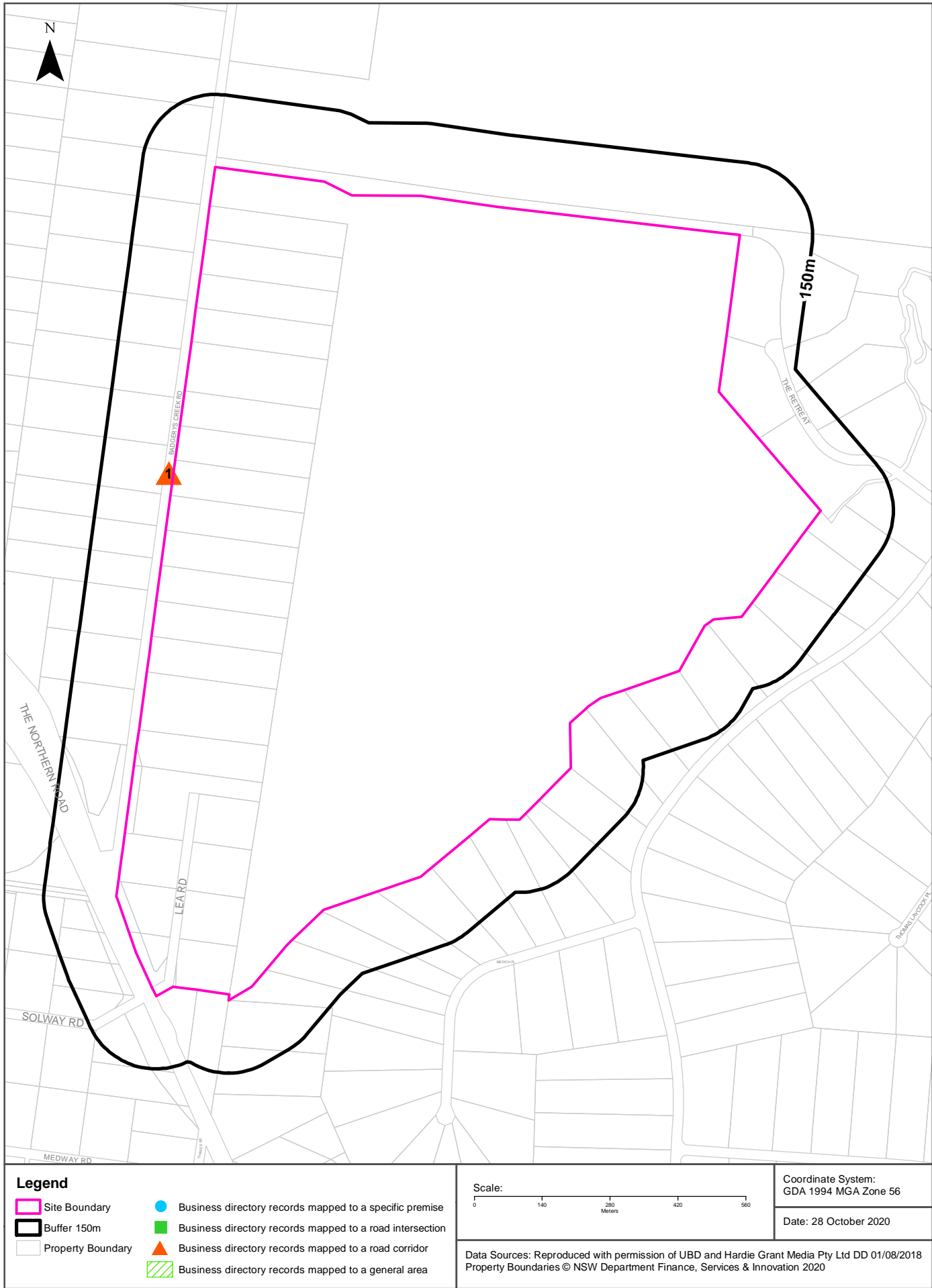
Former Licensed activities under the Protection of the Environment Operations Act 1997, now revoked or surrendered, within the dataset buffer:

Licence No	Organisation	Location	Status	Issued Date	Activity	Loc Conf	Distance	Direction
4653	LUHRMANN ENVIRONMENT MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW	Surrendered	06/09/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	0m	Onsite
4838	Robert Orchard	Various Waterways throughout New South Wales - SYDNEY NSW 2000	Surrendered	07/09/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	0m	Onsite
5093	CAMDEN COUNCIL	WATERWAYS OF CAMDEN LOCAL GOVERNMENT AREA, -, CAMDEN	Surrendered	28/08/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	0m	Onsite
5176	LIVERPOOL CITY COUNCIL	WATERWAYS OF LIVERPOOL CITY	Surrendered	17/04/2001	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	0m	Onsite
6630	SYDNEY WEED & PEST MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW - PROSPECT, NSW, 2148	Surrendered	09/11/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	0m	Onsite

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

# Historical Business Directories

Badgerys Creek Road, Bringelly, NSW 2556



## Historical Business Directories

Badgerys Creek Road, Bringelly, NSW 2556

### Business Directory Records 1950-1991 Premise or Road Intersection Matches

Universal Business Directory records from years 1991, 1986, 1982, 1970, 1961 & 1950, mapped to a premise or road intersection within the dataset buffer:

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
	No records in buffer						

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## Business Directory Records 1950-1991

### Road or Area Matches

Universal Business Directory records from years 1991, 1986, 1982, 1970, 1961 & 1950, 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:

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
1	MIXED BUSINESSES	Restall, A. & J., Badgerys Creek Rd. Badgery's Creek	534302	1970	Road Match	0m
	BUTCHERS-RETAIL	Shadlow, J., Badgerys Creek Rd. Badgery's Creek	534300	1970	Road Match	0m
	MIXED BUSINESSES	Restall, A. & J., Badgerys Creek Rd., Badgery's Creek	185005	1961	Road Match	0m
	BUTCHERS-RETAIL	Shadlow, J., Badgerys Creek Rd., Badgery's Creek	185003	1961	Road Match	0m

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## Historical Business Directories

Badgerys Creek Road, Bringelly, NSW 2556

### Dry Cleaners, Motor Garages & Service Stations 1948-1993 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.

Note: The Universal Business Directories were published between 1948 and 1993. Dry Cleaners, Motor Garages & Service Stations have been extracted from all of these directories except the following years 1951, 1955, 1957, 1960, 1963, 1973, 1974, 1977, 1987.

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
	No records in buffer						

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## Dry Cleaners, Motor Garages & Service Stations 1948-1993 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.

Note: The Universal Business Directories were published between 1948 and 1993. Dry Cleaners, Motor Garages & Service Stations have been extracted from all of these directories except the following years 1951, 1955, 1957, 1960, 1963, 1973, 1974, 1977, 1987.

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
	No records in buffer					

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## Aerial Imagery 2020

Badgerys Creek Road, Bringelly, NSW 2556







# Aerial Imagery 2014

Badgerys Creek Road, Bringelly, NSW 2556



**Legend**

 Site Boundary

 Buffer 150m

Scale: 0 125 250 375 500 Meters	Data Sources: Aerial Imagery © Aerometrex Pty Ltd	Coordinate System: GDA 1994 MGA Zone 56	Date: 28 October 2020
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# Aerial Imagery 2009

Badgerys Creek Road, Bringelly, NSW 2556



Scale: 0 125 250 375 500 Meters	Data Sources: Aerial Imagery © Aerometrex Pty Ltd	Coordinate System: GDA 1994 MGA Zone 56	Date: 28 October 2020
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# Aerial Imagery 2005

Badgerys Creek Road, Bringelly, NSW 2556



**Legend**

 Site Boundary

 Buffer 150m

Scale: 0 125 250 375 500 Meters	Data Sources Aerial Imagery: © Aerometrex Pty Ltd	Coordinate System: GDA 1994 MGA Zone 56	Date: 26 October 2020
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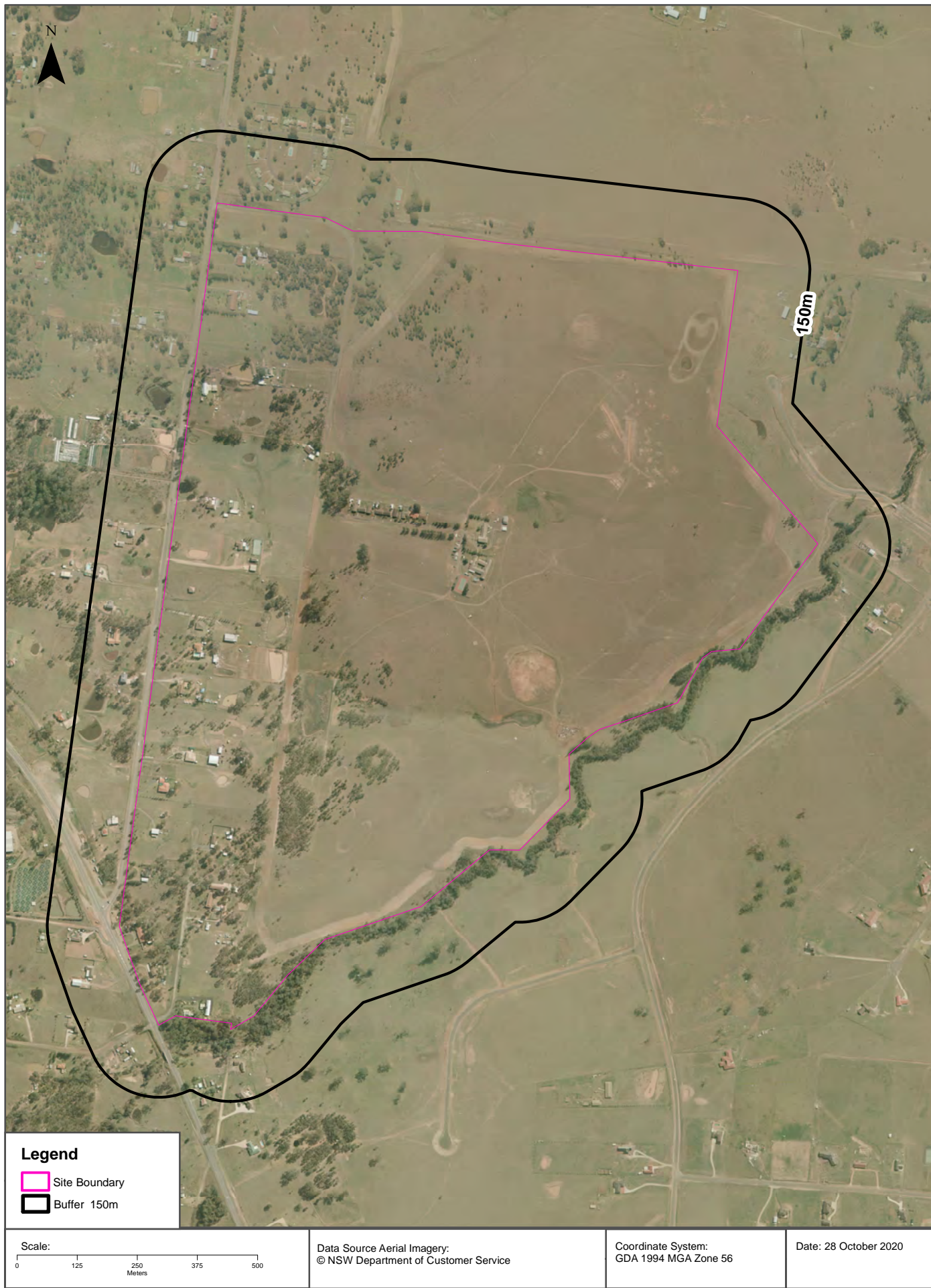








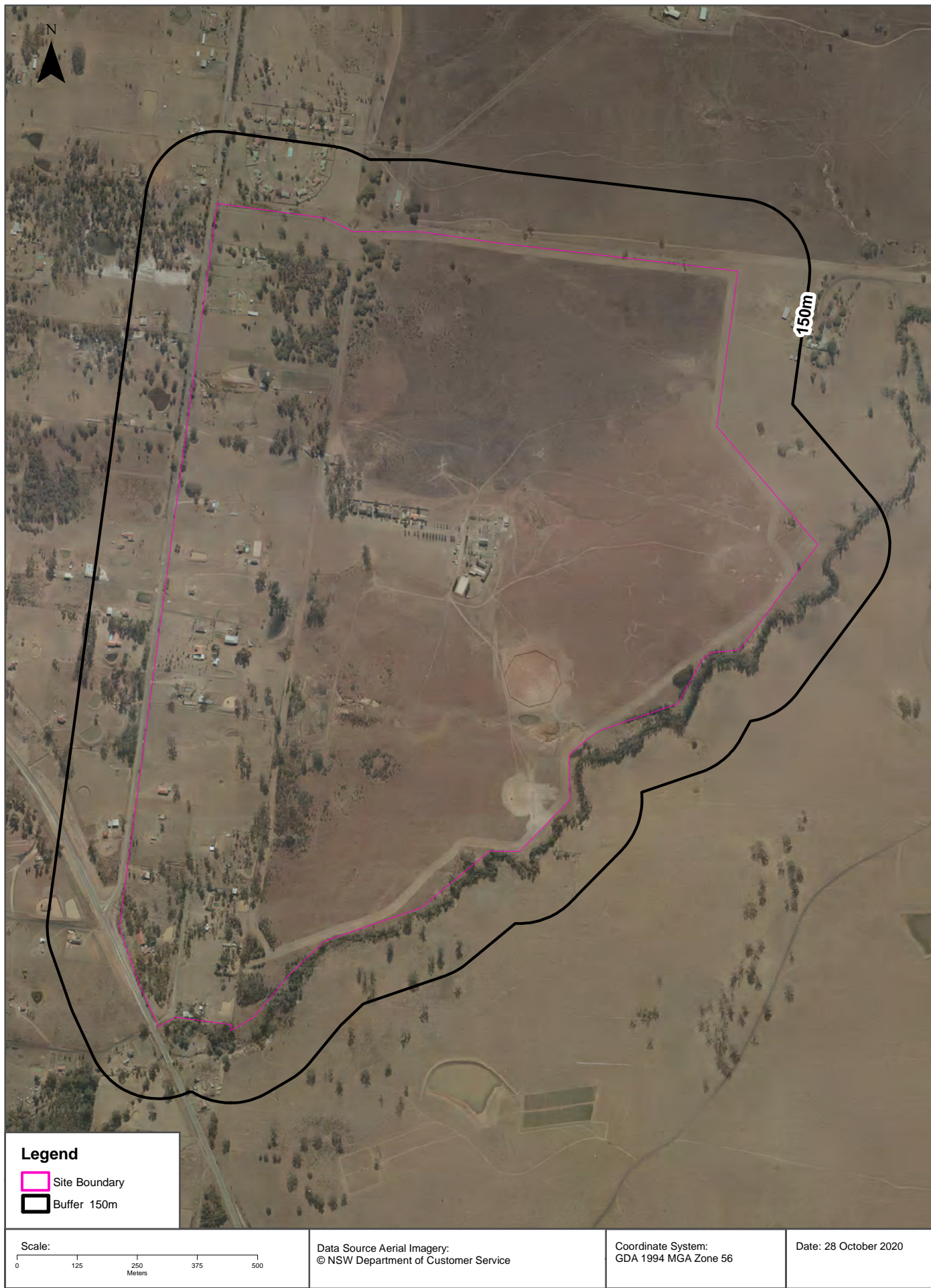
























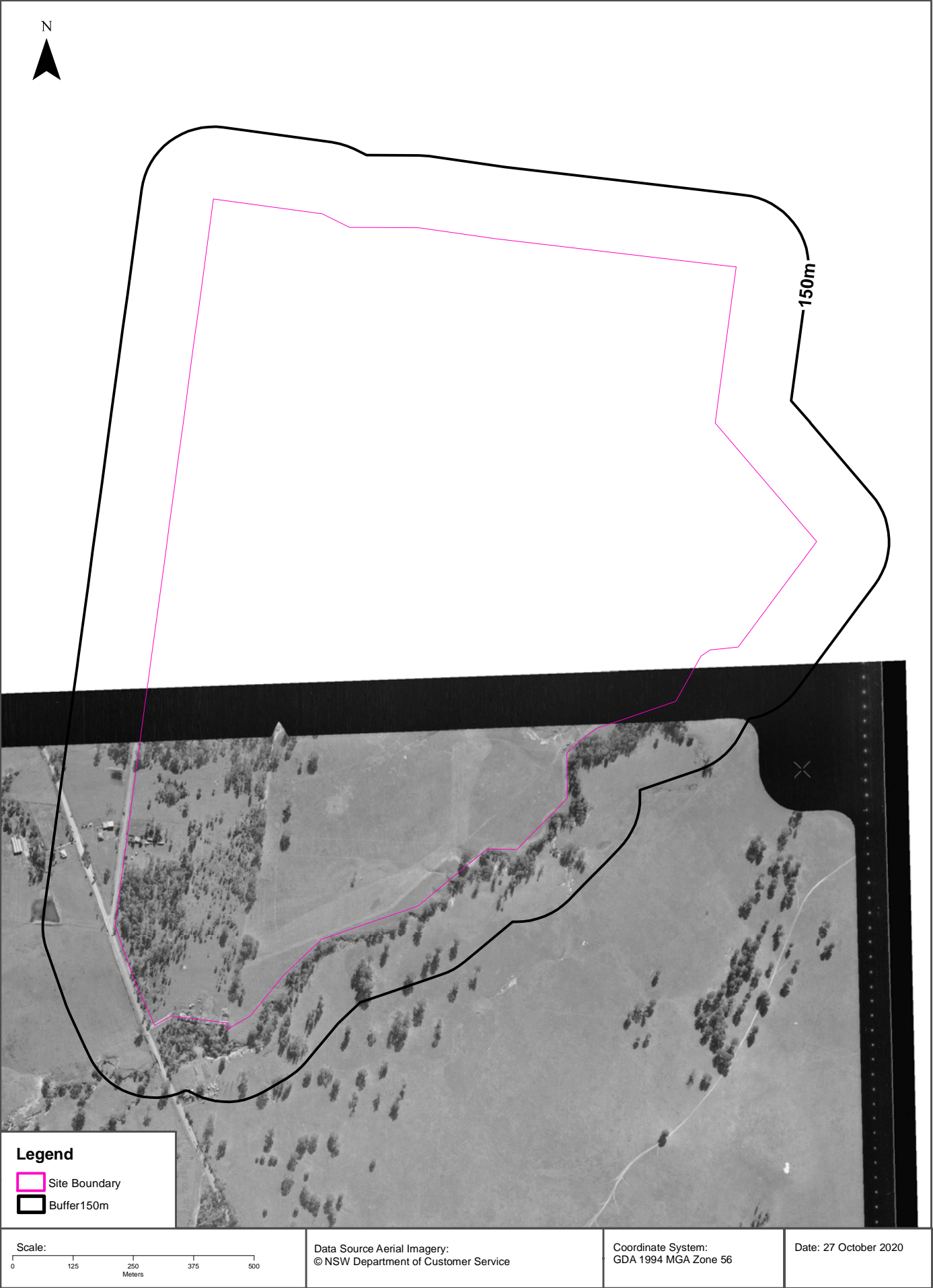
Aerial Imagery 1965

Badgerys Creek Road, Bringelly, NSW 2556





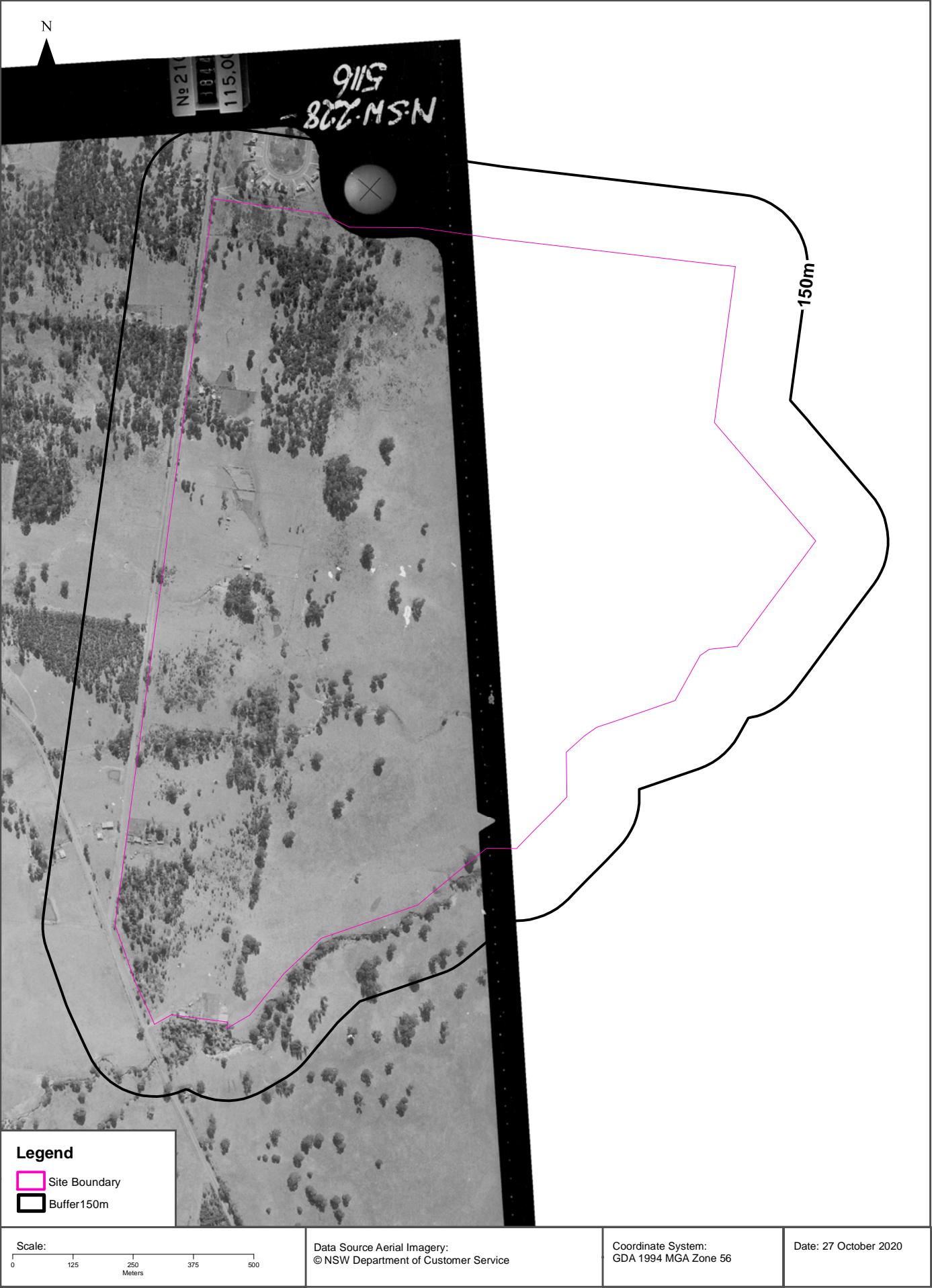






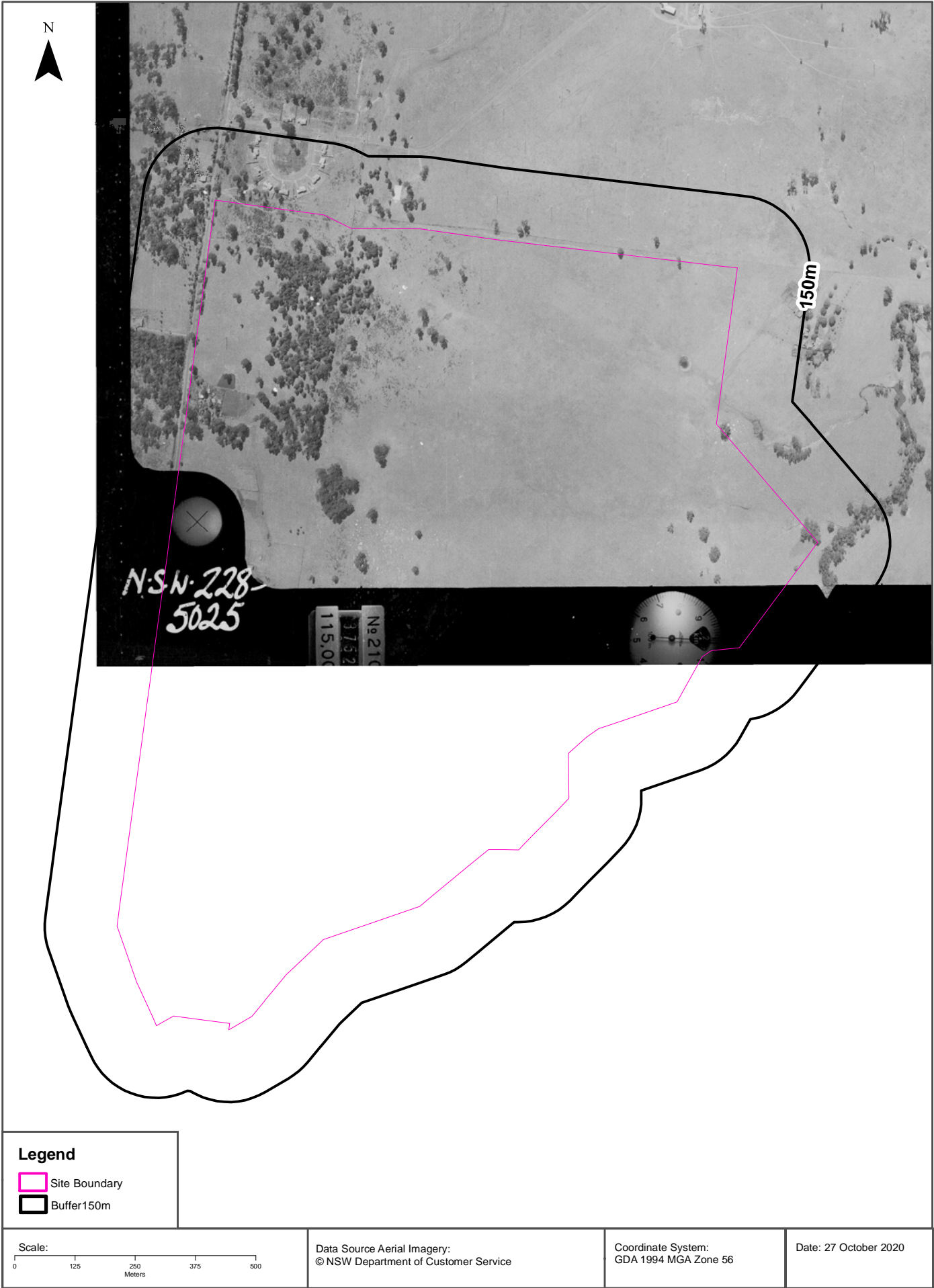
Aerial Imagery 1955

Badgerys Creek Road, Bringelly, NSW 2556



Aerial Imagery 1955

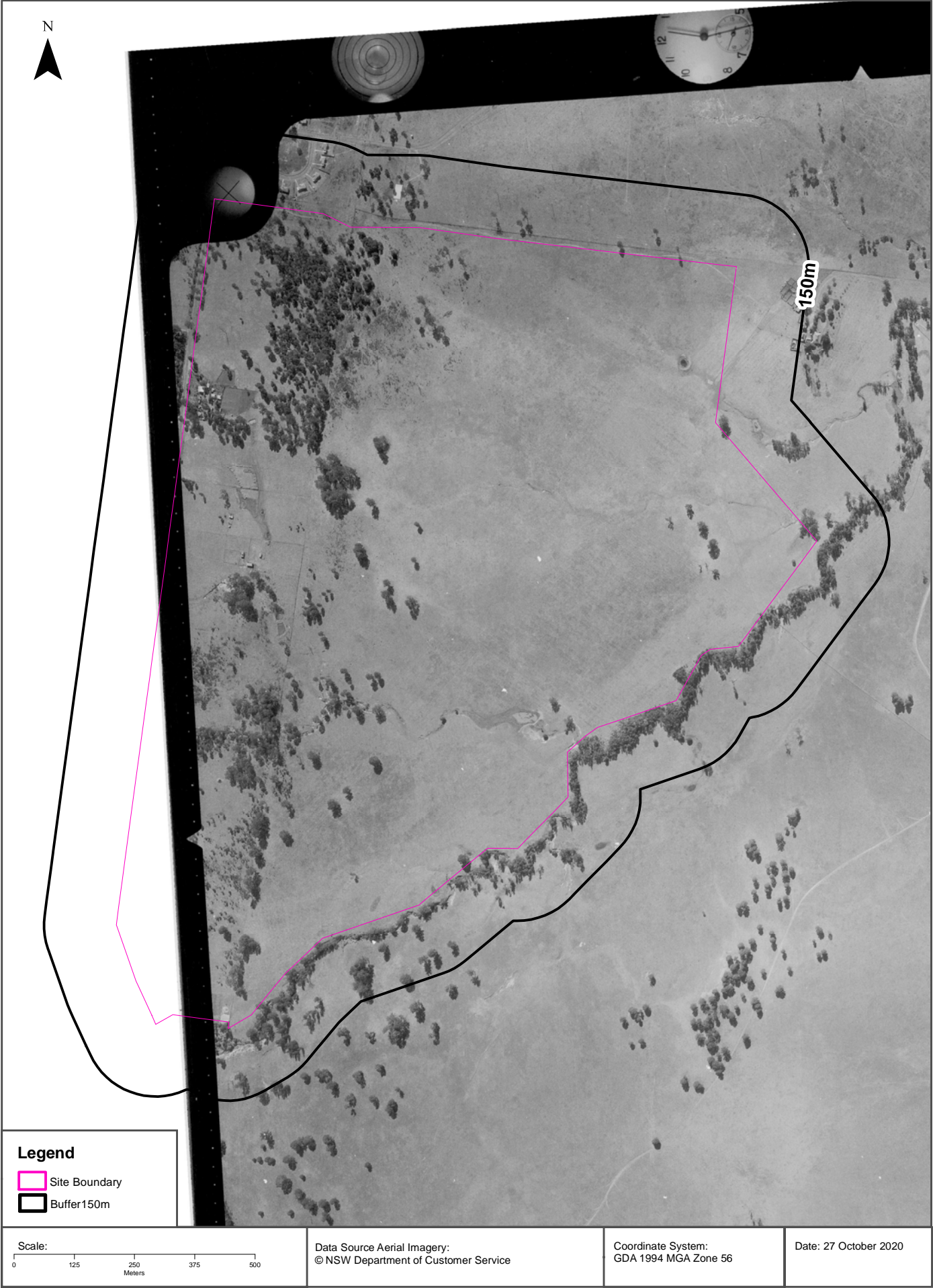
Badgerys Creek Road, Bringelly, NSW 2556



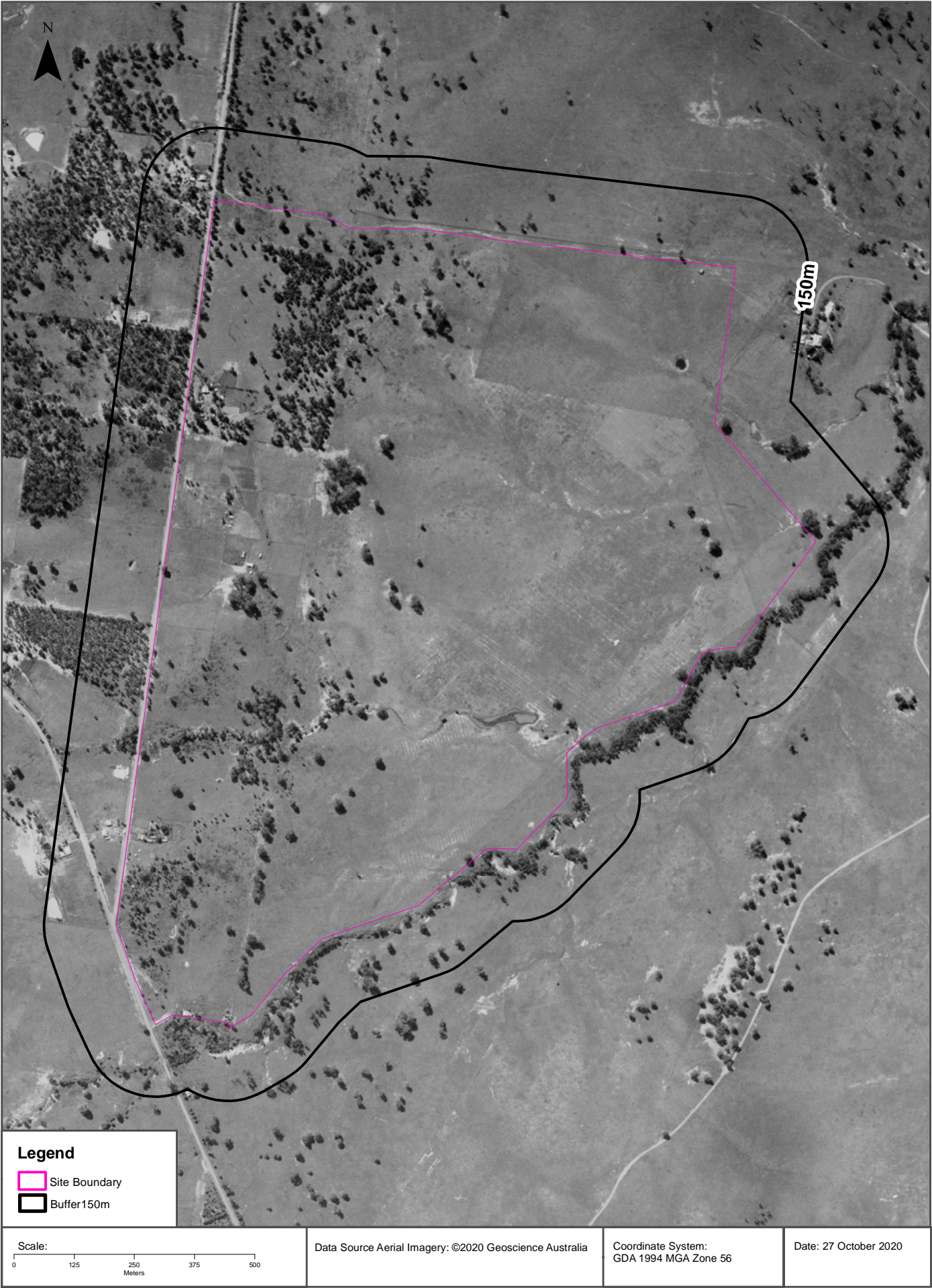


Aerial Imagery 1955

Badgerys Creek Road, Bringelly, NSW 2556

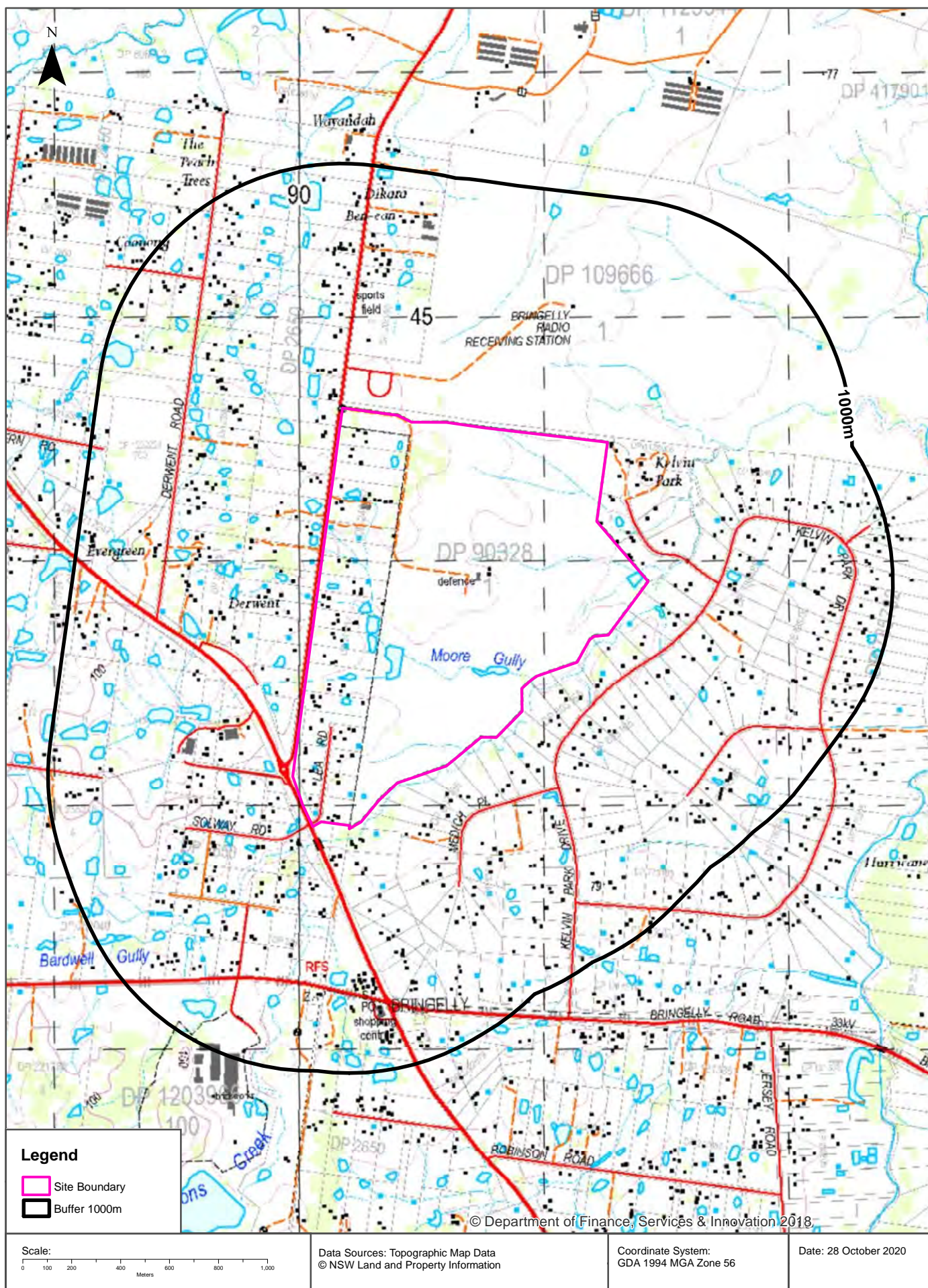






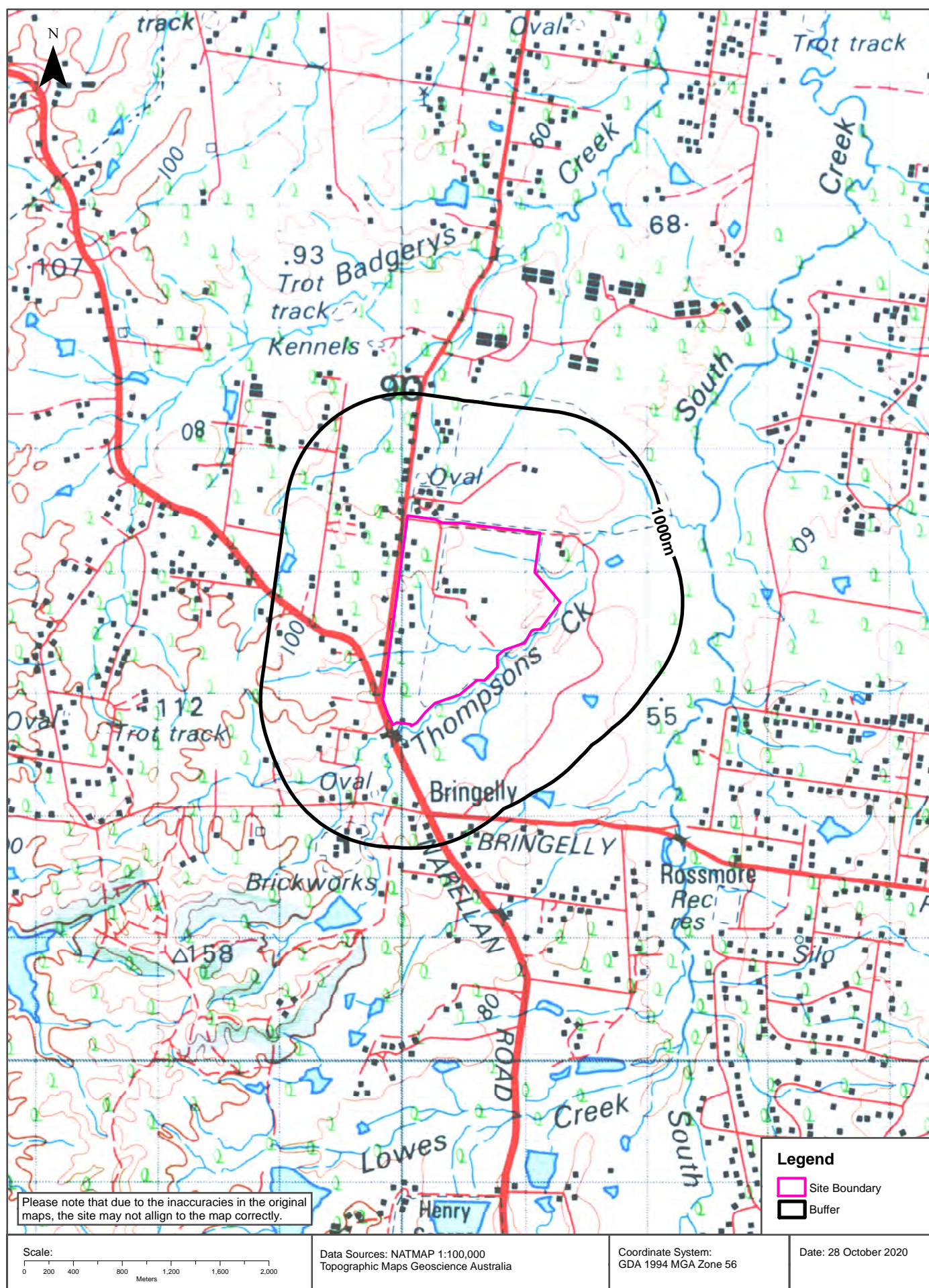


**Badgerys Creek Road, Bringelly, NSW 2556**





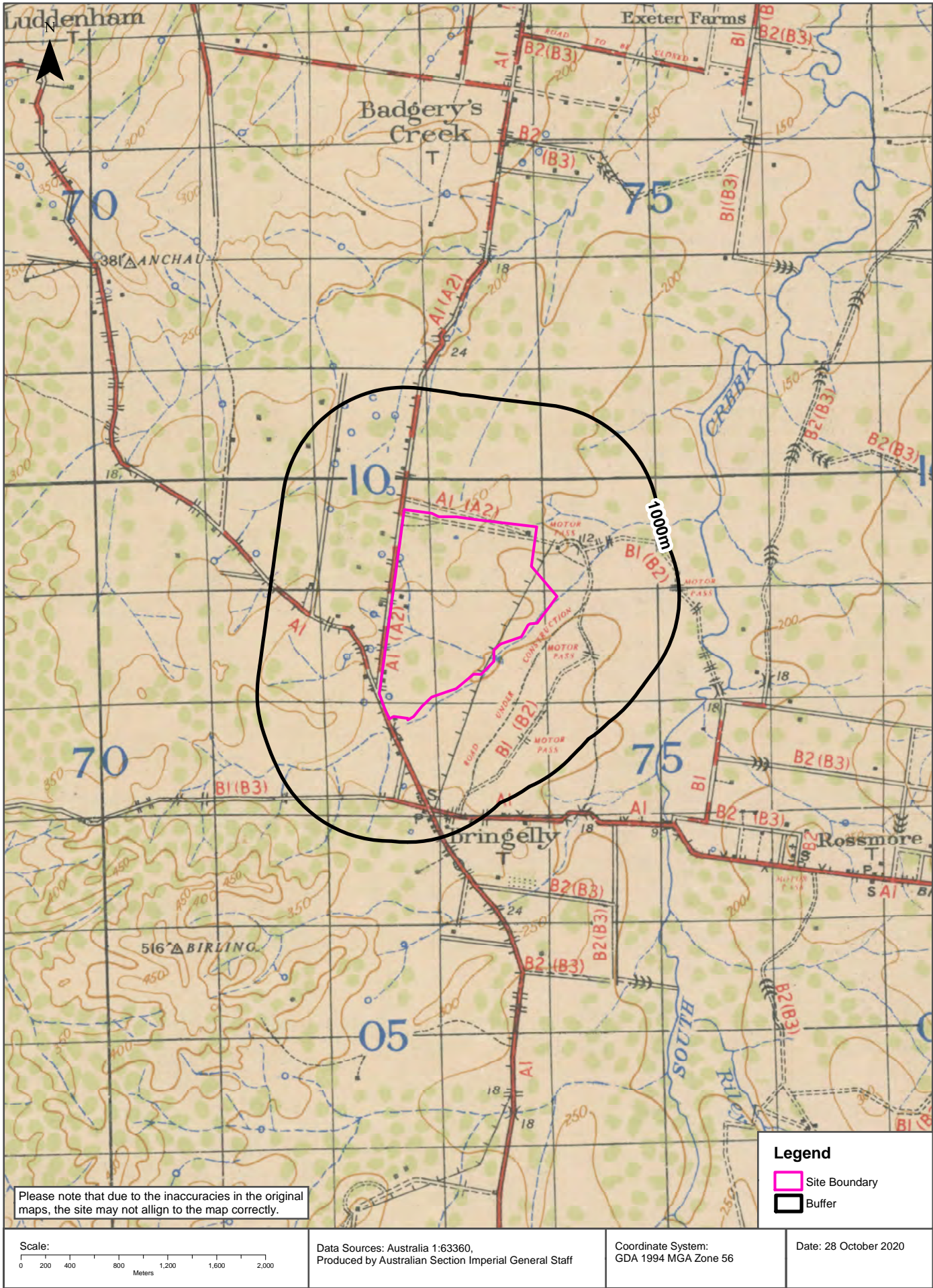
**Badgerys Creek Road, Bringelly, NSW 2556**





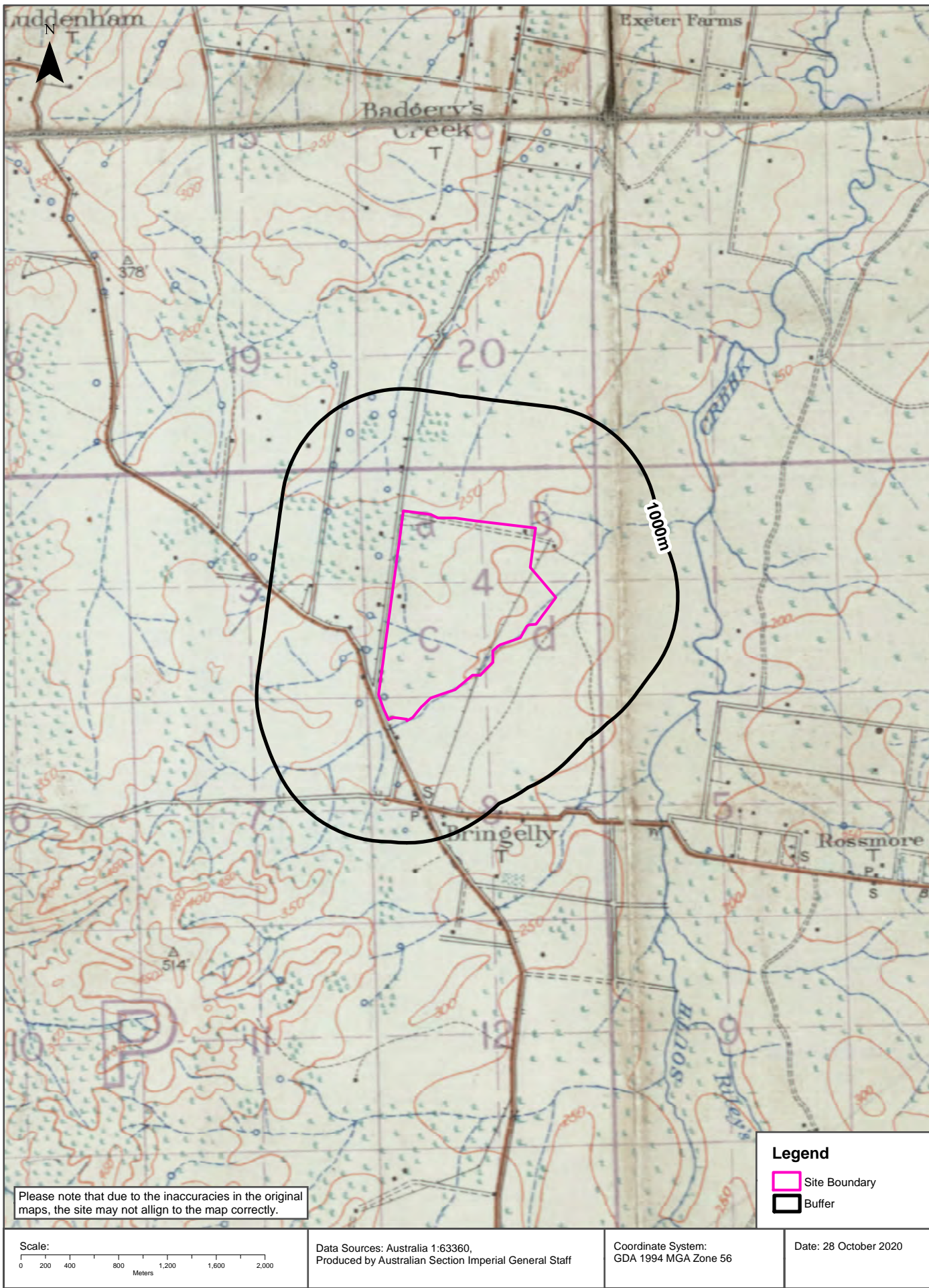
# Historical Map c.1942

Badgerys Creek Road, Bringelly, NSW 2556





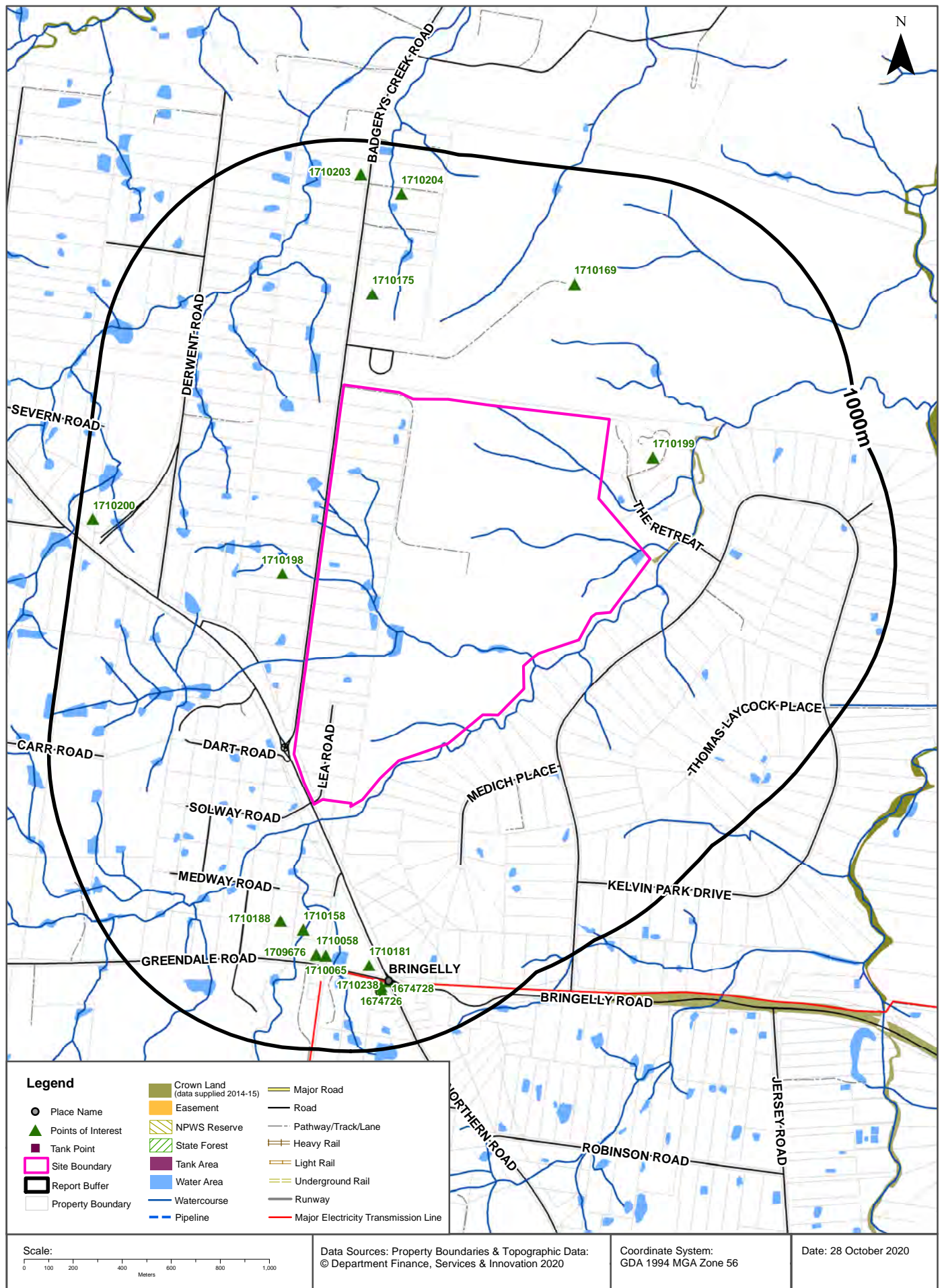
Historical Map c.1929  
Badgerys Creek Road, Bringelly, NSW 2556





# Topographic Features

Badgerys Creek Road, Bringelly, NSW 2556



## Topographic Features

Badgerys Creek Road, Bringelly, NSW 2556

### Points of Interest

What Points of Interest exist within the dataset buffer?

Map Id	Feature Type	Label	Distance	Direction
1710198	Homestead	DERWENT	145m	West
1710199	Homestead	KELVIN PARK	196m	North East
1710175	Sports Field	Sports Field	382m	North
1710188	Park	BRINGELLY PARK	496m	South West
1710158	Park	BRINGELLY RECREATION RESERVE	514m	South
1710169	Transmission Station	BRINGELLY RADIO RECEIVING STATION	532m	North East
1709676	Community Facility	BRINGELLY COMMUNITY CENTRE	614m	South
1710058	Community Medical Centre	BRINGELLY EARLY CHILDHOOD HEALTH CENTRE	614m	South
1710065	Firestation - Bush	BRINGELLY RFB	617m	South
1710181	Primary School	BRINGELLY PUBLIC SCHOOL	654m	South
1710238	Suburb	BRINGELLY	730m	South
1674726	Post Office	BRINGELLY POST OFFICE	745m	South
1674728	Shopping Centre	BRINGELLY VILLAGE CENTRE	765m	South
1710204	Homestead	BEN-EAN	804m	North
1710203	Homestead	DIKARA	862m	North
1710200	Homestead	EVERGREEN	940m	West

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

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## Topographic Features

Badgerys Creek Road, Bringelly, NSW 2556

### 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
	No records in buffer					

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
N/A	No records in buffer				

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

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## Topographic Features

Badgerys Creek Road, Bringelly, NSW 2556

### 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: © NSW Department of Finance, Services & Innovation (2018)  
Creative Commons 3.0 © Commonwealth of Australia <http://creativecommons.org/licenses/by/3.0/au/deed.en>

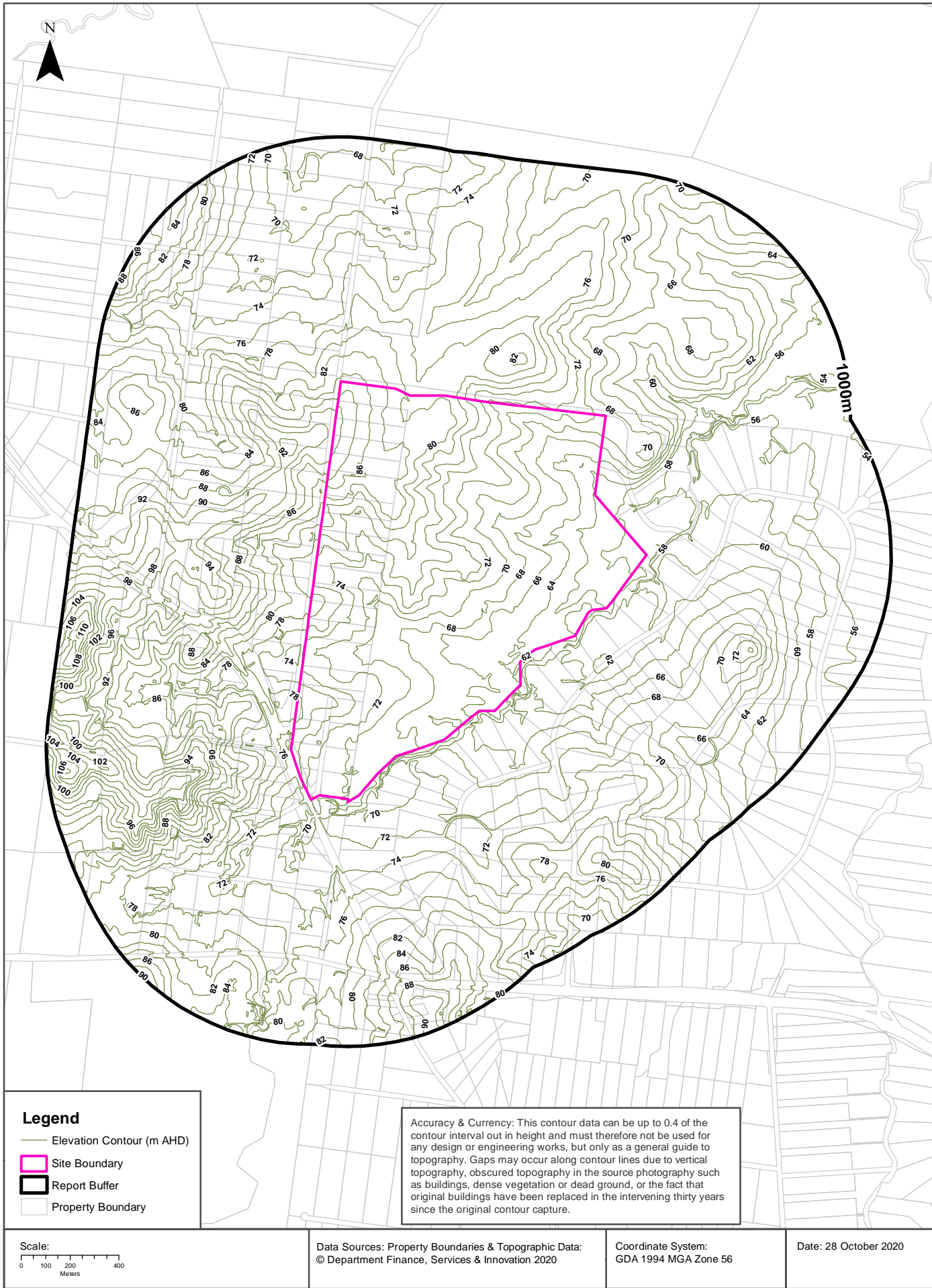
### National Parks and Wildlife Service Reserves

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: © NSW Department of Finance, Services & Innovation (2018)  
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## Hydrogeology & Groundwater

Badgerys Creek Road, Bringelly, NSW 2556

### 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)

Creative Commons 3.0 © Commonwealth of Australia <http://creativecommons.org/licenses/by/3.0/au/deed.en>

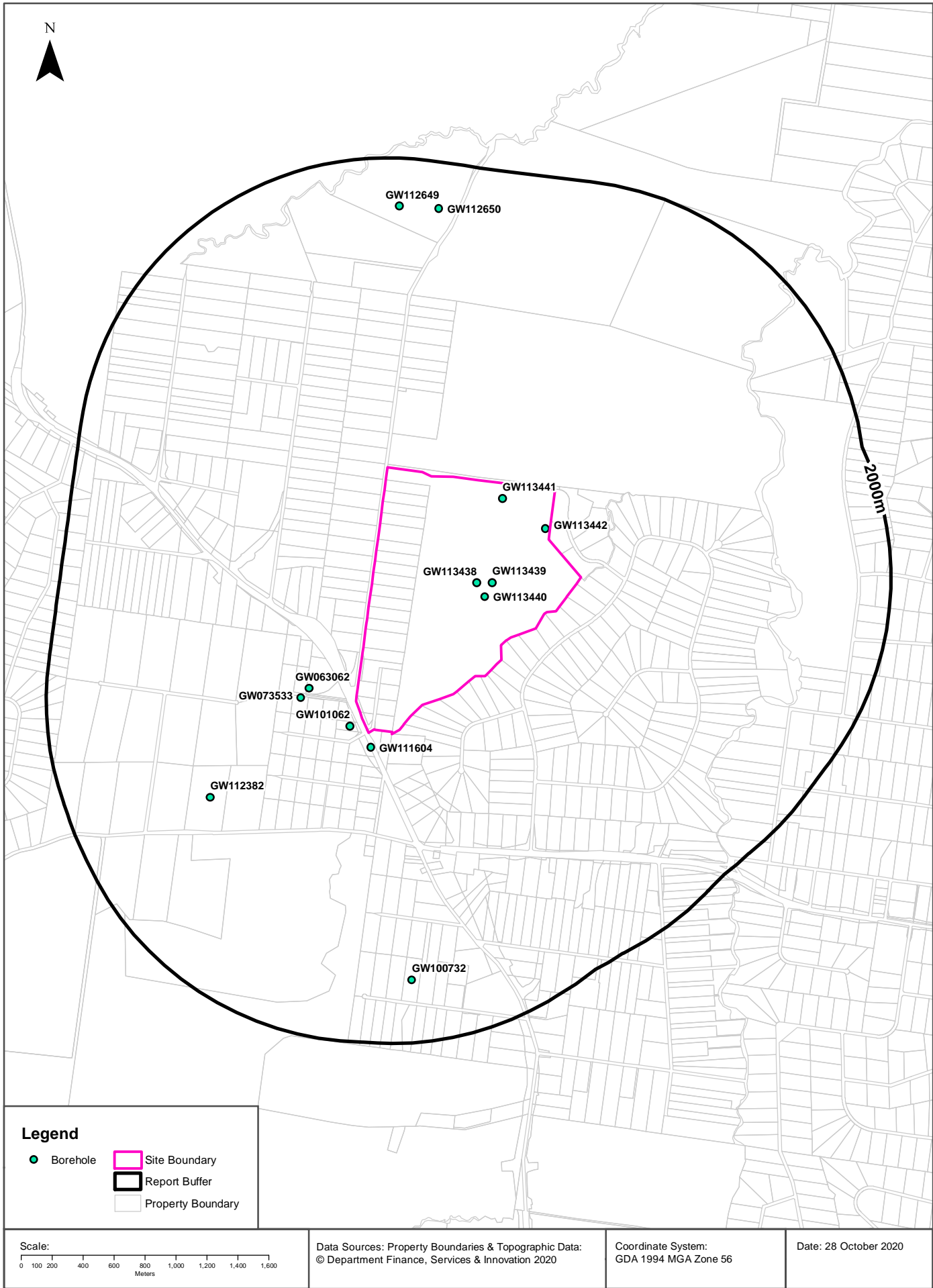
### Temporary Water Restriction (Botany Sands Groundwater Source) Order 2018

Temporary water restrictions relating to the Botany Sands aquifer within the dataset buffer:

Prohibition Area No.	Prohibition	Distance	Direction
N/A	No records in buffer		

Temporary Water Restriction (Botany Sands Groundwater Source) Order 2018 Data Source : NSW Department of Primary Industries





# Hydrogeology & Groundwater

Badgerys Creek Road, Bringelly, NSW 2556

## Groundwater Boreholes

Boreholes within the dataset buffer:

GW No.	Licence No	Work Type	Owner Type	Authorised Purpose	Intended Purpose	Name	Complete Date	Final Depth (m)	Drilled Depth (m)	Salinity (mg/L)	SWL (m bgl)	Yield (L/s)	Elev (AHD)	Dist	Dir
GW113 439	10BL604 379	Bore	Other Govt	Monitoring Bore	Monitoring Bore	RAAF Receiving Station	13/12/2010	12.20	12.20					0m	Onsite
GW113 438	10BL604 379	Bore	Other Govt	Monitoring Bore	Monitoring Bore	RAAF Receiving Station	13/12/2010	12.20	12.20					0m	Onsite
GW113 441	10BL604 379	Bore	Private	Monitoring Bore	Monitoring Bore	RAAF Receiving Station	15/12/2010	12.20	12.20					0m	Onsite
GW113 442	10BL604 379	Bore	Private	Monitoring Bore	Monitoring Bore	RAAF Receiving Station	15/12/2010	6.00	6.00					0m	Onsite
GW113 440	10BL604 379	Bore	Other Govt	Monitoring Bore	Monitoring Bore	RAAF Receiving Station	14/12/2010	12.10	12.10					0m	Onsite
GW101 062	10BL158 117, 10WA10 8412	Bore	Private	Domestic, Stock	Domestic, Stock		09/09/1997	220.00	220.00		45.00	1.800		93m	South West
GW111 604	10BL604 962	Bore	Other Govt	Monitoring Bore	Monitoring Bore		25/08/2011	20.00	20.00					98m	South West
GW063 062	10BL126 198, 10WA10 9401	Bore	Private	Domestic, Industrial, Stock	Domestic, Industrial, Stock		01/01/1989	151.00						310m	South West
GW073 533		Bore	Private		Domestic		01/01/1990	330.00						355m	South West
GW112 382	10WA11 8659	Bore	Private	Domestic	Domestic		01/01/1924	7.00	7.00		4.50			1105m	South West
GW100 732	10BL157 848, 10WA10 8391	Bore	Private	Domestic, Stock	Domestic, Stock		17/01/1997	138.00	138.00	13300	20.00	1.300		1596m	South
GW112 649	10BL605 135	Bore	Private	Monitoring Bore	Monitoring Bore		24/04/2012	30.12	30.12		6.80			1689m	North
GW112 650	10BL605 135	Bore	Private	Monitoring Bore	Monitoring Bore		24/04/2012	30.70	30.70		8.50			1700m	North

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

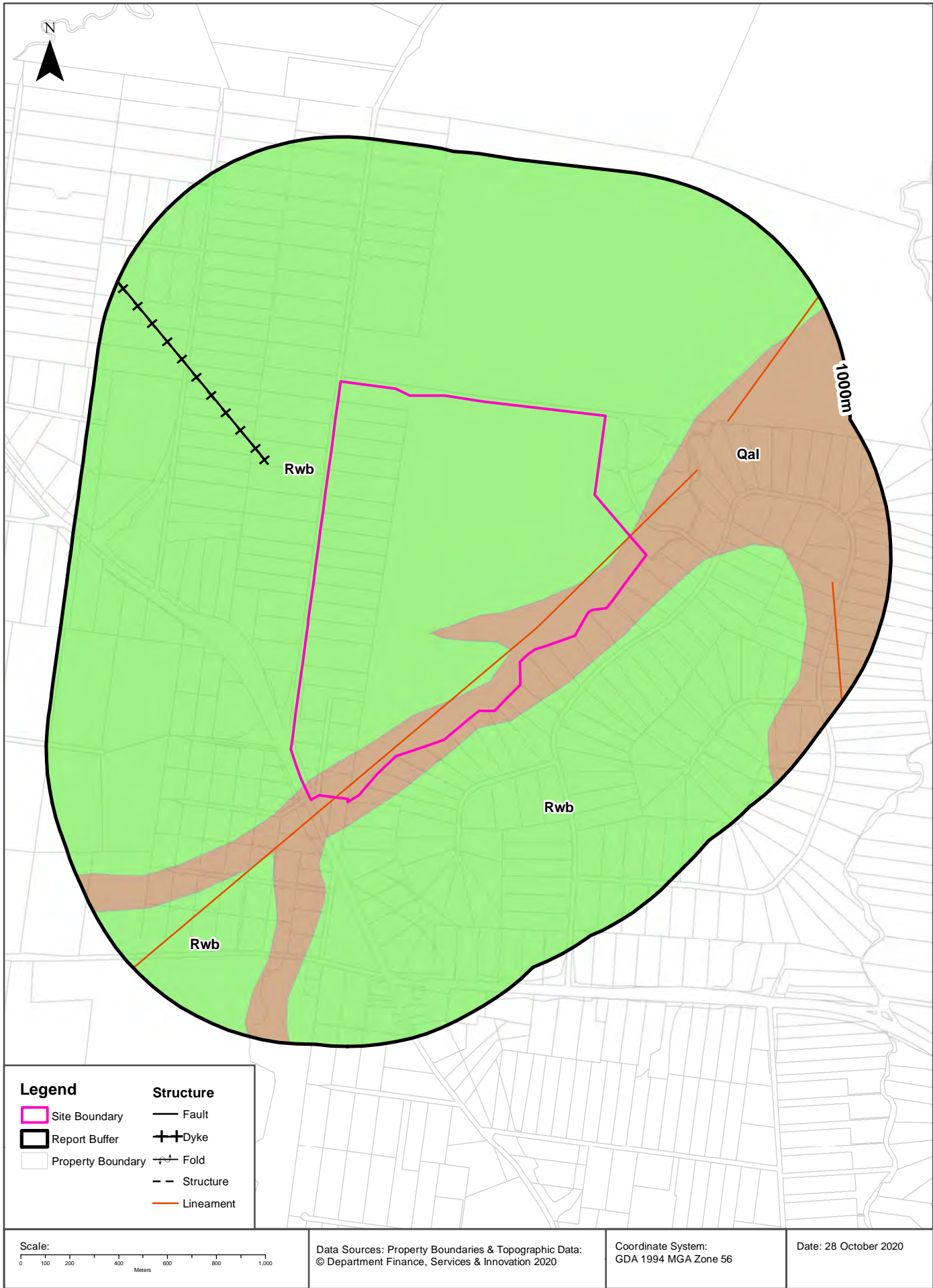
Badgerys Creek Road, Bringelly, NSW 2556

## Driller's Logs

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

Groundwater No	Drillers Log	Distance	Direction
GW101062	0.00m-2.00m CLAY 2.00m-4.00m BROWN SHALE 4.00m-51.00m BLACK SHALE. WATER BEARING 24m TDS-8768/1.0L/s 51.00m-53.00m DARK GREY SANDSTONE. VERY FINE GRAIN 53.00m-55.00m BLACK SHALE 55.00m-67.00m DARK GREY SANDSTONE. VERY FINE GRAIN 67.00m-110.00m BLACK SHALE 110.00m-170.00m WHITE QUARTZ. SANDSTONE M TO C GRAIN BIT OF QUARTZ 170.00m-190.00m WHITE QUARTZ. SANDSTONE M TO C GRAIN. LOT OF QUARTZ. AT 180 1.2 TDS 7507/AT 186-1.4 TDS -6720 190.00m-199.00m SILTSTONE 199.00m-220.00m WHITE QUARTZ. SANDSTONE.MED.GRAIN. BIT OF QUARTZ 220.00m-220.00m AT 204-1.6 TDS-5888 AT 220 -1.8 L/s TDS = 5568	93m	South West
GW111604	0.00m-0.60m TOPSOIL 0.60m-3.05m SILTY CLAY 3.05m-4.00m SILTY CLAY,PALE GREY 4.00m-5.80m SILTY CLAY,BROWN MOTTLED 5.80m-8.00m SHALE GREY,THIN SILTSTONE 8.00m-9.50m SHALE DARK GREY 9.50m-12.90m SHALE DARK GREY,FINE GRAINED SANDSTONE 12.90m-17.10m SHALE GREY,DARK GREY 17.10m-20.00m SANDSTONE.GREY,SHALE FINE GRAINED	98m	South West
GW100732	0.00m-4.50m CLAY 4.50m-28.40m SHALE DARK GREY 28.40m-30.70m SANDSTONE DARK GREY F.G. CEMENTED 30.70m-36.30m SHALE DARK GREY 36.30m-37.30m SANDSTONE DARK GREY F.G. CEMENTED 37.30m-56.00m SHALE DARK GREY 56.00m-57.30m SANDSTONE DARK GREY F.G. CEMENTED 57.30m-61.80m SILTSTONE 61.80m-104.50m SHALE DARK GREY 104.50m-105.40m SANDSTONE GREY F.G. CEMENTED 105.40m-108.60m SANDSTONE GREY F.G. CEMENTED 108.60m-110.30m SANDSTONE GREY C.G. SLIGHT QUARTZ MATRIX 110.30m-112.50m SANDSTONE LIGHT GREY OPEN 112.50m-119.70m SANDSTONE GREY F.G. CEMENTED 119.70m-125.30m SANDSTONE LIGHT GREY C.G. OPEN 125.30m-131.90m SANDSTONE LIGHT GREY C.G. 131.90m-133.70m SANDSTONE LIGHT GREY QUARTZ MATRIX 133.70m-137.80m SANDSTONE LIGHT GREY C.G. OPEN 137.80m-138.00m SHALE	1596m	South
GW112649	0.00m-0.20m TOPSOIL, CLAYEY SILT 0.20m-2.10m SILTY CLAY 2.10m-7.40m CLAYSTONE,WEATHERED 7.40m-8.76m SANDSTONE,WEATHERED 8.76m-13.84m SILTSTONE , WEATHERED 13.84m-14.40m LAMINITE,SANDSTONE AND SILTSTONE 14.40m-27.73m SILTSTONE,WEATHERED,DARK GREY 27.73m-29.16m LAMINITE,SANDSTONE AND SILTSTONE 29.16m-30.12m SILTSTONE,M/STRENGTH.DARK GREY	1689m	North
GW112650	0.00m-0.20m TOPSOIL (CLAYEY SILT) 0.20m-3.65m SILTY CLAY 3.65m-5.45m SILTSTONE, CLAYSTONE 5.45m-11.15m SANDSTONE WEATHERED 11.15m-21.15m SILTSTONE 21.15m-22.70m SANDSTONE / SILTSTONE 22.70m-26.30m SILTSTONE FRESH 26.30m-27.80m LAMINITE,SANDSTONE AND SILTSTONE 27.80m-30.70m SILTSTONE,FRESH,GREY	1700m	North

Drill Log Data Source: NSW Department of Primary Industries - Office of Water / Water Administration Ministerial Corp  
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## Geology

Badgerys Creek Road, Bringelly, NSW 2556

### Geological Units

What are the Geological Units onsite?

Symbol	Description	Unit Name	Group	Sub Group	Age	Dom Lith	Map Sheet	Dataset
Qal	Fine-grained sand, silt and clay				Quaternary		Penrith	1:100,000
Rwb	Shale, carbonaceous claystone, claystone, laminate, fine to medium-grained lithic sandstone, rare coal and tuff	Bringelly Shale	Wianamatta Group (undifferentiated)		Middle Triassic		Penrith	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
Qal	Fine-grained sand, silt and clay				Quaternary		Penrith	1:100,000
Rwb	Shale, carbonaceous claystone, claystone, laminate, fine to medium-grained lithic sandstone, rare coal and tuff	Bringelly Shale	Wianamatta Group (undifferentiated)		Middle Triassic		Penrith	1:100,000

### Geological Structures

What are the Geological Structures onsite?

Feature	Name	Description	Map Sheet	Dataset
Lineament			Penrith	1:100,000

What are the Geological Structures within the dataset buffer?

Feature	Name	Description	Map Sheet	Dataset
Lineament		Narellan Lineament	Penrith	1:100,000
Lineament			Penrith	1:100,000
Lineament			Penrith	1:100,000
Dyke			Penrith	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

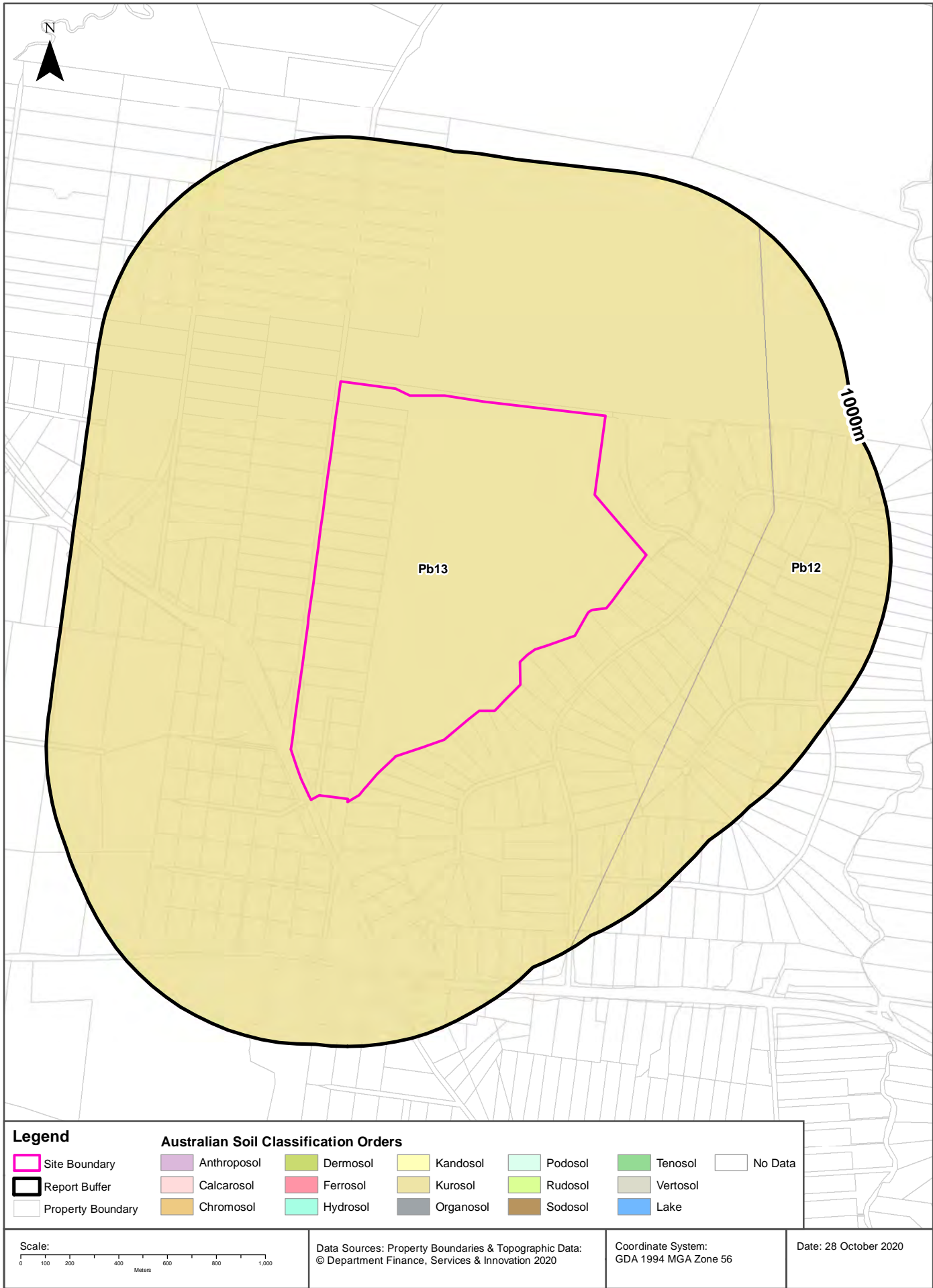
Badgerys Creek Road, Bringelly, NSW 2556

## 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



## Soils

Badgerys Creek Road, Bringelly, NSW 2556

### Atlas of Australian Soils

Soil mapping units and Australian Soil Classification orders within the dataset buffer:

Map Unit Code	Soil Order	Map Unit Description	Distance
Pb13	Kurosol	Ridge and valley country of gently undulating ridge tops and steep side slopes often with slumping, also rounded hilly to steep hilly areas and relatively narrow valleys: chief soils are hard acidic red soils (Dr2.21) with hard acidic yellow mottled soils (Dy3.41); in places some ironstone gravels occur in both these soils. Associated are hard neutral and alkaline red soils (Dr2.22 and Dr2.23) in saddles and some mid-slope positions; (Dy3.42 and Dy3.43) soils, usually in depressions; and small areas of undescribed soils in wet soaks and valley areas. Small areas of other soils are likely throughout.	0m
Pb12	Kurosol	Gently rolling to rounded hilly country with some steep slopes and broad valleys: chief soils are hard acidic red soils (Dr2.21) with hard neutral and acidic yellow mottled soils (Dy3.42 and Dy3.41) on lower slopes and in valleys. Associated are small areas of various soils including (Gn3.54) on some ridges, (Dr3.31) on some slopes; (Dr2.23) in saddles and some mid-slope positions, and some low-lying swampy areas of (Uf6) soils and (Uc1.2) soils with peaty surfaces. Small areas of other soils such as (Db1.2) are likely throughout.	396m

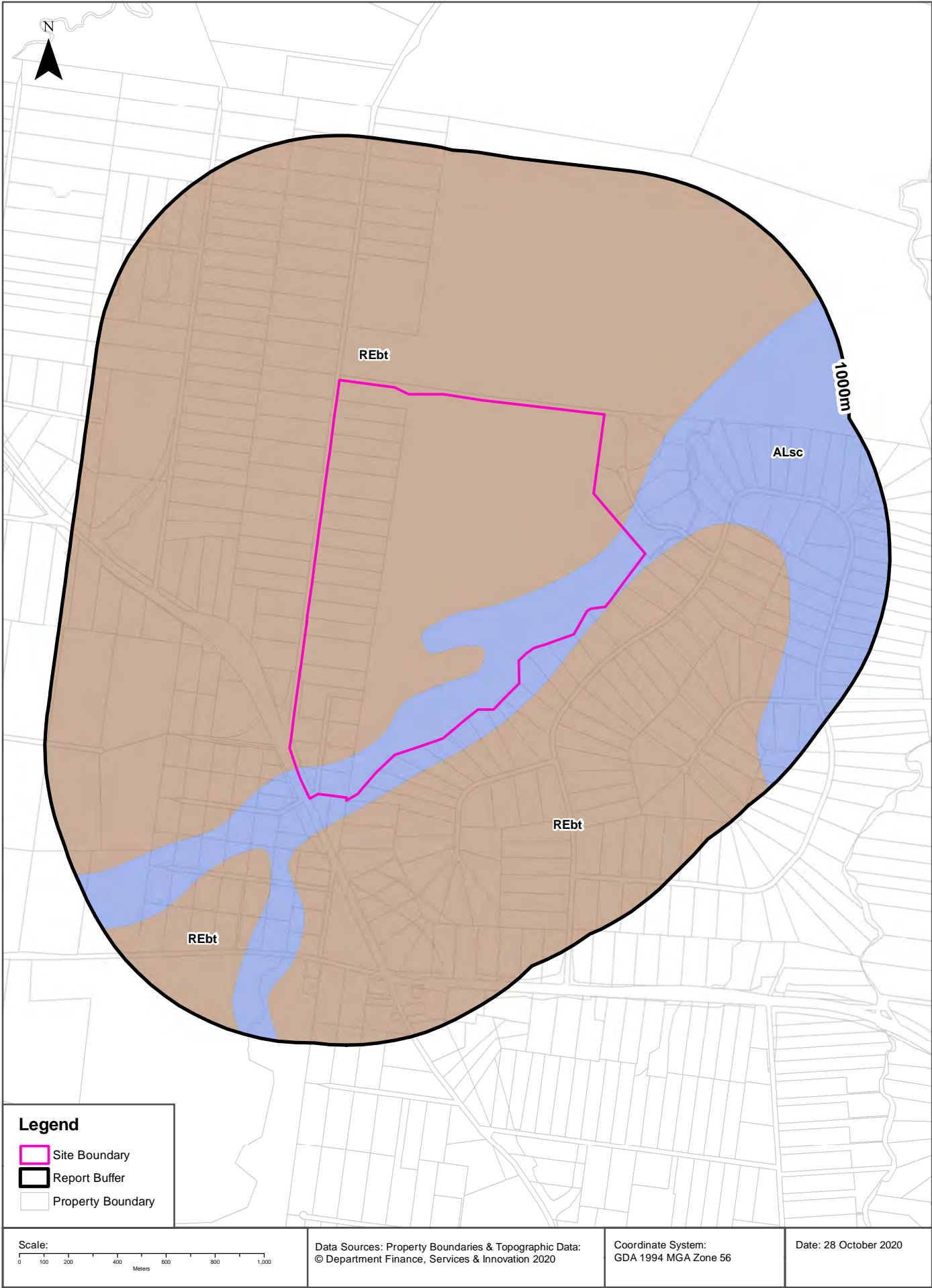
Atlas of Australian Soils Data Source: CSIRO

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# Soil Landscapes

Badgerys Creek Road, Bringelly, NSW 2556



## Soils

Badgerys Creek Road, Bringelly, NSW 2556

## Soil Landscapes

What are the onsite Soil Landscapes?

Soil Code	Name	Group	Process	Map Sheet	Scale
ALsc	SOUTH CREEK		ALLUVIAL	Penrith	1:100,000
REbt	BLACKTOWN		RESIDUAL	Penrith	1:100,000

What are the Soil Landscapes within the dataset buffer?

Soil Code	Name	Group	Process	Map Sheet	Scale
ALsc	SOUTH CREEK		ALLUVIAL	Penrith	1:100,000
REbt	BLACKTOWN		RESIDUAL	Penrith	1:100,000

Soils Landscapes Data Source : NSW Office of Environment and Heritage

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## Acid Sulfate Soils

Badgerys Creek Road, Bringelly, NSW 2556

### Environmental Planning Instrument - Acid Sulfate Soils

What is the on-site Acid Sulfate Soil Plan Class that presents the largest environmental risk?

Soil Class	Description	EPI Name
N/A		

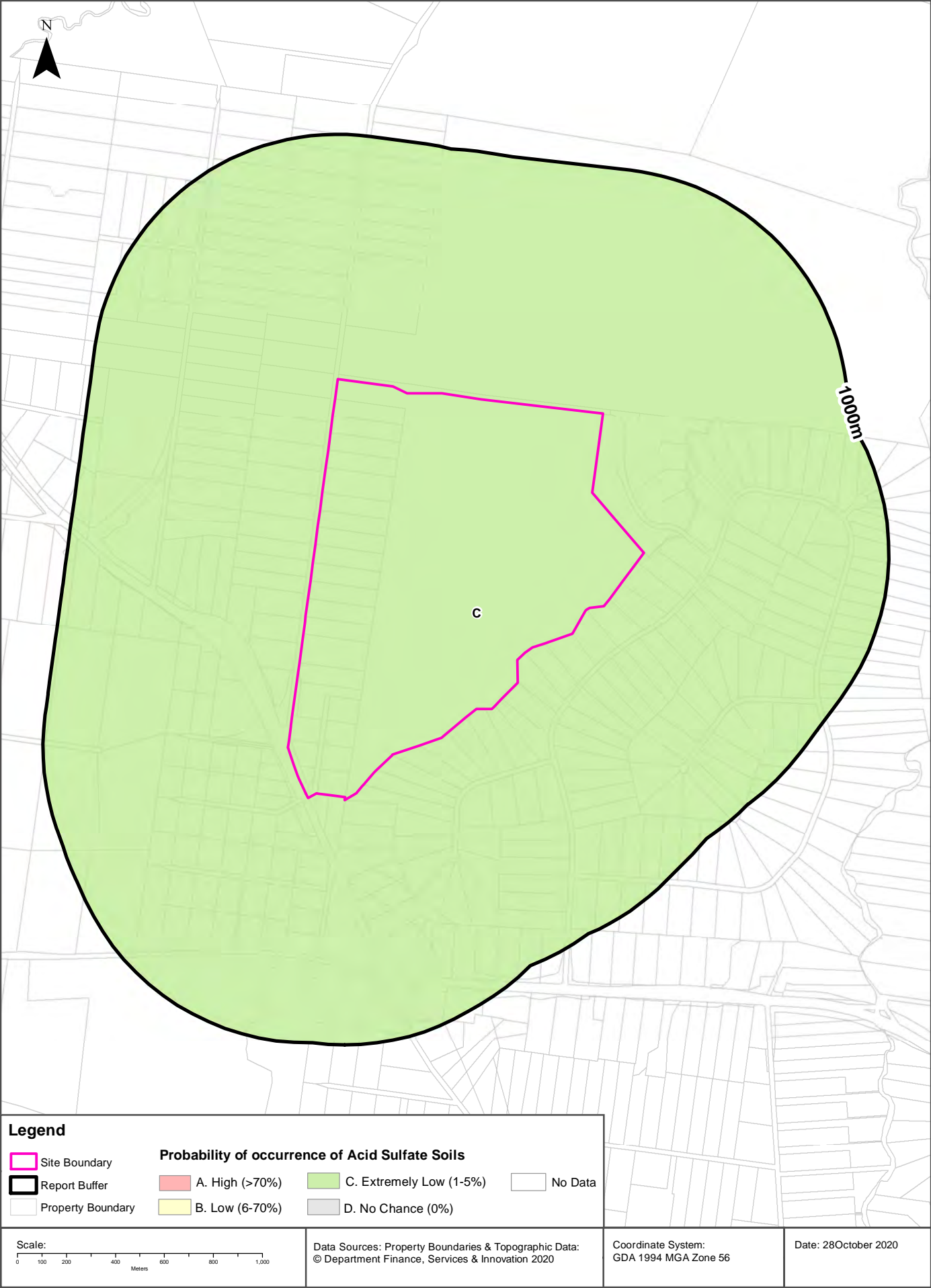
If the on-site Soil Class is 5, what other soil classes exist within 500m?

Soil Class	Description	EPI Name	Distance	Direction
N/A				

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## Acid Sulfate Soils

Badgerys Creek Road, Bringelly, NSW 2556

### Atlas of Australian Acid Sulfate Soils

Atlas of Australian Acid Sulfate Soil categories within the dataset buffer:

Class	Description	Distance
C	Extremely low probability of occurrence. 1-5% chance of occurrence with occurrences in small localised areas.	0m

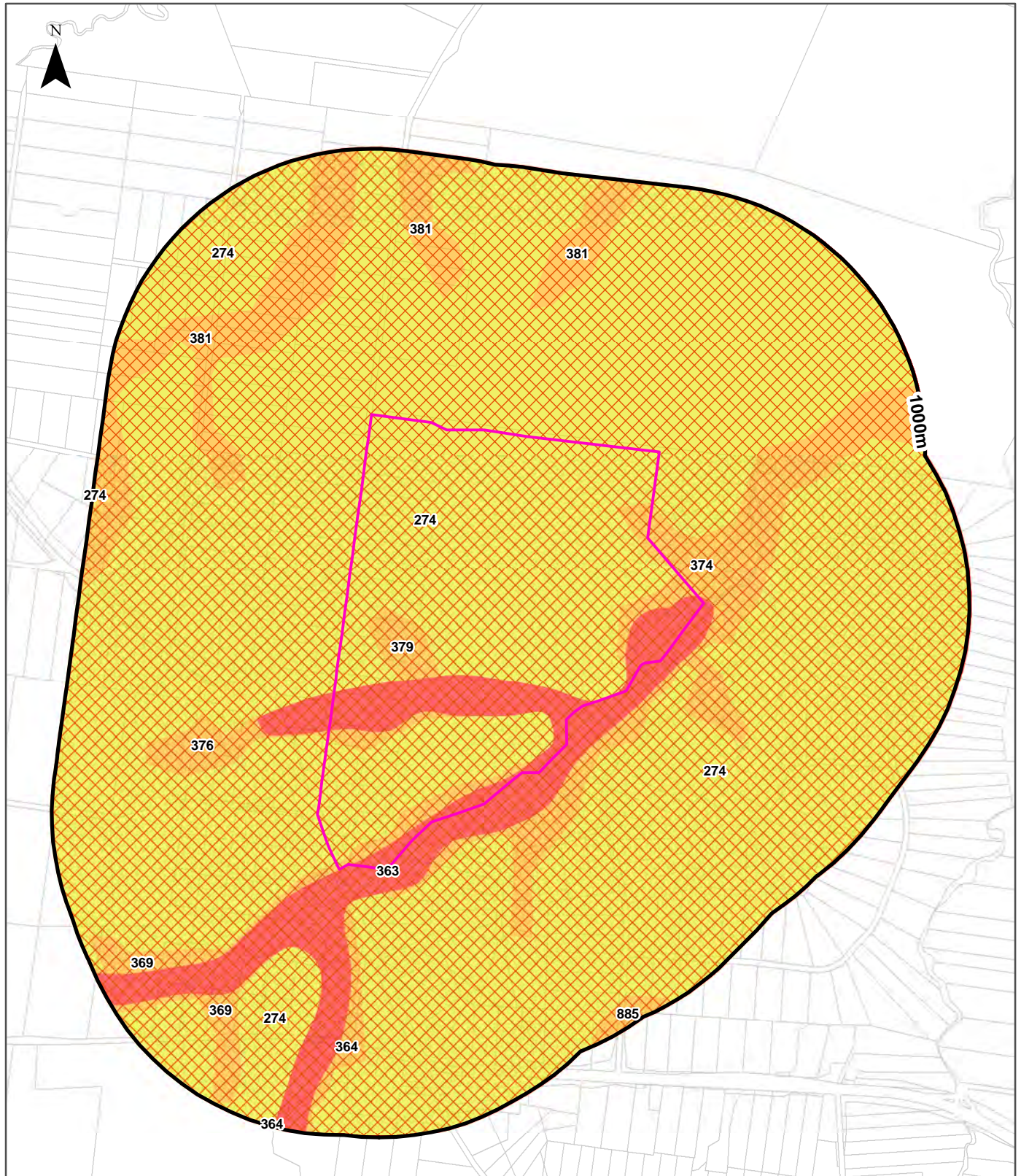
Atlas of Australian Acid Sulfate Soils Data Source: CSIRO

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# Dryland Salinity

Badgerys Creek Road, Bringelly, NSW 2556



Legend		Dryland Salinity - National Assessment		Salinity Potential of Western Sydney	
	Site Boundary		Delineated risk area but no high hazard or risk rating for either 2000, 2020, 2050		Area of Known Salinity
	Report Buffer		High hazard or risk in 2050 only		Area of High Salinity Potential
	Property Boundary		High hazard or risk defined for 2050, but no assessment made for 2000 or 2020		Area of Moderate Salinity Potential
			High hazard or risk in 2020 and 2050		Area of Very Low Salinity Potential
			High hazard or risk in 2000 and 2050. 2020 not defined as high hazard		Area of Water
			High hazard or risk defined for all years: 2000, 2020, 2050		

Scale:  
0 100 200 400 600 800 1,000  
Meters

Data Sources: Property Boundaries & Topographic Data:  
© Department Finance, Services & Innovation 2020

Coordinate System:  
GDA 1994 MGA Zone 56

Date: 28 October 2020



## Dryland Salinity

Badgerys Creek Road, Bringelly, NSW 2556

### Dryland Salinity - National Assessment

Is there Dryland Salinity - National Assessment data onsite?

**Yes**

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

**Yes**

What Dryland Salinity assessments are given?

Assessment 2000	Assessment 2020	Assessment 2050	Distance	Direction
High hazard or risk	High hazard or risk	High hazard or risk	0m	Onsite

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
363	SALT	Area of Known Salinity	0m	Onsite
379	HIGH	Area of High Salinity Potential	0m	Onsite
374	HIGH	Area of High Salinity Potential	0m	Onsite
369	HIGH	Area of High Salinity Potential	0m	Onsite
376	HIGH	Area of High Salinity Potential	0m	Onsite
364	HIGH	Area of High Salinity Potential	129m	South West
381	HIGH	Area of High Salinity Potential	436m	North
885	HIGH	Area of High Salinity Potential	893m	South

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

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## Mining

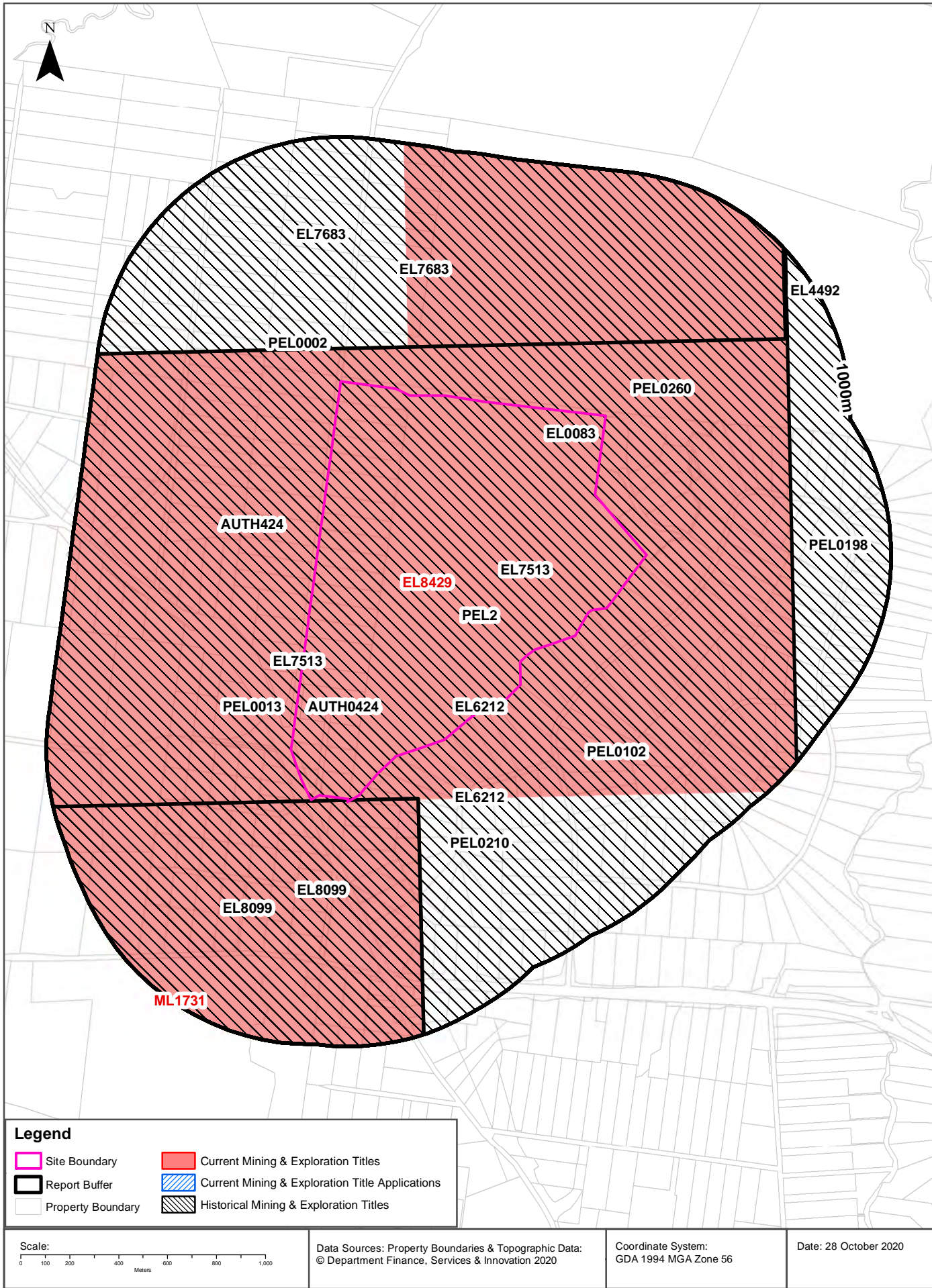
Badgerys Creek Road, Bringelly, NSW 2556

### 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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## Mining

Badgerys Creek Road, Bringelly, NSW 2556

### Current Mining & Exploration Titles

Current Mining & Exploration Titles within the dataset buffer:

Title Ref	Holder	Grant Date	Expiry Date	Last Renewed	Operation	Resource	Minerals	Dist (m)	Dir'
EL8429	THE AUSTRAL BRICK CO PTY LTD	20/04/16	20/04/21	20 Jun 2018	EXPLORING	MINERALS	Group 5	0m	Onsite
ML1731	PGH BRICKS AND PAVERS PTY LIMITED	09/03/16	09/03/37	09 Mar 2016	MINING	MINERALS	Clay/Shale	930m	South West

Current Mining & Exploration Titles Data Source: © State of New South Wales through NSW Department of Industry

### Current Mining & Exploration Title Applications

Current Mining & Exploration Title Applications within the dataset buffer:

Application Ref	Applicant	Application Date	Operation	Resource	Minerals	Dist (m)	Dir'
N/A	No Records in Buffer						

Current Mining & Exploration Title Applications Data Source: © State of New South Wales through NSW Department of Industry

## Mining

Badgerys Creek Road, Bringelly, NSW 2556

### Historical Mining & Exploration Titles

Historical Mining & Exploration Titles within the dataset buffer:

Title Ref	Holder	Start Date	End Date	Resource	Minerals	Dist (m)	Dir'
AUTH0424	SECRETARY OF THE DEPARTMENT OF PLANNING AND ENVIRONMENT	19 Jan 1990	01 May 2019	COAL	Coal	0m	Onsite
AUTH424	SECRETARY OF THE DEPARTMENT OF PLANNING AND ENVIRONMENT			MINERALS		0m	Onsite
EL0083	CONTINENTAL OIL CO OF AUSTRALIA LIMITED	01 Feb 1967	01 Feb 1968	MINERALS		0m	Onsite
EL6212	HOT ROCK ENERGY PTY LTD, LONGREACH OIL LIMITED			MINERALS		0m	Onsite
EL6212	HOT ROCK ENERGY PTY LTD, LONGREACH OIL LIMITED	4 Mar 2004	3 Mar 2013	MINERALS	Geothermal	0m	Onsite
EL7513	GRADIENT ENERGY LIMITED			MINERALS		0m	Onsite
EL7513	GRADIENT ENERGY LIMITED	7 Apr 2010	15 Apr 2011	MINERALS	Geothermal	0m	Onsite
PEL0002	AGL UPSTREAM INVESTMENTS PTY LIMITED	29/03/1993	6/07/2015	PETROLEUM	Petroleum	0m	Onsite
PEL0013	AUSTRALIAN OIL AND GAS CORPORATION LTD			PETROLEUM	Petroleum	0m	Onsite
PEL0102	AUSTRALIAN OIL AND GAS CORPORATION LTD			PETROLEUM	Petroleum	0m	Onsite
PEL0210	THE AUSTRALIAN GAS LIGHT COMPANY (AGL), NORTH BULLI COLLIERIES PTY LTD			PETROLEUM	Petroleum	0m	Onsite
PEL0260	NORTH BULLI COLLIERIES PTY LTD, AGL PETROLEUM OPERATIONS PTY LTD, THE AUSTRALIAN GAS LIGHT CO.	9/09/1981	8/03/1993	PETROLEUM	Petroleum	0m	Onsite
PEL2	AGL UPSTREAM INVESTMENTS PTY LIMITED			MINERALS		0m	Onsite
EL8099	BORAL LIMITED			MINERALS		0m	South West
EL8099	BORAL LIMITED	11 Jun 2013	11 Jun 2015	MINERALS	Clay shale	0m	South West
EL7683	EPIC MINING PTY LTD			MINERALS		134m	North
EL7683	EPIC MINING PTY LTD	7 Jan 2011	7 Jan 2013	MINERALS		134m	North
PEL0198	JOHN STREVS (TERRIGAL) NL			PETROLEUM	Petroleum	595m	East
EL4492	PACIFIC WASTE MANAGEMENT PTY LTD	01 Mar 1993	01 Nov 1993	MINERALS		972m	North East

Historical Mining & Exploration Titles Data Source: © State of New South Wales through NSW Department of Industry

## State Environmental Planning Policy

Badgerys Creek Road, Bringelly, NSW 2556

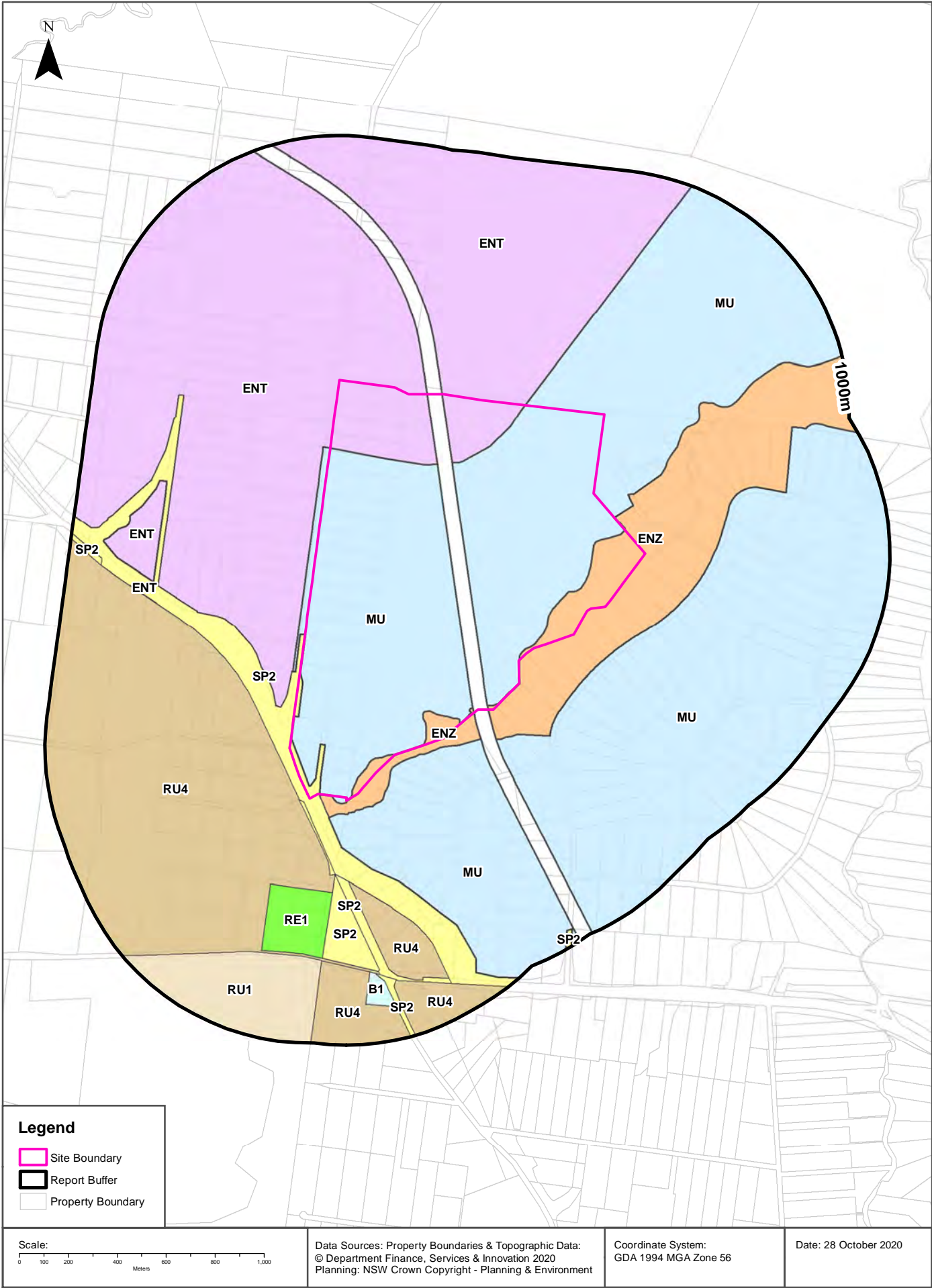
### State Significant Precincts

What SEPP State Significant Precincts exist within the dataset buffer?

Map Id	Precinct	EPI Name	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
N/A	No Records in Buffer							

State Environment Planning Policy Data Source: NSW Crown Copyright - Planning & Environment  
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# Environmental Planning Instrument

Badgerys Creek Road, Bringelly, NSW 2556

## Land Zoning

What EPI Land Zones exist within the dataset buffer?

Zone	Description	Purpose	EPI Name	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
MU	Mixed Use		State Environmental Planning Policy (Western Sydney Aerotropolis) 2020	11/09/2020	01/10/2020	11/09/2020		0m	Onsite
ENT	Enterprise		State Environmental Planning Policy (Western Sydney Aerotropolis) 2020	11/09/2020	01/10/2020	11/09/2020		0m	Onsite
ENZ	Environment and Recreation		State Environmental Planning Policy (Western Sydney Aerotropolis) 2020	11/09/2020	01/10/2020	11/09/2020		0m	Onsite
SP2	Infrastructure	Bringelly Road	State Environmental Planning Policy (Western Sydney Aerotropolis) 2020	11/09/2020	01/10/2020	11/09/2020		0m	Onsite
SP2	Infrastructure	Classified Road	Liverpool Local Environmental Plan 2008	10/09/2020	01/10/2020	10/09/2020	State Environmental Planning Policy (Western Sydney Aerotropolis) Amendment	29m	South
MU	Mixed Use		State Environmental Planning Policy (Western Sydney Aerotropolis) 2020	11/09/2020	01/10/2020	11/09/2020		32m	South
RU4	Primary Production Small Lots		Liverpool Local Environmental Plan 2008	10/09/2020	01/10/2020	10/09/2020	State Environmental Planning Policy (Western Sydney Aerotropolis) Amendment	42m	West
MU	Mixed Use		State Environmental Planning Policy (Western Sydney Aerotropolis) 2020	11/09/2020	01/10/2020	11/09/2020		124m	South East
SP2	Infrastructure	Educational Establishment	Liverpool Local Environmental Plan 2008	29/08/2008	29/08/2008	18/09/2020		305m	South
RU4	Primary Production Small Lots		Liverpool Local Environmental Plan 2008	10/09/2020	01/10/2020	10/09/2020	State Environmental Planning Policy (Western Sydney Aerotropolis) Amendment	330m	South
RE1	Public Recreation		Liverpool Local Environmental Plan 2008	29/08/2008	29/08/2008	18/09/2020		368m	South West
ENT	Enterprise		State Environmental Planning Policy (Western Sydney Aerotropolis) 2020	11/09/2020	01/10/2020	11/09/2020		620m	West
ENT	Enterprise		State Environmental Planning Policy (Western Sydney Aerotropolis) 2020	11/09/2020	01/10/2020	11/09/2020		644m	West
RU1	Primary Production		Camden Local Environmental Plan 2010	03/09/2010	03/09/2010	15/05/2020		645m	South West
RU4	Primary Production Small Lots		Camden Local Environmental Plan 2010	03/09/2010	03/09/2010	15/05/2020		662m	South

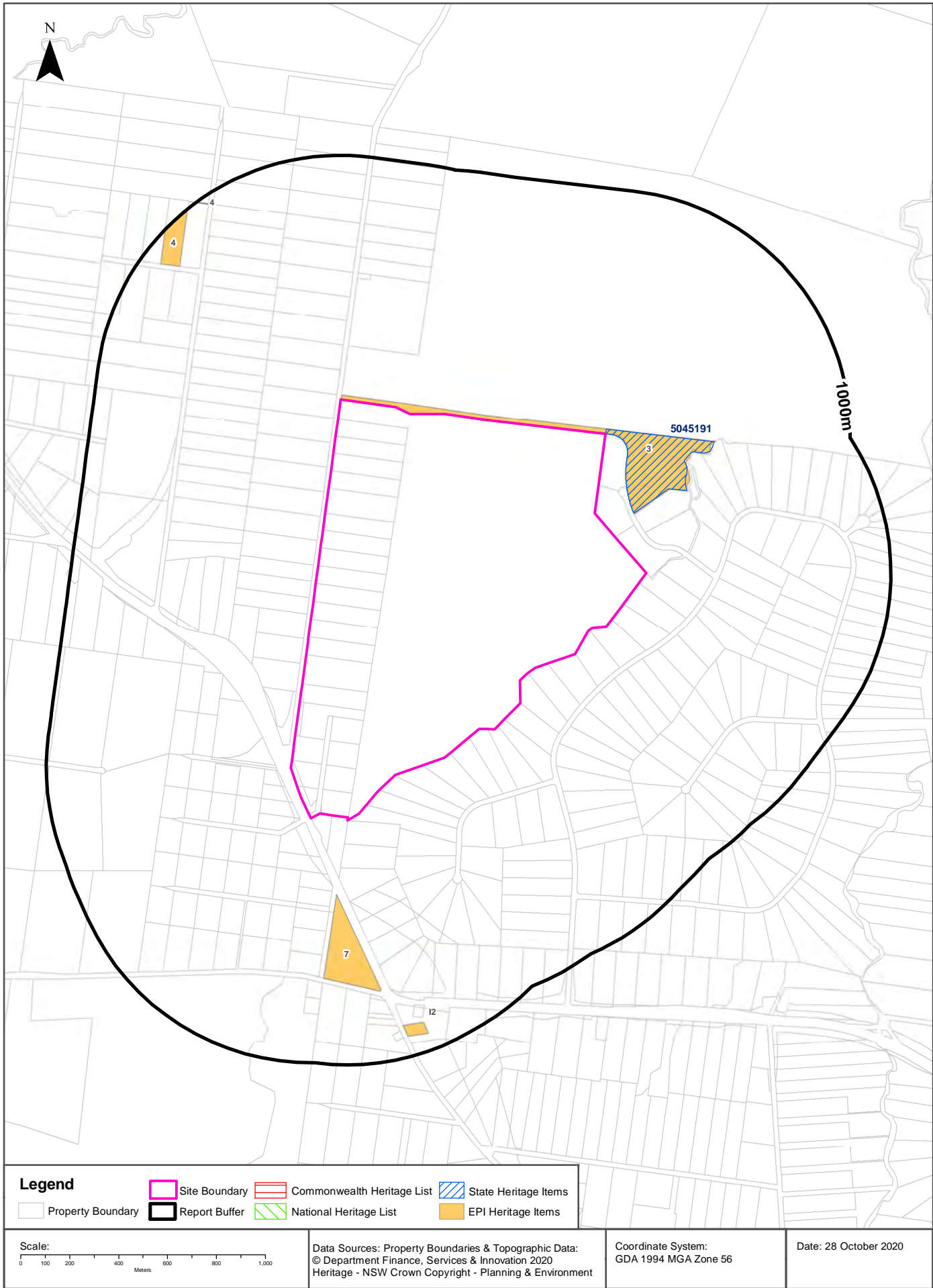
Zone	Description	Purpose	EPI Name	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
SP2	Infrastructure	Classified Road	Liverpool Local Environmental Plan 2008	10/09/2020	01/10/2020	10/09/2020	State Environmental Planning Policy (Western Sydney Aerotropolis)	665m	West
B1	Neighbourhood Centre		Camden Local Environmental Plan 2010	03/09/2010	03/09/2010	15/05/2020		707m	South
SP2	Infrastructure	Classified Road	Camden Local Environmental Plan 2010	03/09/2010	03/09/2010	15/05/2020		716m	South
RU4	Primary Production Small Lots		Camden Local Environmental Plan 2010	28/02/2019	28/02/2019	15/05/2020	Amendment No 40	761m	South East
SP2	Infrastructure	Classified Road	Liverpool Local Environmental Plan 2008	10/09/2020	01/10/2020	10/09/2020	State Environmental Planning Policy (Western Sydney Aerotropolis)	865m	West

Environmental Planning Instrument Data Source: NSW Crown Copyright - Planning & Environment  
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Heritage Items

Badgerys Creek Road, Bringelly, NSW 2556



Legend

- |                   |                            |                      |
|-------------------|----------------------------|----------------------|
| Site Boundary     | Commonwealth Heritage List | State Heritage Items |
| Report Buffer     | National Heritage List     | EPI Heritage Items   |
| Property Boundary |                            |                      |

Scale:  
0 100 200 400 600 800 1,000  
Meters

Data Sources: Property Boundaries & Topographic Data:  
© Department Finance, Services & Innovation 2020  
Heritage - NSW Crown Copyright - Planning & Environment

Coordinate System:  
GDA 1994 MGA Zone 56

Date: 28 October 2020

## Heritage

Badgerys Creek Road, Bringelly, NSW 2556

### Commonwealth Heritage List

What are the Commonwealth Heritage List Items located within the dataset buffer?

Place Id	Name	Address	Place File No	Class	Status	Register Date	Distance	Direction
N/A	No records in buffer							

Heritage Data Source: Australian Government Department of the Environment and Energy - Heritage Branch  
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### National Heritage List

What are the National Heritage List Items located within the dataset buffer?

Note. Please click on Place Id to activate a hyperlink to online website.

Place Id	Name	Address	Place File No	Class	Status	Register Date	Distance	Direction
N/A	No records in buffer							

Heritage Data Source: Australian Government Department of the Environment and Energy - Heritage Branch  
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### State Heritage Register - Curtilages

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

Map Id	Name	Address	LGA	Listing Date	Listing No	Plan No	Distance	Direction
5045191	Kelvin	30 The Retreat, Bringelly	Liverpool	02/04/1999	00046	216	0m	North East

Heritage Data Source: NSW Crown Copyright - Office of Environment & Heritage  
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### Environmental Planning Instrument - Heritage

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

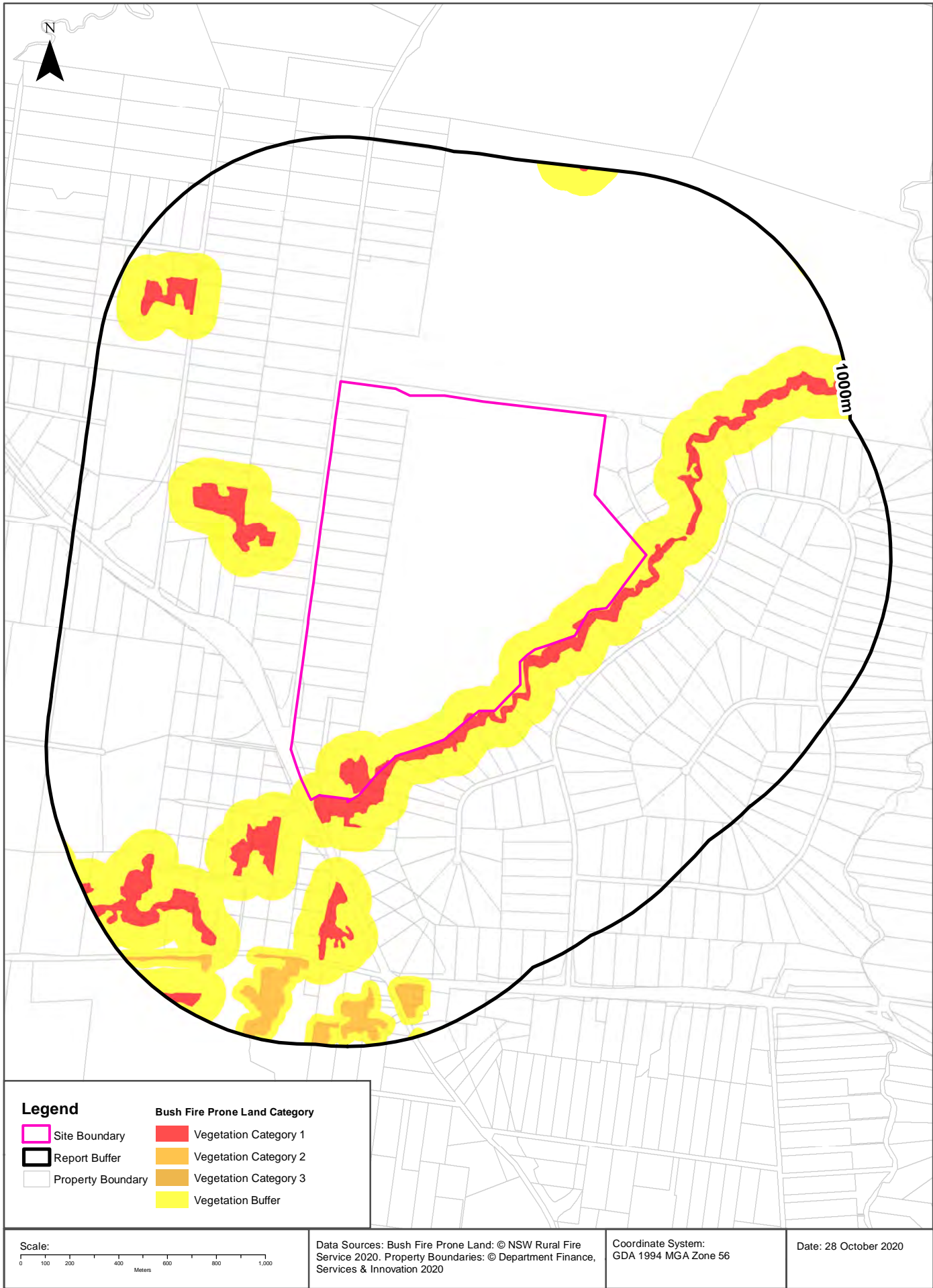
Map Id	Name	Classification	Significance	EPI Name	Published Date	Commenced Date	Currency Date	Distance	Direction
3	Kelvin Park Group, including site landscaping, homestead, kitchen wing, servants's quarters	Item - General	State	State Environmental Planning Policy (Western Sydney Aerotropolis) 2020	11/09/2020	01/10/2020	11/09/2020	0m	North East

Map Id	Name	Classification	Significance	EPI Name	Published Date	Commenced Date	Currency Date	Distance	Direction
7	Bringelly Public School Group, including schoolhouse and former headmaster's residence	Item - General	Local	Liverpool Local Environmental Plan 2008	29/08/2008	29/08/2008	08/04/2016	305m	South
4	Dwelling and rural lot ('Mount Pleasant')	Item - General	State	State Environmental Planning Policy (Western Sydney Aerotropolis) 2020	11/09/2020	01/10/2020	11/09/2020	855m	North West
12	Cottage	Item - General	Local	Camden Local Environmental Plan 2010	03/09/2010	03/09/2010	28/02/2019	868m	South

Heritage Data Source: NSW Crown Copyright - Planning & Environment

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## Natural Hazards

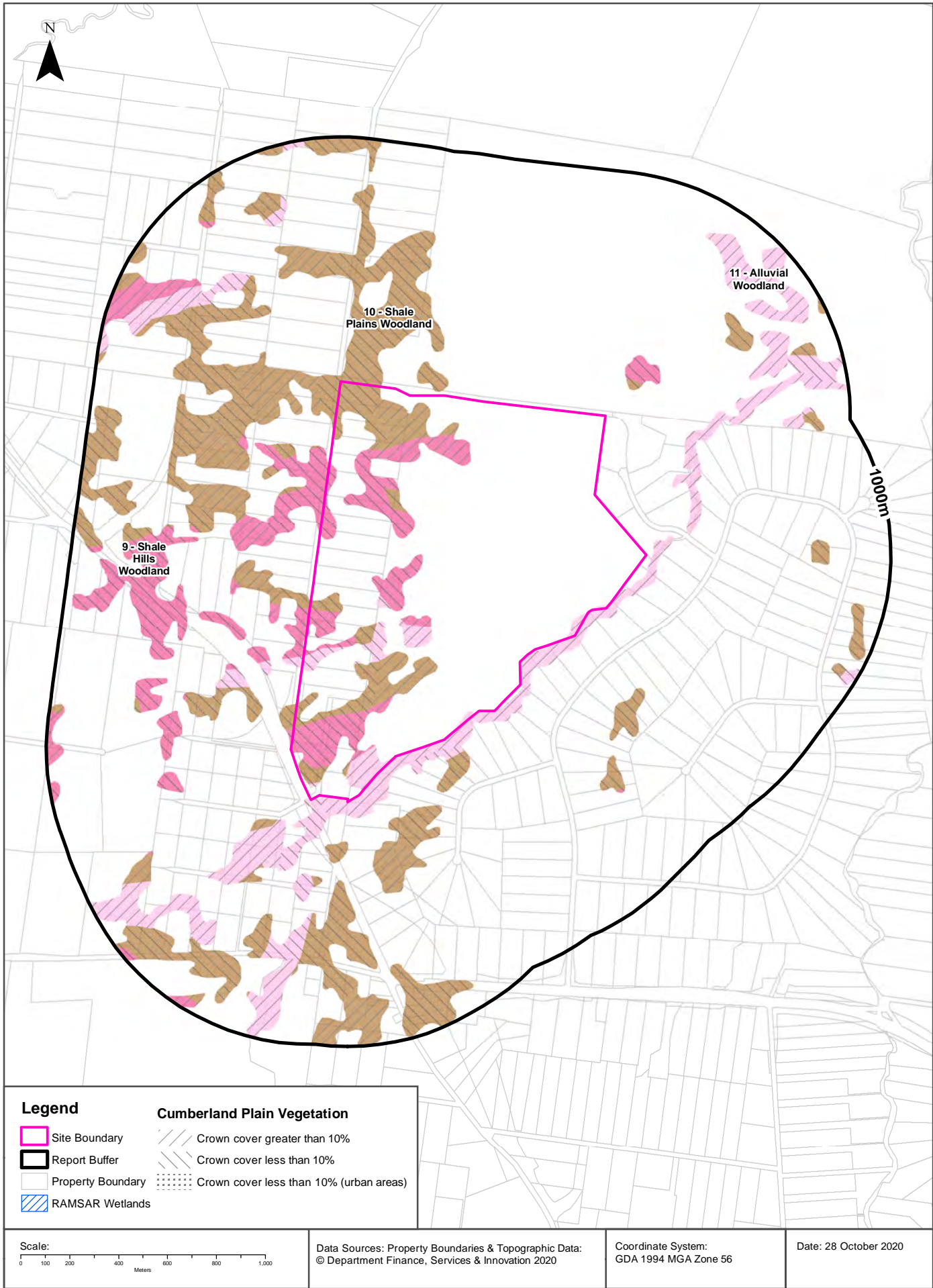
Badgerys Creek Road, Bringelly, NSW 2556

### Bush Fire Prone Land

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

Bush Fire Prone Land Category	Distance	Direction
Vegetation Buffer	0m	Onsite
Vegetation Category 1	0m	Onsite
Vegetation Category 2	645m	South

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





## Ecological Constraints

Badgerys Creek Road, Bringelly, NSW 2556

## Remnant Vegetation of the Cumberland Plain

What remnant vegetation of the Cumberland Plain exists within the dataset buffer?

Description	Crown Cover	Distance	Direction
10 - Shale Plains Woodland	Crown cover greater than 10%	0m	Onsite
11 - Alluvial Woodland	Crown cover greater than 10%	0m	Onsite
9 - Shale Hills Woodland	Crown cover greater than 10%	0m	Onsite
10 - Shale Plains Woodland	Crown cover less than 10%	0m	Onsite
11 - Alluvial Woodland	Crown cover less than 10%	0m	Onsite
9 - Shale Hills Woodland	Crown cover less than 10%	0m	Onsite

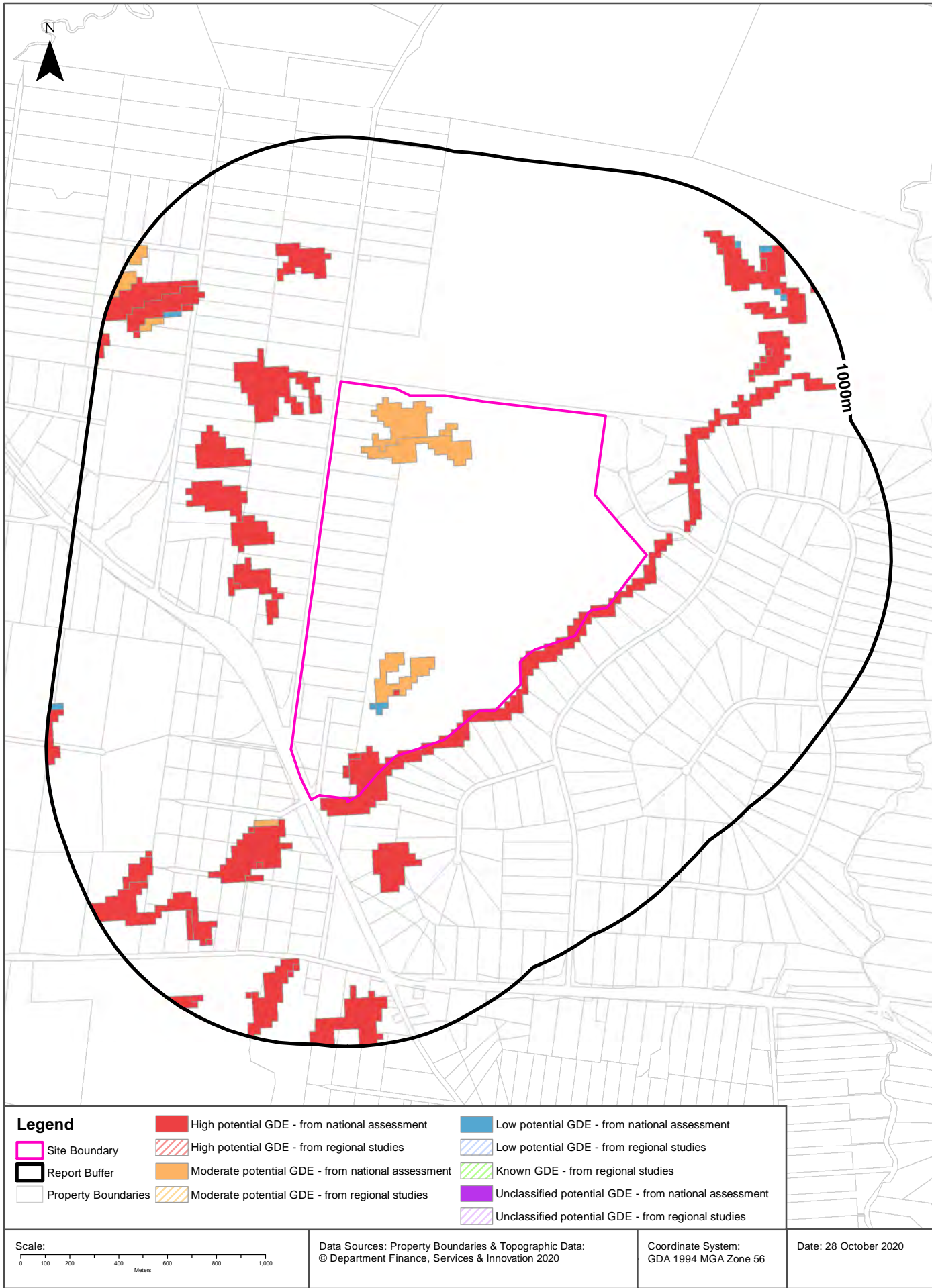
Remnant Vegetation of the Cumberland Plain : NSW Office of Environment and Heritage  
Creative Commons 3.0 © Commonwealth of Australia <http://creativecommons.org/licenses/by/3.0/au/deed.en>

## 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

Badgerys Creek Road, Bringelly, NSW 2556

## Groundwater Dependent Ecosystems Atlas

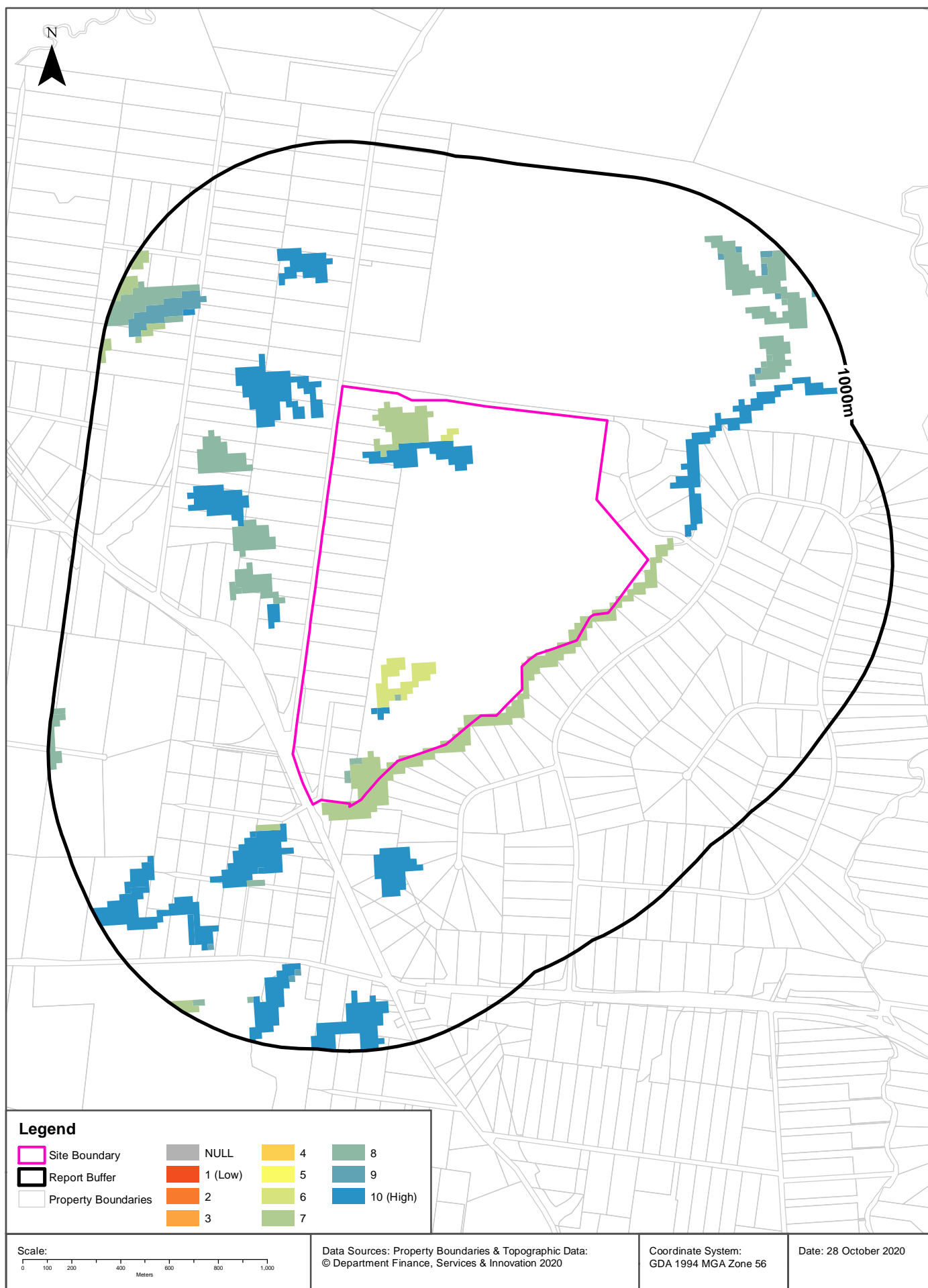
Type	GDE Potential	Geomorphology	Ecosystem Type	Aquifer Geology	Distance
Terrestrial	High potential GDE - from national assessment	Undulating to low hilly country, mainly on shale.	Vegetation	Consolidated sedimentary	0m
Terrestrial	High potential GDE - from national assessment	Undulating to low hilly country, mainly on shale.	Vegetation	Unconsolidated sedimentary	0m
Terrestrial	Low potential GDE - from national assessment	Undulating to low hilly country, mainly on shale.	Vegetation	Consolidated sedimentary	0m
Terrestrial	Moderate potential GDE - from national assessment	Undulating to low hilly country, mainly on shale.	Vegetation	Consolidated sedimentary	0m

Groundwater Dependent Ecosystems Atlas Data Source: The Bureau of Meteorology  
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# Ecological Constraints - Inflow Dependent Ecosystems Likelihood

Badgerys Creek Road, Bringelly, NSW 2556



## Ecological Constraints

Badgerys Creek Road, Bringelly, NSW 2556

### Inflow Dependent Ecosystems Likelihood

Type	IDE Likelihood	Geomorphology	Ecosystem Type	Aquifer Geology	Distance
Terrestrial	6	Undulating to low hilly country, mainly on shale.	Vegetation	Consolidated sedimentary	0m
Terrestrial	7	Undulating to low hilly country, mainly on shale.	Vegetation	Consolidated sedimentary	0m
Terrestrial	7	Undulating to low hilly country, mainly on shale.	Vegetation	Unconsolidated sedimentary	0m
Terrestrial	8	Undulating to low hilly country, mainly on shale.	Vegetation	Consolidated sedimentary	0m
Terrestrial	8	Undulating to low hilly country, mainly on shale.	Vegetation	Unconsolidated sedimentary	0m
Terrestrial	10	Undulating to low hilly country, mainly on shale.	Vegetation	Consolidated sedimentary	0m
Terrestrial	9	Undulating to low hilly country, mainly on shale.	Vegetation	Unconsolidated sedimentary	598m

Inflow Dependent Ecosystems Likelihood Data Source: The Bureau of Meteorology  
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# Ecological Constraints

Badgerys Creek Road, Bringelly, NSW 2556

## NSW BioNet Atlas

Species on the NSW BioNet Atlas that have a NSW or federal conservation status, a NSW sensitivity status, or are listed under a migratory species agreement, and are within 10km of the site?

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Amphibia	Heleioporus australiacus	Giant Burrowing Frog	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Aves	Anseranas semipalmata	Magpie Goose	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Anthochaera phrygia	Regent Honeyeater	Critically Endangered	Not Sensitive	Critically Endangered	
Animalia	Aves	Apus pacificus	Fork-tailed Swift	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Artamus cyanopterus cyanopterus	Dusky Woodswallow	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Botaurus poiciloptilus	Australasian Bittern	Endangered	Not Sensitive	Endangered	
Animalia	Aves	Burhinus grallarius	Bush Stone-curlew	Endangered	Not Sensitive	Not Listed	
Animalia	Aves	Calidris acuminata	Sharp-tailed Sandpiper	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Callocephalon fimbriatum	Gang-gang Cockatoo	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Calyptorhynchus lathamii	Glossy Black-Cockatoo	Vulnerable	Category 2	Not Listed	
Animalia	Aves	Chthonicola sagittata	Speckled Warbler	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Circus assimilis	Spotted Harrier	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Daphoenositta chrysoptera	Varied Sittella	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Ephippiorhynchus asiaticus	Black-necked Stork	Endangered	Not Sensitive	Not Listed	
Animalia	Aves	Gallinago hardwickii	Latham's Snipe	Not Listed	Not Sensitive	Not Listed	ROKAMBA;JAMBA
Animalia	Aves	Glossopsitta pusilla	Little Lorikeet	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Haliaeetus leucogaster	White-bellied Sea-Eagle	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Hieraaetus morphnoides	Little Eagle	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Hirundapus caudacutus	White-throated Needletail	Not Listed	Not Sensitive	Vulnerable	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Lathamus discolor	Swift Parrot	Endangered	Category 3	Critically Endangered	
Animalia	Aves	Lophochroa leadbeateri	Major Mitchell's Cockatoo	Vulnerable	Category 2	Not Listed	
Animalia	Aves	Lophoictinia isura	Square-tailed Kite	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Neophema splendida	Scarlet-chested Parrot	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Ninox strenua	Powerful Owl	Vulnerable	Category 3	Not Listed	



Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Aves	Oxyura australis	Blue-billed Duck	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Petroica boodang	Scarlet Robin	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Petroica phoenicea	Flame Robin	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Pezoporus wallicus wallicus	Eastern Ground Parrot	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Stagonopleura guttata	Diamond Firetail	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Stictonetta naevosa	Freckled Duck	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Tringa nebularia	Common Greenshank	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Gastropoda	Meridolum corneovirens	Cumberland Plain Land Snail	Endangered	Not Sensitive	Not Listed	
Animalia	Gastropoda	Pommerhelix duralensis	Dural Land Snail	Endangered	Not Sensitive	Endangered	
Animalia	Mammalia	Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Mammalia	Falsistrellus tasmaniensis	Eastern False Pipistrelle	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Macropus dorsalis	Black-striped Wallaby	Endangered	Not Sensitive	Not Listed	
Animalia	Mammalia	Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Miniopterus australis	Little Bent-winged Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Miniopterus orianae oceanensis	Large Bent-winged Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Myotis macropus	Southern Myotis	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Petauroides volans	Greater Glider	Not Listed	Not Sensitive	Vulnerable	
Animalia	Mammalia	Phascogale cinerea	Koala	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Mammalia	Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Mammalia	Saccolaimus flaviventris	Yellow-bellied Sheath-tail-bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Scoteanax rueppellii	Greater Broad-nosed Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Reptilia	Caretta caretta	Loggerhead Turtle	Endangered	Not Sensitive	Endangered	
Animalia	Reptilia	Chelonia mydas	Green Turtle	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Reptilia	Eulamprus leuraensis	Blue Mountains Water Skink	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Acacia pubescens	Downy Wattle	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Cynanchum elegans	White-flowered Wax Plant	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Dillwynia tenuifolia		Endangered Population, Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Dillwynia tenuifolia		Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Eucalyptus benthamii	Camden White Gum	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Eucalyptus scoparia	Wallangarra White Gum	Endangered	Not Sensitive	Vulnerable	
Plantae	Flora	Grevillea juniperina subsp. juniperina	Juniper-leaved Grevillea	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Grevillea parviflora subsp. parviflora	Small-flower Grevillea	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Macadamia integrifolia	Macadamia Nut	Not Listed	Not Sensitive	Vulnerable	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Plantae	Flora	Marsdenia viridiflora subsp. viridiflora	Native Pear	Endangered Population	Not Sensitive	Not Listed	
Plantae	Flora	Persoonia nutans	Nodding Geebung	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Pimelea spicata	Spiked Rice-flower	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Pultenaea parviflora		Endangered	Not Sensitive	Vulnerable	
Plantae	Flora	Pultenaea pedunculata	Matted Bush-pea	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Syzygium paniculatum	Magenta Lilly Pilly	Endangered	Not Sensitive	Vulnerable	

Data does not include NSW category 1 sensitive species.

NSW BioNet: © State of NSW and Office of Environment and Heritage

## 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
Premise match	Georeferenced to the site location / premise or part of site
General area or suburb match	Georeferenced with the confidence of the general/approximate area
Road match	Georeferenced to the road or rail
Road intersection	Georeferenced to the road intersection
Feature is a buffered point	Feature is a buffered point
Land adjacent to geocoded site	Land adjacent to Georeferenced Site
Network of features	Georeferenced to a network of features



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  12. These Terms are subject to New South Wales law.

## **APPENDIX D      SITE PHOTOGRAPHS**





## Project Photo Log WPCA PFAS Investigation - 0571466



**Photograph 1**

Area A- Gravel/fill material preceding potential discharge point



**Photograph 2**

Area A- Gravel/fill



**Photograph 3**

Area A- Potential discharge/runoff point



**Photograph 4**

Area B – Metal man hole cover





## Project Photo Log WPCA PFAS Investigation - 0571466



**Photograph 5**  
Area B – Potentially Disturbed Ground



**Photograph 6**  
Area C – Dam wall fill/debris East



**Photograph 7**  
Area C- Dam



**Photograph 8**  
Area B- Dam Wall potential staining and debris SE





## Project Photo Log WPCA PFAS Investigation - 0571466



**Photograph 9**  
Area C- Debris SE



**Photograph 10**  
Area C- Potentially Disturbed ground



**Photograph 11**  
Area D – Fill west of dam



**Photograph 12**  
Area D – Fill north of dam





## Project Photo Log WPCA PFAS Investigation - 0571466



**Photograph 13**  
Area D – Wetland/Marsh area



**Photograph 14**  
Area DA1- Disturbed grounds with old wiring



**Photograph 15**  
Area DA1 – Wooden debris



**Photograph 16**  
Area DA1- Disturbed grounds with old wiring, concrete supports and fill





## Project Photo Log WPCA PFAS Investigation - 0571466



**Photograph 17**

Area E- Marsh/wetland along south boundary of E



**Photograph 18**

Area E – Drain and small gully running south



**Photograph 19**

Area E- Drain towards area C and D wetland



**Photograph 20**

Area E – Manhole cover/concrete slab





## Project Photo Log WPCA PFAS Investigation - 0571466



Photograph 21

Area F – Concrete support on boundary with E



Photograph 22

Area F – Concrete support on boundary with E



Photograph 23

Area G – Old wooden structure (horse ring?)



Photograph 24

Area H- Dam





## Project Photo Log WPCA PFAS Investigation - 0571466



Photograph 25

Area H – Staining in sediment and sheen on water  
(potentially organic)



Photograph 26

Area H – Old concrete plumbing waste



Photograph 27

Area H - Support



Photograph 28

Area H - Support





## Project Photo Log WPCA PFAS Investigation - 0571466



Photograph 29  
Area H - Support



Photograph 30  
Area H – Potential fill mound



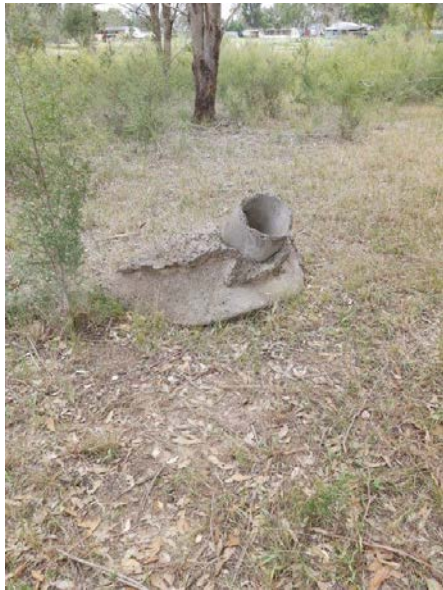
Photograph 31  
Area I – Concrete support northern end



Photograph 32  
Area I – Potentially disturbed ground



## Project Photo Log WPCA PFAS Investigation - 0571466



**Photograph 33**  
Area I – Concrete piping



**Photograph 34**  
Area I – Wetland/marsh



**Photograph 35**  
Area I – Western dam wall potential fill



**Photograph 36**  
Area I – Disturbed grounds





## Project Photo Log WPCA PFAS Investigation - 0571466



**Photograph 37**  
Area 1 – Disturbed grounds



**Photograph 38**  
Area 2 – Drainage under road



**Photograph 39**  
Area 5 - Gully



**Photograph 40**  
Area 10 – Support structures and poles



## Project Photo Log WPCA PFAS Investigation - 0571466



Photograph 41

Area 10 – Support structures and poles



Photograph 42

Area 10 - Potential catchment/drainage area along boundary



Photograph 43

Area 10- Potential catchment/drainage area along boundary



Photograph 44

Area 12 – Drainage line from drain running SE/NE





## Project Photo Log WPCA PFAS Investigation - 0571466



Photograph 45

Area 12 – Gravel fill along dirt road



Photograph 46

Area 12 – Concrete structure within area of potential pebbly fill



Photograph 47

Area 12 – Concrete structure



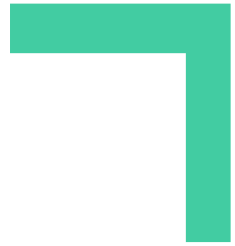
Photograph 48

Area 14 – Gravel fill across road





## Project Photo Log WPCA PFAS Investigation - 0571466



Photograph 49

Area 14 – Small dam catching runoff from NE



Photograph 50

Area 14 – Gravel fill in grass



Photograph 51

Area 15 – Large marsh catchment area on boundary



Photograph 52

Area 15 – Dry pond in gully to catchment area (Photo 47)





## Project Photo Log WPCA PFAS Investigation - 0571466



**Photograph 53**

Area 16 – Minor gully slopes towards SW



**Photograph 54**

Area 16 – SW corner catchment dam



**Photograph 55**

Area 17 – Potential runoff from residential with small gully into site



**Photograph 56**

Area 17 – Potential runoff from residential with small gully into site





## Project Photo Log WPCA PFAS Investigation - 0571466



**Photograph 57**  
Area 18 – Disturbed ground



**Photograph 58**  
Area 19 – Abandoned pump house



**Photograph 59**  
Area 19 – Asbestos warnings



**Photograph 60**  
Area 19 – Radio tower





## Project Photo Log WPCA PFAS Investigation - 0571466



**Photograph 61**  
Area 19 - Water storage structure



**Photograph 62**  
Area 19 – Bunker like structure



**Photograph 63**  
Area 19 – Concrete slab (many in area 19)



**Photograph 64**  
Area 19 – Potential past chemical storage building



## Project Photo Log WPCA PFAS Investigation - 0571466



Photograph 65  
Area 19 - Compound



Photograph 66  
Area 19 – White good storage



Photograph 67  
Area 19 - Compound



Photograph 68  
Area 19 – Fire equipment





## Project Photo Log WPCA PFAS Investigation - 0571466



**Photograph 69**  
Area 19 – Cable junction



**Photograph 70**  
Area 19 – Steel manhole cover



**Photograph 71**  
Area 19 – Mechanical equipment and potential chemical storage drums



**Photograph 72**  
South of Area 19 – Fill mound





## Project Photo Log WPCA PFAS Investigation - 0571466



**Photograph 73**  
South of Area 19 – Fill mound



**Photograph 74**  
South of Area 19 – Brick wall remnants



**Photograph 75**  
South of Area 19 – Concrete and metal structures



**Photograph 76**  
South of Area 19 – Concrete slab, one of many



## Project Photo Log WPCA PFAS Investigation - 0571466



**Photograph 77**  
South of Area 19 – Steel bin debris



**Photograph 78**  
Moore Gully – Western Boundary



**Photograph 79**  
150m SE of MW1



**Photograph 80**  
150m SE of MW1





## Project Photo Log WPCA PFAS Investigation - 0571466



**Photograph 81**

150m SE of MW1- Potentially disturbed land



**Photograph 82**

Disturbed area surrounding MW1



**Photograph 83**

MW1 Area – Potential drainage flow into disturbed area from North



**Photograph 84**

MW1 Area – Concrete and cable remnants





## Project Photo Log WPCA PFAS Investigation - 0571466



Photograph 85

White substance found across ground



Photograph 86

White substance found across ground



Photograph 87

Location of White substance

## **APPENDIX E**

## **LABORATORY CERTIFICATES**

**Australia**
**Melbourne**

6 Monterey Road  
Dandenong South VIC 3175  
Phone : +61 3 8564 5000  
NATA # 1261  
Site # 1254 & 14271

**Sydney**

Unit F3, Building F  
16 Mars Road  
Lane Cove West NSW 2066  
Phone : +61 2 9900 8400  
NATA # 1261 Site # 18217

**Brisbane**

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Phone : +61 7 3902 4600  
NATA # 1261 Site # 20794

**Perth**

2/91 Leach Highway  
Kewdale WA 6105  
Phone : +61 8 9251 9600  
NATA # 1261  
Site # 23736

**Newcastle**

4/52 Industrial Drive  
Mayfield East NSW 2304  
PO Box 60 Wickham 2293  
Phone : +61 2 4968 8448

**New Zealand**
**Auckland**

35 O'Rourke Road  
Penrose, Auckland 1061  
Phone : +64 9 526 45 51  
IANZ # 1327

**Christchurch**

43 Detroit Drive  
Rolleston, Christchurch 7675  
Phone : 0800 856 450  
IANZ # 1290

## Sample Receipt Advice

**Company name:** ERM Hunter Valley  
**Contact name:** Ian Batterley  
**Project name:** WPCA BADGERYS CK RD  
**Project ID:** 0571466  
**Turnaround time:** 5 Day  
**Date/Time received:** Dec 14, 2020 10:00 AM  
**Eurofins reference:** 763324

## Sample Information

- ✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ✓ Sample Temperature of a random sample selected from the batch as recorded by Eurofins Sample Receipt : 2 degrees Celsius.
- ✓ All samples have been received as described on the above COC.
- ✓ COC has been completed correctly.
- ✓ Attempt to chill was evident.
- ✓ Appropriately preserved sample containers have been used.
- ✓ All samples were received in good condition.
- ✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ✓ Appropriate sample containers have been used.
- N/A Sample containers for volatile analysis received with zero headspace.
- ✓ Split sample sent to requested external lab.
- ✗ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

## Notes

## Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

**Andrew Black on phone : (+61) 2 9900 8490 or by email: AndrewBlack@eurofins.com**

Results will be delivered electronically via email to Ian Batterley - ian.batterley@erm.com.

*Note: A copy of these results will also be delivered to the general ERM Hunter Valley email address.*



## Australia

**Melbourne**  
6 Monterey Road  
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Site # 23736

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4/52 Industrial Drive  
Mayfield East NSW 2304  
PO Box 60 Wickham 2293  
Phone : +61 2 4968 8448

## New Zealand

**Auckland**  
35 O'Rourke Road  
Penrose, Auckland 1061  
Phone : +64 9 526 45 51  
IANZ # 1327

**Christchurch**  
43 Detroit Drive  
Rolleston, Christchurch 7675  
Phone : 0800 856 450  
IANZ # 1290

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

**Company Name:** ERM Hunter Valley  
**Address:** Level 1 / 45 Watt Street  
Newcastle  
NSW 2300  
  
**Project Name:** WPCA BADGERYS CK RD  
**Project ID:** 0571466

**Order No.:**  
**Report #:** 763324  
**Phone:** (02) 4964 2150  
**Fax:** (02) 4964 2152

**Received:** Dec 14, 2020 10:00 AM  
**Due:** Dec 21, 2020  
**Priority:** 5 Day  
**Contact Name:** Ian Batterley

**Eurofins Analytical Services Manager : Andrew Black**

Sample Detail						AUS Leaching Procedure	Moisture Set	Per- and Polyfluoralkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
Mayfield Laboratory								
External Laboratory								
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
1	SW1	Dec 10, 2020		Water	N20-De26729			X
2	SW2	Dec 10, 2020		Water	N20-De26730			X
3	SW3	Dec 10, 2020		Water	N20-De26731			X
4	SW4	Dec 10, 2020		Water	N20-De26732			X
5	SW5	Dec 10, 2020		Water	N20-De26733			X
6	SW6	Dec 10, 2020		Water	N20-De26734			X
7	SW7	Dec 10, 2020		Water	N20-De26735			X
8	SW8	Dec 10, 2020		Water	N20-De26736			X
9	SW9	Dec 10, 2020		Water	N20-De26737			X

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Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
Mayfield Laboratory								
External Laboratory								
10	SW10	Dec 10, 2020		Water	N20-De26738			X
11	SW11	Dec 11, 2020		Water	N20-De26739			X
12	SED-1	Dec 10, 2020		Soil	N20-De26740		X	X
13	SED-2	Dec 10, 2020		Soil	N20-De26741		X	X
14	SED-3	Dec 10, 2020		Soil	N20-De26742		X	X
15	SED-4	Dec 10, 2020		Soil	N20-De26743		X	X
16	SED-5	Dec 10, 2020		Soil	N20-De26744		X	X
17	SED-6	Dec 10, 2020		Soil	N20-De26745		X	X
18	SED-7	Dec 10, 2020		Soil	N20-De26746		X	X
19	SED-8	Dec 10, 2020		Soil	N20-De26747		X	X
20	SED-9	Dec 10, 2020		Soil	N20-De26748		X	X

## Australia

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Phone : +64 9 526 45 51  
IANZ # 1327

### Christchurch

43 Detroit Drive  
Rolleston, Christchurch 7675  
Phone : 0800 856 450  
IANZ # 1290

**Company Name:** ERM Hunter Valley  
**Address:** Level 1 / 45 Watt Street  
Newcastle  
NSW 2300

**Project Name:** WPCA BADGERYS CK RD  
**Project ID:** 0571466

**Order No.:**  
**Report #:** 763324  
**Phone:** (02) 4964 2150  
**Fax:** (02) 4964 2152

**Received:** Dec 14, 2020 10:00 AM  
**Due:** Dec 21, 2020  
**Priority:** 5 Day  
**Contact Name:** Ian Batterley

**Eurofins Analytical Services Manager : Andrew Black**

## Sample Detail

AUS Leaching Procedure

Moisture Set

Per- and Polyfluoroalkyl Substances (PFASs)

**Melbourne Laboratory - NATA Site # 1254 & 14271**

**Sydney Laboratory - NATA Site # 18217**

**Brisbane Laboratory - NATA Site # 20794**

**Perth Laboratory - NATA Site # 23736**

**Mayfield Laboratory**

**External Laboratory**

21	SED-10	Dec 11, 2020		Soil	N20-De26749		X	X
22	SED-11	Dec 11, 2020		AUS Leachate	N20-De26750	X		X
23	MW1-B	Dec 11, 2020		Water	N20-De26751			X
24	BB116	Dec 11, 2020		Water	N20-De26752			X
25	MW2	Dec 11, 2020		Water	N20-De26753			X
26	BB114	Dec 11, 2020		Water	N20-De26754			X
27	BB01	Dec 11, 2020		Water	N20-De26755			X
28	BB02	Dec 11, 2020		Water	N20-De26756			X
29	BB03	Dec 11, 2020		Water	N20-De26757			X
30	D01_20201210	Dec 10, 2020		Water	N20-De26758			X



## Australia

### Melbourne

6 Monterey Road  
Dandenong South VIC 3175  
Phone : +61 3 8564 5000  
NATA # 1261  
Site # 1254 & 14271

### Sydney

Unit F3, Building F  
16 Mars Road  
Lane Cove West NSW 2066  
Phone : +61 2 9900 8400  
NATA # 1261 Site # 18217

### Brisbane

1/21 Smallwood Place  
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Phone : +61 7 3902 4600  
NATA # 1261 Site # 20794

### Perth

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Phone : +61 8 9251 9600  
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Site # 23736

### Newcastle

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Mayfield East NSW 2304  
PO Box 60 Wickham 2293  
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**Project Name:** WPCA BADGERYS CK RD  
**Project ID:** 0571466

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**Phone:** (02) 4964 2150  
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**Received:** Dec 14, 2020 10:00 AM  
**Due:** Dec 21, 2020  
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**Contact Name:** Ian Batterley

**Eurofins Analytical Services Manager : Andrew Black**

## Sample Detail

AUS Leaching Procedure

Moisture Set

Per- and Polyfluoroalkyl Substances (PFASs)

**Melbourne Laboratory - NATA Site # 1254 & 14271**

**Sydney Laboratory - NATA Site # 18217**

**Brisbane Laboratory - NATA Site # 20794**

**Perth Laboratory - NATA Site # 23736**

**Mayfield Laboratory**

**External Laboratory**

31	D02_20201210	Dec 10, 2020		Soil	N20-De26760		x	x
32	D01_20201211	Dec 11, 2020		Water	N20-De26762			x
33	D01_20201209	Dec 11, 2020		Water	N20-De26764			x
34	TB01	Dec 11, 2020		Water	N20-De26765			x
35	TB02	Dec 11, 2020		Water	N20-De26766			x
36	SED-2	Dec 10, 2020		AUS Leachate	N20-De32042	x		x
37	SED-4	Dec 10, 2020		AUS Leachate	N20-De32043	x		x
38	SED-6	Dec 10, 2020		AUS Leachate	N20-De32044	x		x
39	SED-10	Dec 10, 2020		AUS Leachate	N20-De32045	x		x

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**Project Name:** WPCA BADGERYS CK RD  
**Project ID:** 0571466

**Order No.:**  
**Report #:** 763324  
**Phone:** (02) 4964 2150  
**Fax:** (02) 4964 2152

**Received:** Dec 14, 2020 10:00 AM  
**Due:** Dec 21, 2020  
**Priority:** 5 Day  
**Contact Name:** Ian Batterley

**Eurofins Analytical Services Manager : Andrew Black**

## Sample Detail

AUS Leaching Procedure

Moisture Set

Per- and Polyfluoroalkyl Substances (PFASs)

Melbourne Laboratory - NATA Site # 1254 & 14271

Sydney Laboratory - NATA Site # 18217

Brisbane Laboratory - NATA Site # 20794

Perth Laboratory - NATA Site # 23736

Mayfield Laboratory

External Laboratory

Test Counts

5

11

39

ERM Hunter Valley  
Level 1 / 45 Watt Street  
Newcastle  
NSW 2300



NATA Accredited  
Accreditation Number 1261  
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing  
The results of the tests, calibrations and/or  
measurements included in this document are traceable  
to Australian/national standards.

Attention: Ian Batterley

Report 763324-L  
Project name WPCA BADGERYS CK RD  
Project ID 0571466  
Received Date Dec 14, 2020

Client Sample ID			SED-11 AUS Leachate N20-De26750 Dec 11, 2020	SED-2 AUS Leachate N20-De32042 Dec 10, 2020	SED-4 AUS Leachate N20-De32043 Dec 10, 2020	SED-6 AUS Leachate N20-De32044 Dec 10, 2020
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>AUS Leaching Procedure</b>						
Leachate Fluid <sup>C01</sup>		comment	4.0	1.0	1.0	1.0
pH (initial)	0.1	pH Units	8.3	5.0	5.0	5.0
pH (Leachate fluid)	0.1	pH Units	6.7	5.0	5.0	5.0
pH (off)	0.1	pH Units	9.7	5.1	5.0	5.1
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>						
Perfluorobutanoic acid (PFBA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA) <sup>N11</sup>	0.01	ug/L	< 0.01	0.01	< 0.01	< 0.01
Perfluorohexanoic acid (PFHxA) <sup>N11</sup>	0.01	ug/L	< 0.01	0.03	< 0.01	< 0.01
Perfluoroheptanoic acid (PFHpA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA) <sup>N11</sup>	0.01	ug/L	<sup>G10</sup> < 0.02	< 0.01	< 0.01	< 0.01
Perfluorononanoic acid (PFNA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTTrDA) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	71	108	102	103
13C5-PFPeA (surr.)	1	%	94	73	75	74
13C5-PFHxA (surr.)	1	%	120	65	68	53
13C4-PFHpA (surr.)	1	%	118	110	105	91
13C8-PFOA (surr.)	1	%	133	110	108	102
13C5-PFNA (surr.)	1	%	85	102	77	100
13C6-PFDA (surr.)	1	%	134	113	99	108
13C2-PFUnDA (surr.)	1	%	110	118	106	106
13C2-PFDoDA (surr.)	1	%	107	106	99	100
13C2-PFTeDA (surr.)	1	%	46	118	101	103
<b>Perfluoroalkyl sulfonamido substances</b>						
Perfluorooctane sulfonamide (FOSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05



Client Sample ID			SED-11 AUS Leachate N20-De26750 Dec 11, 2020	SED-2 AUS Leachate N20-De32042 Dec 10, 2020	SED-4 AUS Leachate N20-De32043 Dec 10, 2020	SED-6 AUS Leachate N20-De32044 Dec 10, 2020
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>Perfluoroalkyl sulfonamido substances</b>						
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	107	91	91	89
D3-N-MeFOSA (surr.)	1	%	122	83	83	81
D5-N-EtFOSA (surr.)	1	%	136	88	84	89
D7-N-MeFOSE (surr.)	1	%	74	127	113	112
D9-N-EtFOSE (surr.)	1	%	74	105	106	114
D5-N-EtFOSAA (surr.)	1	%	51	45	43	51
D3-N-MeFOSAA (surr.)	1	%	41	43	41	44
<b>Perfluoroalkyl sulfonic acids (PFASs)</b>						
Perfluorobutanesulfonic acid (PFBS) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorononanesulfonic acid (PFNS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroheptanesulfonic acid (PFHpS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS) <sup>N11</sup>	0.01	ug/L	<sup>N09</sup> 0.03	<sup>N09</sup> 0.02	< 0.01	< 0.01
Perfluorodecanesulfonic acid (PFDS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	120	74	63	71
18O2-PFHxS (surr.)	1	%	119	99	97	97
13C8-PFOS (surr.)	1	%	130	105	105	104
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA)</b>						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTS (surr.)	1	%	112	134	95	127
13C2-6:2 FTSA (surr.)	1	%	102	173	142	171
13C2-8:2 FTSA (surr.)	1	%	194	140	106	107
13C2-10:2 FTSA (surr.)	1	%	139	144	112	130
<b>PFASs Summations</b>						
Sum (PFHxS + PFOS)*	0.01	ug/L	0.03	0.02	< 0.01	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	0.03	0.02	< 0.01	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	0.03	0.02	< 0.01	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	0.06	< 0.05	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	< 0.1	< 0.1	< 0.1

<b>Client Sample ID</b>			<b>SED-10</b>
<b>Sample Matrix</b>			<b>AUS Leachate</b>
<b>Eurofins Sample No.</b>			<b>N20-De32045</b>
<b>Date Sampled</b>			<b>Dec 10, 2020</b>
Test/Reference	LOR	Unit	
<b>AUS Leaching Procedure</b>			
Leachate Fluid <sup>C01</sup>		comment	1.0
pH (initial)	0.1	pH Units	5.0
pH (Leachate fluid)	0.1	pH Units	5.0
pH (off)	0.1	pH Units	5.0
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>			
Perfluorobutanoic acid (PFBA) <sup>N11</sup>	0.05	ug/L	< 0.05
Perfluoropentanoic acid (PFPeA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorohexanoic acid (PFHxA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluoroheptanoic acid (PFHpA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorooctanoic acid (PFOA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorononanoic acid (PFNA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorodecanoic acid (PFDA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluoroundecanoic acid (PFUnDA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorododecanoic acid (PFDoDA) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorotridecanoic acid (PFTeDA) <sup>N15</sup>	0.01	ug/L	< 0.01
Perfluorotetradecanoic acid (PFTeDA) <sup>N11</sup>	0.01	ug/L	< 0.01
13C4-PFBA (surr.)	1	%	103
13C5-PFPeA (surr.)	1	%	73
13C5-PFHxA (surr.)	1	%	57
13C4-PFHpA (surr.)	1	%	97
13C8-PFOA (surr.)	1	%	110
13C5-PFNA (surr.)	1	%	97
13C6-PFDA (surr.)	1	%	112
13C2-PFUnDA (surr.)	1	%	109
13C2-PFDoDA (surr.)	1	%	101
13C2-PFTeDA (surr.)	1	%	92
<b>Perfluoroalkyl sulfonamido substances</b>			
Perfluorooctane sulfonamide (FOSA) <sup>N11</sup>	0.05	ug/L	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) <sup>N11</sup>	0.05	ug/L	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) <sup>N11</sup>	0.05	ug/L	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) <sup>N11</sup>	0.05	ug/L	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) <sup>N11</sup>	0.05	ug/L	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) <sup>N11</sup>	0.05	ug/L	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) <sup>N11</sup>	0.05	ug/L	< 0.05
13C8-FOSA (surr.)	1	%	92
D3-N-MeFOSA (surr.)	1	%	86
D5-N-EtFOSA (surr.)	1	%	88
D7-N-MeFOSE (surr.)	1	%	114
D9-N-EtFOSE (surr.)	1	%	109
D5-N-EtFOSAA (surr.)	1	%	58
D3-N-MeFOSAA (surr.)	1	%	51
<b>Perfluoroalkyl sulfonic acids (PFSAs)</b>			
Perfluorobutanesulfonic acid (PFBS) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorononanesulfonic acid (PFNS) <sup>N15</sup>	0.01	ug/L	< 0.01
Perfluoropropanesulfonic acid (PFPrS) <sup>N15</sup>	0.01	ug/L	< 0.01
Perfluoropentanesulfonic acid (PFPeS) <sup>N15</sup>	0.01	ug/L	< 0.01

<b>Client Sample ID</b>			<b>SED-10</b>
<b>Sample Matrix</b>			<b>AUS Leachate</b>
<b>Eurofins Sample No.</b>			<b>N20-De32045</b>
<b>Date Sampled</b>			<b>Dec 10, 2020</b>
Test/Reference	LOR	Unit	
<b>Perfluoroalkyl sulfonic acids (PFASs)</b>			
Perfluorohexanesulfonic acid (PFHxS) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluoroheptanesulfonic acid (PFHpS) <sup>N15</sup>	0.01	ug/L	< 0.01
Perfluorooctanesulfonic acid (PFOS) <sup>N11</sup>	0.01	ug/L	< 0.01
Perfluorodecanesulfonic acid (PFDS) <sup>N15</sup>	0.01	ug/L	< 0.01
13C3-PFBS (surr.)	1	%	73
18O2-PFHxS (surr.)	1	%	103
13C8-PFOS (surr.)	1	%	106
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA)</b>			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) <sup>N11</sup>	0.05	ug/L	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01
13C2-4:2 FTS (surr.)	1	%	124
13C2-6:2 FTSA (surr.)	1	%	177
13C2-8:2 FTSA (surr.)	1	%	120
13C2-10:2 FTSA (surr.)	1	%	137
<b>PFASs Summations</b>			
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1



## Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
AUS Leaching Procedure	Brisbane	Dec 18, 2020	7 Days
- Method: LTM-GEN-7010 Leaching Procedure for Soils & Solid Wastes			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Dec 18, 2020	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Dec 18, 2020	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAAs)	Brisbane	Dec 18, 2020	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Dec 18, 2020	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

## Australia

### Melbourne

6 Monterey Road  
Dandenong South VIC 3175  
Phone : +61 3 8564 5000  
NATA # 1261  
Site # 1254 & 14271

### Sydney

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IANZ # 1327

### Christchurch

43 Detroit Drive  
Rolleston, Christchurch 7675  
Phone : 0800 856 450  
IANZ # 1290

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

**Company Name:** ERM Hunter Valley  
**Address:** Level 1 / 45 Watt Street  
Newcastle  
NSW 2300

**Project Name:** WPCA BADGERYS CK RD  
**Project ID:** 0571466

**Order No.:**  
**Report #:** 763324  
**Phone:** (02) 4964 2150  
**Fax:** (02) 4964 2152

**Received:** Dec 14, 2020 10:00 AM  
**Due:** Dec 21, 2020  
**Priority:** 5 Day  
**Contact Name:** Ian Batterley

**Eurofins Analytical Services Manager : Andrew Black**

Sample Detail						AUS Leaching Procedure	Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
Mayfield Laboratory								
External Laboratory								
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
1	SW1	Dec 10, 2020		Water	N20-De26729			X
2	SW2	Dec 10, 2020		Water	N20-De26730			X
3	SW3	Dec 10, 2020		Water	N20-De26731			X
4	SW4	Dec 10, 2020		Water	N20-De26732			X
5	SW5	Dec 10, 2020		Water	N20-De26733			X
6	SW6	Dec 10, 2020		Water	N20-De26734			X
7	SW7	Dec 10, 2020		Water	N20-De26735			X
8	SW8	Dec 10, 2020		Water	N20-De26736			X
9	SW9	Dec 10, 2020		Water	N20-De26737			X

## Australia

### Melbourne

6 Monterey Road  
Dandenong South VIC 3175  
Phone : +61 3 8564 5000  
NATA # 1261  
Site # 1254 & 14271

### Sydney

Unit F3, Building F  
16 Mars Road  
Lane Cove West NSW 2066  
Phone : +61 2 9900 8400  
NATA # 1261 Site # 18217

### Brisbane

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Perth Laboratory - NATA Site # 23736

Mayfield Laboratory

External Laboratory

10	SW10	Dec 10, 2020		Water	N20-De26738			X
11	SW11	Dec 11, 2020		Water	N20-De26739			X
12	SED-1	Dec 10, 2020		Soil	N20-De26740		X	X
13	SED-2	Dec 10, 2020		Soil	N20-De26741		X	X
14	SED-3	Dec 10, 2020		Soil	N20-De26742		X	X
15	SED-4	Dec 10, 2020		Soil	N20-De26743		X	X
16	SED-5	Dec 10, 2020		Soil	N20-De26744		X	X
17	SED-6	Dec 10, 2020		Soil	N20-De26745		X	X
18	SED-7	Dec 10, 2020		Soil	N20-De26746		X	X
19	SED-8	Dec 10, 2020		Soil	N20-De26747		X	X
20	SED-9	Dec 10, 2020		Soil	N20-De26748		X	X



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**Perth Laboratory - NATA Site # 23736**

**Mayfield Laboratory**

**External Laboratory**

21	SED-10	Dec 11, 2020		Soil	N20-De26749		X	X
22	SED-11	Dec 11, 2020		AUS Leachate	N20-De26750	X		X
23	MW1-B	Dec 11, 2020		Water	N20-De26751			X
24	BB116	Dec 11, 2020		Water	N20-De26752			X
25	MW2	Dec 11, 2020		Water	N20-De26753			X
26	BB114	Dec 11, 2020		Water	N20-De26754			X
27	BB01	Dec 11, 2020		Water	N20-De26755			X
28	BB02	Dec 11, 2020		Water	N20-De26756			X
29	BB03	Dec 11, 2020		Water	N20-De26757			X
30	D01_20201210	Dec 10, 2020		Water	N20-De26758			X

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**Mayfield Laboratory**

**External Laboratory**

31	D02_20201210	Dec 10, 2020		Soil	N20-De26760		x	x
32	D01_20201211	Dec 11, 2020		Water	N20-De26762			x
33	D01_20201209	Dec 11, 2020		Water	N20-De26764			x
34	TB01	Dec 11, 2020		Water	N20-De26765			x
35	TB02	Dec 11, 2020		Water	N20-De26766			x
36	SED-2	Dec 10, 2020		AUS Leachate	N20-De32042	x		x
37	SED-4	Dec 10, 2020		AUS Leachate	N20-De32043	x		x
38	SED-6	Dec 10, 2020		AUS Leachate	N20-De32044	x		x
39	SED-10	Dec 10, 2020		AUS Leachate	N20-De32045	x		x

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External Laboratory

Test Counts

5

11

39



## Internal Quality Control Review and Glossary

### General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

### Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

**\*\*NOTE:** pH duplicates are reported as a range NOT as RPD

### Units

**mg/kg:** milligrams per kilogram

**mg/L:** milligrams per litre

**ug/L:** micrograms per litre

**ppm:** Parts per million

**ppb:** Parts per billion

**%:** Percentage

**org/100mL:** Organisms per 100 millilitres

**NTU:** Nephelometric Turbidity Units

**MPN/100mL:** Most Probable Number of organisms per 100 millilitres

### Terms

<b>Dry</b>	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
<b>LOR</b>	Limit of Reporting.
<b>SPIKE</b>	Addition of the analyte to the sample and reported as percentage recovery.
<b>RPD</b>	Relative Percent Difference between two Duplicate pieces of analysis.
<b>LCS</b>	Laboratory Control Sample - reported as percent recovery.
<b>CRM</b>	Certified Reference Material - reported as percent recovery.
<b>Method Blank</b>	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
<b>Surr - Surrogate</b>	The addition of a like compound to the analyte target and reported as percentage recovery.
<b>Duplicate</b>	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
<b>USEPA</b>	United States Environmental Protection Agency
<b>APHA</b>	American Public Health Association
<b>TCLP</b>	Toxicity Characteristic Leaching Procedure
<b>COC</b>	Chain of Custody
<b>SRA</b>	Sample Receipt Advice
<b>QSM</b>	US Department of Defense Quality Systems Manual Version 5.3
<b>CP</b>	Client Parent - QC was performed on samples pertaining to this report
<b>NC</b>	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
<b>TEQ</b>	Toxic Equivalency Quotient

### QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

### QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

**Quality Control Results**

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
<b>Method Blank</b>									
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>									
Perfluorobutanoic acid (PFBA)			ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)			ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)			ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)			ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)			ug/L	0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)			ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)			ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)			ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)			ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTTrDA)			ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)			ug/L	< 0.01			0.01	Pass	
<b>Method Blank</b>									
<b>Perfluoroalkyl sulfonamido substances</b>									
Perfluorooctane sulfonamide (FOSA)			ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)			ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)			ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)			ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)			ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)			ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)			ug/L	< 0.05			0.05	Pass	
<b>Method Blank</b>									
<b>Perfluoroalkyl sulfonic acids (PFSA's)</b>									
Perfluorobutanesulfonic acid (PFBS)			ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)			ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)			ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)			ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)			ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)			ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)			ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)			ug/L	< 0.01			0.01	Pass	
<b>Method Blank</b>									
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)</b>									
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)			ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)			ug/L	< 0.01			0.01	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
<b>Duplicate</b>									
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	P20-De21663	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	P20-De21663	NCP	ug/L	0.02	0.02	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	P20-De21663	NCP	ug/L	0.08	0.08	2.0	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	P20-De21663	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	P20-De21663	NCP	ug/L	< 0.04	< 0.04	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	P20-De21663	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	P20-De21663	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	P20-De21663	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
<b>Duplicate</b>									
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>				Result 1	Result 2	RPD			
Perfluorododecanoic acid (PFDoDA)	P20-De21663	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	P20-De21663	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	P20-De21663	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
<b>Duplicate</b>									
<b>Perfluoroalkyl sulfonamido substances</b>				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	P20-De21663	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	P20-De21663	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	P20-De21663	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	P20-De21663	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	P20-De21663	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	P20-De21663	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	P20-De21663	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
<b>Duplicate</b>									
<b>Perfluoroalkyl sulfonic acids (PFSAs)</b>				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	P20-De21663	NCP	ug/L	0.03	0.03	4.0	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	P20-De21663	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	P20-De21663	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	P20-De21663	NCP	ug/L	0.04	0.04	3.0	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	P20-De21663	NCP	ug/L	0.43	0.45	6.0	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	P20-De21663	NCP	ug/L	0.02	0.02	6.0	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	P20-De21663	NCP	ug/L	0.04	0.05	4.0	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	P20-De21663	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
<b>Duplicate</b>									
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA)</b>				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	P20-De21663	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	P20-De21663	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	P20-De21663	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	P20-De21663	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	



## Comments

### Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

### Qualifier Codes/Comments

Code	Description
C01	Leachate Fluid Key: 1 - pH 5.0; 2 - pH 2.9; 3 - pH 9.2; 4 - Reagent (DI) water; 5 - Client sample, 6 - other
G10	The LOR has been raised due to suspected contamination
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

## Authorised By

Andrew Black	Analytical Services Manager
Sarah McCallion	Senior Analyst-PFAS (QLD)



**Glenn Jackson**

**General Manager**

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

\* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

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ERM Hunter Valley  
Level 1 / 45 Watt Street  
Newcastle  
NSW 2300



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Accreditation Number 1261  
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Accredited for compliance with ISO/IEC 17025 – Testing  
The results of the tests, calibrations and/or  
measurements included in this document are traceable  
to Australian/national standards.

Attention: Ian Batterley

Report 763324-S  
Project name WPCA BADGERYS CK RD  
Project ID 0571466  
Received Date Dec 14, 2020

Client Sample ID			SED-1 Soil N20-De26740 Dec 10, 2020	SED-2 Soil N20-De26741 Dec 10, 2020	SED-3 Soil N20-De26742 Dec 10, 2020	SED-4 Soil N20-De26743 Dec 10, 2020
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
% Moisture	1	%	56	43	48	58
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>						
Perfluorobutanoic acid (PFBA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanoic acid (PFPeA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanoic acid (PFHxA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroheptanoic acid (PFHpA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanoic acid (PFOA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanoic acid (PFNA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorodecanoic acid (PFDA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroundecanoic acid (PFUnDA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorododecanoic acid (PFDoDA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotridecanoic acid (PFTTrDA) <sup>N15</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotetradecanoic acid (PFTTeDA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
13C4-PFBA (surr.)	1	%	101	112	101	80
13C5-PFPeA (surr.)	1	%	104	115	122	85
13C5-PFHxA (surr.)	1	%	101	114	103	78
13C4-PFHpA (surr.)	1	%	112	117	105	92
13C8-PFOA (surr.)	1	%	102	108	98	90
13C5-PFNA (surr.)	1	%	106	116	109	98
13C6-PFDA (surr.)	1	%	116	129	115	116
13C2-PFUnDA (surr.)	1	%	70	80	82	73
13C2-PFDoDA (surr.)	1	%	62	78	88	79
13C2-PFTTeDA (surr.)	1	%	72	111	115	107
<b>Perfluoroalkyl sulfonamido substances</b>						
Perfluorooctane sulfonamide (FOSA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
N-ethylperfluorooctanesulfonamidoacetic acid (N-EtFOSAA) <sup>N11</sup>	10	ug/kg	< 10	< 10	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) <sup>N11</sup>	10	ug/kg	< 10	< 10	< 10	< 10
13C8-FOSA (surr.)	1	%	50	75	81	78

Client Sample ID			SED-1 Soil N20-De26740 Dec 10, 2020	SED-2 Soil N20-De26741 Dec 10, 2020	SED-3 Soil N20-De26742 Dec 10, 2020	SED-4 Soil N20-De26743 Dec 10, 2020
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>Perfluoroalkyl sulfonamido substances</b>						
D3-N-MeFOSA (surr.)	1	%	61	74	84	78
D5-N-EtFOSA (surr.)	1	%	55	69	89	71
D7-N-MeFOSE (surr.)	1	%	81	118	131	119
D9-N-EtFOSE (surr.)	1	%	68	94	116	102
D5-N-EtFOSAA (surr.)	1	%	51	81	86	81
D3-N-MeFOSAA (surr.)	1	%	56	66	80	72
<b>Perfluoroalkyl sulfonic acids (PFSA's)</b>						
Perfluorobutanesulfonic acid (PFBS) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanesulfonic acid (PFNS) <sup>N15</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropropanesulfonic acid (PFPrS) <sup>N15</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS) <sup>N15</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroheptanesulfonic acid (PFHpS) <sup>N15</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanesulfonic acid (PFOS) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorodecanesulfonic acid (PFDS) <sup>N15</sup>	5	ug/kg	< 5	< 5	< 5	< 5
13C3-PFBS (surr.)	1	%	93	109	108	80
18O2-PFHxS (surr.)	1	%	105	116	112	105
13C8-PFOS (surr.)	1	%	108	124	118	112
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)</b>						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) <sup>N11</sup>	10	ug/kg	< 10	< 10	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
13C2-4:2 FTS (surr.)	1	%	114	93	92	42
13C2-6:2 FTSA (surr.)	1	%	121	91	79	71
13C2-8:2 FTSA (surr.)	1	%	116	116	89	104
13C2-10:2 FTSA (surr.)	1	%	72	84	83	82
<b>PFASs Summations</b>						
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	< 5	< 5	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	< 5	< 5	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	< 5	< 5	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10	< 10	< 10	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50	< 50	< 50	< 50

Client Sample ID			SED-5 Soil N20-De26744 Dec 10, 2020	SED-6 Soil N20-De26745 Dec 10, 2020	SED-7 Soil N20-De26746 Dec 10, 2020	SED-8 Soil N20-De26747 Dec 10, 2020
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
% Moisture	1	%	69	72	24	38



Client Sample ID			SED-5 Soil N20-De26744 Dec 10, 2020	SED-6 Soil N20-De26745 Dec 10, 2020	SED-7 Soil N20-De26746 Dec 10, 2020	SED-8 Soil N20-De26747 Dec 10, 2020
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>						
Perfluorobutanoic acid (PFBA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanoic acid (PFPeA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanoic acid (PFHxA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroheptanoic acid (PFHpA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanoic acid (PFOA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanoic acid (PFNA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorodecanoic acid (PFDA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroundecanoic acid (PFUnDA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorododecanoic acid (PFDoDA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotridecanoic acid (PFTeDA) <sup>N15</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotetradecanoic acid (PFTeDA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
13C4-PFBA (surr.)	1	%	99	93	104	114
13C5-PFPeA (surr.)	1	%	110	86	124	130
13C5-PFHxA (surr.)	1	%	98	88	113	115
13C4-PFHpA (surr.)	1	%	98	82	114	104
13C8-PFOA (surr.)	1	%	99	89	104	109
13C5-PFNA (surr.)	1	%	105	74	108	115
13C6-PFDA (surr.)	1	%	126	79	123	118
13C2-PFUnDA (surr.)	1	%	74	48	83	81
13C2-PFDoDA (surr.)	1	%	87	34	91	86
13C2-PFTeDA (surr.)	1	%	105	47	131	121
<b>Perfluoroalkyl sulfonamido substances</b>						
Perfluorooctane sulfonamide (FOSA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) <sup>N11</sup>	10	ug/kg	< 10	< 10	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) <sup>N11</sup>	10	ug/kg	< 10	< 10	< 10	< 10
13C8-FOSA (surr.)	1	%	86	31	91	89
D3-N-MeFOSA (surr.)	1	%	90	44	84	78
D5-N-EtFOSA (surr.)	1	%	80	32	93	80
D7-N-MeFOSE (surr.)	1	%	116	67	149	109
D9-N-EtFOSE (surr.)	1	%	112	43	136	98
D5-N-EtFOSAA (surr.)	1	%	82	43	89	86
D3-N-MeFOSAA (surr.)	1	%	74	20	81	85
<b>Perfluoroalkyl sulfonic acids (PFSAs)</b>						
Perfluorobutanesulfonic acid (PFBS) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanesulfonic acid (PFNS) <sup>N15</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropropanesulfonic acid (PFPrS) <sup>N15</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS) <sup>N15</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroheptanesulfonic acid (PFHpS) <sup>N15</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanesulfonic acid (PFOS) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorodecanesulfonic acid (PFDS) <sup>N15</sup>	5	ug/kg	< 5	< 5	< 5	< 5
13C3-PFBS (surr.)	1	%	103	78	118	107

Client Sample ID			SED-5 Soil N20-De26744 Dec 10, 2020	SED-6 Soil N20-De26745 Dec 10, 2020	SED-7 Soil N20-De26746 Dec 10, 2020	SED-8 Soil N20-De26747 Dec 10, 2020
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>Perfluoroalkyl sulfonic acids (PFSA)</b>						
18O2-PFHxS (surr.)	1	%	113	99	115	115
13C8-PFOS (surr.)	1	%	117	96	121	122
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA)</b>						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) <sup>N11</sup>	10	ug/kg	< 10	< 10	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5	< 5
13C2-4:2 FTS (surr.)	1	%	105	175	70	100
13C2-6:2 FTSA (surr.)	1	%	92	180	83	113
13C2-8:2 FTSA (surr.)	1	%	101	126	98	95
13C2-10:2 FTSA (surr.)	1	%	88	53	95	86
<b>PFASs Summations</b>						
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	< 5	< 5	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	< 5	< 5	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	< 5	< 5	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10	< 10	< 10	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50	< 50	< 50	< 50

Client Sample ID			SED-9 Soil N20-De26748 Dec 10, 2020	SED-10 Soil N20-De26749 Dec 11, 2020	D02_20201210 Soil N20-De26760 Dec 10, 2020
Sample Matrix					
Eurofins Sample No.					
Date Sampled					
Test/Reference	LOR	Unit			
% Moisture	1	%	43	69	12
<b>Perfluoroalkyl carboxylic acids (PFCA)</b>					
Perfluorobutanoic acid (PFBA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5
Perfluoropentanoic acid (PFPeA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5
Perfluorohexanoic acid (PFHxA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5
Perfluoroheptanoic acid (PFHpA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5
Perfluorooctanoic acid (PFOA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5
Perfluorononanoic acid (PFNA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5
Perfluorodecanoic acid (PFDA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5
Perfluoroundecanoic acid (PFUnDA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5
Perfluorododecanoic acid (PFDoDA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5
Perfluorotridecanoic acid (PFTrDA) <sup>N15</sup>	5	ug/kg	< 5	< 5	< 5
Perfluorotetradecanoic acid (PFTeDA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5
13C4-PFBA (surr.)	1	%	116	98	107
13C5-PFPeA (surr.)	1	%	114	109	120
13C5-PFHxA (surr.)	1	%	117	97	128
13C4-PFHpA (surr.)	1	%	117	99	108
13C8-PFOA (surr.)	1	%	114	102	105
13C5-PFNA (surr.)	1	%	122	95	110
13C6-PFDA (surr.)	1	%	128	100	125
13C2-PFUnDA (surr.)	1	%	78	56	82

Client Sample ID			SED-9 Soil N20-De26748 Dec 10, 2020	SED-10 Soil N20-De26749 Dec 11, 2020	D02_20201210 Soil N20-De26760 Dec 10, 2020
Sample Matrix					
Eurofins Sample No.					
Date Sampled					
Test/Reference	LOR	Unit			
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>					
13C2-PFDoDA (surr.)	1	%	80	37	94
13C2-PFTEdA (surr.)	1	%	98	45	132
<b>Perfluoroalkyl sulfonamido substances</b>					
Perfluorooctane sulfonamide (FOSA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) <sup>N11</sup>	10	ug/kg	< 10	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) <sup>N11</sup>	10	ug/kg	< 10	< 10	< 10
13C8-FOSA (surr.)	1	%	85	35	98
D3-N-MeFOSA (surr.)	1	%	63	49	98
D5-N-EtFOSA (surr.)	1	%	64	41	94
D7-N-MeFOSE (surr.)	1	%	98	63	140
D9-N-EtFOSE (surr.)	1	%	83	47	130
D5-N-EtFOSAA (surr.)	1	%	98	38	72
D3-N-MeFOSAA (surr.)	1	%	86	21	65
<b>Perfluoroalkyl sulfonic acids (PFASs)</b>					
Perfluorobutanesulfonic acid (PFBS) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5
Perfluorononanesulfonic acid (PFNS) <sup>N15</sup>	5	ug/kg	< 5	< 5	< 5
Perfluoropropanesulfonic acid (PFPrS) <sup>N15</sup>	5	ug/kg	< 5	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS) <sup>N15</sup>	5	ug/kg	< 5	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5
Perfluoroheptanesulfonic acid (PFHpS) <sup>N15</sup>	5	ug/kg	< 5	< 5	< 5
Perfluorooctanesulfonic acid (PFOS) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5
Perfluorodecanesulfonic acid (PFDS) <sup>N15</sup>	5	ug/kg	< 5	< 5	< 5
13C3-PFBS (surr.)	1	%	105	91	118
18O2-PFHxS (surr.)	1	%	111	104	112
13C8-PFOS (surr.)	1	%	122	106	125
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA)</b>					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) <sup>N11</sup>	10	ug/kg	< 10	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) <sup>N11</sup>	5	ug/kg	< 5	< 5	< 5
13C2-4:2 FTS (surr.)	1	%	129	190	65
13C2-6:2 FTSA (surr.)	1	%	136	199	75
13C2-8:2 FTSA (surr.)	1	%	115	143	89
13C2-10:2 FTSA (surr.)	1	%	80	61	91
<b>PFASs Summations</b>					
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	< 5	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	< 5	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	< 5	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10	< 10	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50	< 50	< 50



## Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
% Moisture	Brisbane	Dec 21, 2020	14 Days
- Method: LTM-GEN-7080 Moisture			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Dec 16, 2020	180 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Dec 16, 2020	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAAs)	Brisbane	Dec 16, 2020	180 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Dec 16, 2020	180 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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NATA # 1261  
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Phone : +61 2 4968 8448

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**Company Name:** ERM Hunter Valley  
**Address:** Level 1 / 45 Watt Street  
Newcastle  
NSW 2300

**Project Name:** WPCA BADGERYS CK RD  
**Project ID:** 0571466

**Order No.:**  
**Report #:** 763324  
**Phone:** (02) 4964 2150  
**Fax:** (02) 4964 2152

**Received:** Dec 14, 2020 10:00 AM  
**Due:** Dec 21, 2020  
**Priority:** 5 Day  
**Contact Name:** Ian Batterley

**Eurofins Analytical Services Manager : Andrew Black**

## Sample Detail

AUS Leaching Procedure

Moisture Set

Per- and Polyfluoroalkyl Substances (PFASs)

Melbourne Laboratory - NATA Site # 1254 & 14271

Sydney Laboratory - NATA Site # 18217

Brisbane Laboratory - NATA Site # 20794

Perth Laboratory - NATA Site # 23736

Mayfield Laboratory

External Laboratory

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
1	SW1	Dec 10, 2020		Water	N20-De26729			X
2	SW2	Dec 10, 2020		Water	N20-De26730			X
3	SW3	Dec 10, 2020		Water	N20-De26731			X
4	SW4	Dec 10, 2020		Water	N20-De26732			X
5	SW5	Dec 10, 2020		Water	N20-De26733			X
6	SW6	Dec 10, 2020		Water	N20-De26734			X
7	SW7	Dec 10, 2020		Water	N20-De26735			X
8	SW8	Dec 10, 2020		Water	N20-De26736			X
9	SW9	Dec 10, 2020		Water	N20-De26737			X

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**Mayfield Laboratory**

**External Laboratory**

10	SW10	Dec 10, 2020		Water	N20-De26738			X
11	SW11	Dec 11, 2020		Water	N20-De26739			X
12	SED-1	Dec 10, 2020		Soil	N20-De26740		X	X
13	SED-2	Dec 10, 2020		Soil	N20-De26741		X	X
14	SED-3	Dec 10, 2020		Soil	N20-De26742		X	X
15	SED-4	Dec 10, 2020		Soil	N20-De26743		X	X
16	SED-5	Dec 10, 2020		Soil	N20-De26744		X	X
17	SED-6	Dec 10, 2020		Soil	N20-De26745		X	X
18	SED-7	Dec 10, 2020		Soil	N20-De26746		X	X
19	SED-8	Dec 10, 2020		Soil	N20-De26747		X	X
20	SED-9	Dec 10, 2020		Soil	N20-De26748		X	X



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**Brisbane Laboratory - NATA Site # 20794**

**Perth Laboratory - NATA Site # 23736**

**Mayfield Laboratory**

**External Laboratory**

21	SED-10	Dec 11, 2020		Soil	N20-De26749		X	X
22	SED-11	Dec 11, 2020		AUS Leachate	N20-De26750	X		X
23	MW1-B	Dec 11, 2020		Water	N20-De26751			X
24	BB116	Dec 11, 2020		Water	N20-De26752			X
25	MW2	Dec 11, 2020		Water	N20-De26753			X
26	BB114	Dec 11, 2020		Water	N20-De26754			X
27	BB01	Dec 11, 2020		Water	N20-De26755			X
28	BB02	Dec 11, 2020		Water	N20-De26756			X
29	BB03	Dec 11, 2020		Water	N20-De26757			X
30	D01_20201210	Dec 10, 2020		Water	N20-De26758			X

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**Brisbane Laboratory - NATA Site # 20794**

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**Mayfield Laboratory**

**External Laboratory**

31	D02_20201210	Dec 10, 2020		Soil	N20-De26760		x	x
32	D01_20201211	Dec 11, 2020		Water	N20-De26762			x
33	D01_20201209	Dec 11, 2020		Water	N20-De26764			x
34	TB01	Dec 11, 2020		Water	N20-De26765			x
35	TB02	Dec 11, 2020		Water	N20-De26766			x
36	SED-2	Dec 10, 2020		AUS Leachate	N20-De32042	x		x
37	SED-4	Dec 10, 2020		AUS Leachate	N20-De32043	x		x
38	SED-6	Dec 10, 2020		AUS Leachate	N20-De32044	x		x
39	SED-10	Dec 10, 2020		AUS Leachate	N20-De32045	x		x

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Sample Detail			
	AUS Leaching Procedure	Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271			
Sydney Laboratory - NATA Site # 18217			
Brisbane Laboratory - NATA Site # 20794	X	X	X
Perth Laboratory - NATA Site # 23736			
Mayfield Laboratory			
External Laboratory			
Test Counts	5	11	39



## Internal Quality Control Review and Glossary

### General

- Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
- This report replaces any interim results previously issued.

### Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

**\*\*NOTE:** pH duplicates are reported as a range NOT as RPD

### Units

**mg/kg:** milligrams per kilogram

**mg/L:** milligrams per litre

**ug/L:** micrograms per litre

**ppm:** Parts per million

**ppb:** Parts per billion

**%:** Percentage

**org/100mL:** Organisms per 100 millilitres

**NTU:** Nephelometric Turbidity Units

**MPN/100mL:** Most Probable Number of organisms per 100 millilitres

### Terms

<b>Dry</b>	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
<b>LOR</b>	Limit of Reporting.
<b>SPIKE</b>	Addition of the analyte to the sample and reported as percentage recovery.
<b>RPD</b>	Relative Percent Difference between two Duplicate pieces of analysis.
<b>LCS</b>	Laboratory Control Sample - reported as percent recovery.
<b>CRM</b>	Certified Reference Material - reported as percent recovery.
<b>Method Blank</b>	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
<b>Surr - Surrogate</b>	The addition of a like compound to the analyte target and reported as percentage recovery.
<b>Duplicate</b>	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
<b>USEPA</b>	United States Environmental Protection Agency
<b>APHA</b>	American Public Health Association
<b>TCLP</b>	Toxicity Characteristic Leaching Procedure
<b>COC</b>	Chain of Custody
<b>SRA</b>	Sample Receipt Advice
<b>QSM</b>	US Department of Defense Quality Systems Manual Version 5.3
<b>CP</b>	Client Parent - QC was performed on samples pertaining to this report
<b>NC</b>	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
<b>TEQ</b>	Toxic Equivalency Quotient

### QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

### QC Data General Comments

- Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
- Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
- Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
- pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

**Quality Control Results**

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
<b>Method Blank</b>							
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>							
Perfluorobutanoic acid (PFBA)	ug/kg	< 5			5	Pass	
Perfluoropentanoic acid (PFPeA)	ug/kg	< 5			5	Pass	
Perfluorohexanoic acid (PFHxA)	ug/kg	< 5			5	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/kg	< 5			5	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 5			5	Pass	
Perfluorononanoic acid (PFNA)	ug/kg	< 5			5	Pass	
Perfluorodecanoic acid (PFDA)	ug/kg	< 5			5	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/kg	< 5			5	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/kg	< 5			5	Pass	
Perfluorotridecanoic acid (PFTTrDA)	ug/kg	< 5			5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 5			5	Pass	
<b>Method Blank</b>							
<b>Perfluoroalkyl sulfonamido substances</b>							
Perfluorooctane sulfonamide (FOSA)	ug/kg	< 5			5	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/kg	< 5			5	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/kg	< 5			5	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/kg	< 5			5	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/kg	< 5			5	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 10			10	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 10			10	Pass	
<b>Method Blank</b>							
<b>Perfluoroalkyl sulfonic acids (PFSA's)</b>							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 5			5	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/kg	< 5			5	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/kg	< 5			5	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/kg	< 5			5	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 5			5	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/kg	< 5			5	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 5			5	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 5			5	Pass	
<b>Method Blank</b>							
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)</b>							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/kg	< 10			10	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/kg	< 5			5	Pass	
<b>LCS - % Recovery</b>							
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>							
Perfluorobutanoic acid (PFBA)	%	92			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	96			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	98			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	90			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	93			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	91			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	91			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	88			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	86			50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	%	85			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	84			50-150	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
<b>LCS - % Recovery</b>									
<b>Perfluoroalkyl sulfonamido substances</b>									
Perfluorooctane sulfonamide (FOSA)			%	95			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)			%	89			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)			%	101			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)			%	106			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)			%	101			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)			%	94			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)			%	98			50-150	Pass	
<b>LCS - % Recovery</b>									
<b>Perfluoroalkyl sulfonic acids (PFSA's)</b>									
Perfluorobutanesulfonic acid (PFBS)			%	88			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)			%	103			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)			%	111			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)			%	92			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)			%	92			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)			%	101			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)			%	112			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)			%	101			50-150	Pass	
<b>LCS - % Recovery</b>									
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)</b>									
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			%	95			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)			%	98			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			%	98			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)			%	91			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
<b>Spike - % Recovery</b>									
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>									
				Result 1					
Perfluorobutanoic acid (PFBA)	N20-De26741	CP	%	93			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	N20-De26741	CP	%	99			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	N20-De26741	CP	%	107			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	N20-De26741	CP	%	90			50-150	Pass	
Perfluorooctanoic acid (PFOA)	N20-De26741	CP	%	96			50-150	Pass	
Perfluorononanoic acid (PFNA)	N20-De26741	CP	%	91			50-150	Pass	
Perfluorodecanoic acid (PFDA)	N20-De26741	CP	%	91			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	N20-De26741	CP	%	93			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	N20-De26741	CP	%	107			50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	N20-De26741	CP	%	105			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	N20-De26741	CP	%	93			50-150	Pass	
<b>Spike - % Recovery</b>									
<b>Perfluoroalkyl sulfonamido substances</b>									
				Result 1					
Perfluorooctane sulfonamide (FOSA)	N20-De26741	CP	%	104			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	N20-De26741	CP	%	110			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	N20-De26741	CP	%	104			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	N20-De26741	CP	%	100			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	N20-De26741	CP	%	94			50-150	Pass	



Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	N20-De26741	CP	%	89			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	N20-De26741	CP	%	90			50-150	Pass	
<b>Spike - % Recovery</b>									
<b>Perfluoroalkyl sulfonic acids (PFSA's)</b>				Result 1					
Perfluorobutanesulfonic acid (PFBS)	N20-De26741	CP	%	107			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	N20-De26741	CP	%	114			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	N20-De26741	CP	%	110			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	N20-De26741	CP	%	94			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	N20-De26741	CP	%	94			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	N20-De26741	CP	%	91			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	N20-De26741	CP	%	103			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	N20-De26741	CP	%	103			50-150	Pass	
<b>Spike - % Recovery</b>									
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)</b>				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	N20-De26741	CP	%	99			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	N20-De26741	CP	%	99			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	N20-De26741	CP	%	92			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	N20-De26741	CP	%	90			50-150	Pass	
<b>Spike - % Recovery</b>									
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>				Result 1					
Perfluorobutanoic acid (PFBA)	N20-De26760	CP	%	95			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	N20-De26760	CP	%	105			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	N20-De26760	CP	%	101			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	N20-De26760	CP	%	89			50-150	Pass	
Perfluorooctanoic acid (PFOA)	N20-De26760	CP	%	101			50-150	Pass	
Perfluorononanoic acid (PFNA)	N20-De26760	CP	%	90			50-150	Pass	
Perfluorodecanoic acid (PFDA)	N20-De26760	CP	%	88			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	N20-De26760	CP	%	91			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	N20-De26760	CP	%	113			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	N20-De26760	CP	%	97			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	N20-De26760	CP	%	94			50-150	Pass	
<b>Spike - % Recovery</b>									
<b>Perfluoroalkyl sulfonamido substances</b>				Result 1					
Perfluorooctane sulfonamide (FOSA)	N20-De26760	CP	%	109			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	N20-De26760	CP	%	98			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	N20-De26760	CP	%	103			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	N20-De26760	CP	%	87			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	N20-De26760	CP	%	93			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	N20-De26760	CP	%	94			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	N20-De26760	CP	%	89			50-150	Pass	
<b>Spike - % Recovery</b>									
<b>Perfluoroalkyl sulfonic acids (PFSA's)</b>				Result 1					
Perfluorobutanesulfonic acid (PFBS)	N20-De26760	CP	%	103			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	N20-De26760	CP	%	95			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	N20-De26760	CP	%	106			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	N20-De26760	CP	%	85			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	N20-De26760	CP	%	93			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	N20-De26760	CP	%	84			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	N20-De26760	CP	%	92			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	N20-De26760	CP	%	66			50-150	Pass	
<b>Spike - % Recovery</b>									
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)</b>				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	N20-De26760	CP	%	70			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	N20-De26760	CP	%	100			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	N20-De26760	CP	%	95			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	N20-De26760	CP	%	73			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
<b>Duplicate</b>									
				Result 1	Result 2	RPD			
% Moisture	N20-De26746	CP	%	24	25	6.0	30%	Pass	

## Comments

### Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

### Qualifier Codes/Comments

Code	Description
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

## Authorised By

Andrew Black	Analytical Services Manager
Sarah McCallion	Senior Analyst-PFAS (QLD)



### Glenn Jackson General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

\* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

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ERM Hunter Valley  
Level 1 / 45 Watt Street  
Newcastle  
NSW 2300



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Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing  
The results of the tests, calibrations and/or  
measurements included in this document are traceable  
to Australian/national standards.

Attention: Ian Batterley

Report 763324-W  
Project name WPCA BADGERYS CK RD  
Project ID 0571466  
Received Date Dec 14, 2020

Client Sample ID			SW1 Water N20-De26729 Dec 10, 2020	SW2 Water N20-De26730 Dec 10, 2020	SW3 Water N20-De26731 Dec 10, 2020	SW4 Water N20-De26732 Dec 10, 2020
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>						
Perfluorobutanoic acid (PFBA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA) <sup>N11</sup>	0.01	ug/L	0.02	0.24	< 0.01	0.01
Perfluorohexanoic acid (PFHxA) <sup>N11</sup>	0.01	ug/L	0.02	1.7	< 0.01	0.05
Perfluoroheptanoic acid (PFHpA) <sup>N11</sup>	0.01	ug/L	< 0.01	N090.13	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA) <sup>N11</sup>	0.01	ug/L	< 0.02	N090.09	< 0.02	< 0.02
Perfluorononanoic acid (PFNA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA) <sup>N11</sup>	0.01	ug/L	< 0.01	0.02	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTeDA) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	65	61	69	70
13C5-PFPeA (surr.)	1	%	77	70	77	89
13C5-PFHxA (surr.)	1	%	83	149	77	80
13C4-PFHpA (surr.)	1	%	109	92	108	123
13C8-PFOA (surr.)	1	%	117	109	105	128
13C5-PFNA (surr.)	1	%	76	81	85	93
13C6-PFDA (surr.)	1	%	101	103	107	98
13C2-PFUnDA (surr.)	1	%	94	101	105	97
13C2-PFDoDA (surr.)	1	%	58	71	69	71
13C2-PFTeDA (surr.)	1	%	50	49	65	73
<b>Perfluoroalkyl sulfonamido substances</b>						
Perfluorooctane sulfonamide (FOSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluorooctanesulfonamidoacetic acid (N-EtFOSAA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	115	121	129	119
D3-N-MeFOSA (surr.)	1	%	97	101	99	115
D5-N-EtFOSA (surr.)	1	%	108	88	81	115

Client Sample ID			SW1 Water N20-De26729 Dec 10, 2020	SW2 Water N20-De26730 Dec 10, 2020	SW3 Water N20-De26731 Dec 10, 2020	SW4 Water N20-De26732 Dec 10, 2020
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>Perfluoroalkyl sulfonamido substances</b>						
D7-N-MeFOSE (surr.)	1	%	82	72	77	87
D9-N-EtFOSE (surr.)	1	%	87	75	84	94
D5-N-EtFOSAA (surr.)	1	%	71	54	74	94
D3-N-MeFOSAA (surr.)	1	%	79	68	92	108
<b>Perfluoroalkyl sulfonic acids (PFSA's)</b>						
Perfluorobutanesulfonic acid (PFBS) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorononanesulfonic acid (PFNS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS) <sup>N11</sup>	0.01	ug/L	< 0.01	<sup>N09</sup> 0.01	< 0.01	< 0.01
Perfluoroheptanesulfonic acid (PFHpS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS) <sup>N11</sup>	0.01	ug/L	< 0.01	<sup>N09</sup> 0.02	< 0.01	< 0.01
Perfluorodecanesulfonic acid (PFDS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	109	109	111	111
18O2-PFHxS (surr.)	1	%	118	118	115	123
13C8-PFOS (surr.)	1	%	107	108	107	111
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)</b>						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTS (surr.)	1	%	121	128	126	115
13C2-6:2 FTSA (surr.)	1	%	INT	INT	INT	INT
13C2-8:2 FTSA (surr.)	1	%	114	183	139	118
13C2-10:2 FTSA (surr.)	1	%	100	170	143	114
<b>PFASs Summations</b>						
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	0.03	< 0.01	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.02	0.11	< 0.02	< 0.02
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.02	0.12	< 0.02	< 0.02
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	2.19	< 0.05	0.06
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	2.21	< 0.1	< 0.1

Client Sample ID			SW5 Water N20-De26733 Dec 10, 2020	SW6 Water N20-De26734 Dec 10, 2020	SW7 Water N20-De26735 Dec 10, 2020	SW8 Water N20-De26736 Dec 10, 2020
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>						
Perfluorobutanoic acid (PFBA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA) <sup>N11</sup>	0.01	ug/L	0.03	0.02	0.02	< 0.01
Perfluorohexanoic acid (PFHxA) <sup>N11</sup>	0.01	ug/L	0.06	0.03	0.03	0.02
Perfluoroheptanoic acid (PFHpA) <sup>N11</sup>	0.01	ug/L	0.01	< 0.01	< 0.01	<sup>N09</sup> 0.02
Perfluorooctanoic acid (PFOA) <sup>N11</sup>	0.01	ug/L	< 0.03	< 0.03	< 0.03	< 0.02
Perfluorononanoic acid (PFNA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01

Client Sample ID			SW5	SW6	SW7	SW8
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			N20-De26733	N20-De26734	N20-De26735	N20-De26736
Date Sampled			Dec 10, 2020	Dec 10, 2020	Dec 10, 2020	Dec 10, 2020
Test/Reference	LOR	Unit				
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>						
Perfluoroundecanoic acid (PFUnDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTeDA) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	72	69	66	46
13C5-PFPeA (surr.)	1	%	91	84	81	52
13C5-PFHxA (surr.)	1	%	83	84	77	56
13C4-PFHpA (surr.)	1	%	114	115	102	78
13C8-PFOA (surr.)	1	%	105	97	105	99
13C5-PFNA (surr.)	1	%	75	77	75	73
13C6-PFDA (surr.)	1	%	98	88	84	104
13C2-PFUnDA (surr.)	1	%	86	87	83	97
13C2-PFDoDA (surr.)	1	%	57	56	50	74
13C2-PFTeDA (surr.)	1	%	41	53	44	43
<b>Perfluoroalkyl sulfonamido substances</b>						
Perfluorooctane sulfonamide (FOSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	117	118	111	116
D3-N-MeFOSA (surr.)	1	%	94	93	101	92
D5-N-EtFOSA (surr.)	1	%	93	78	89	94
D7-N-MeFOSE (surr.)	1	%	77	84	79	75
D9-N-EtFOSE (surr.)	1	%	82	74	82	77
D5-N-EtFOSAA (surr.)	1	%	63	61	69	90
D3-N-MeFOSAA (surr.)	1	%	73	80	87	113
<b>Perfluoroalkyl sulfonic acids (PFSA)</b>						
Perfluorobutanesulfonic acid (PFBS) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorononanesulfonic acid (PFNS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	<sup>N09</sup> 0.06
Perfluoroheptanesulfonic acid (PFHpS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	<sup>N09</sup> 0.05
Perfluorodecanesulfonic acid (PFDS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	108	108	111	95
18O2-PFHxS (surr.)	1	%	120	113	112	109
13C8-PFOS (surr.)	1	%	113	106	107	113



Client Sample ID			SW5 Water N20-De26733 Dec 10, 2020	SW6 Water N20-De26734 Dec 10, 2020	SW7 Water N20-De26735 Dec 10, 2020	SW8 Water N20-De26736 Dec 10, 2020
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA)</b>						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTS (surr.)	1	%	119	120	119	113
13C2-6:2 FTSA (surr.)	1	%	187	161	164	INT
13C2-8:2 FTSA (surr.)	1	%	100	94	100	173
13C2-10:2 FTSA (surr.)	1	%	88	99	79	145
<b>PFASs Summations</b>						
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	< 0.01	< 0.01	0.11
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.03	< 0.03	< 0.03	0.05
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.03	< 0.03	< 0.03	0.11
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	0.1	0.05	0.05	0.15
Sum of PFASs (n=30)*	0.1	ug/L	0.1	< 0.1	< 0.1	0.15

Client Sample ID			SW9 Water N20-De26737 Dec 10, 2020	SW10 Water N20-De26738 Dec 10, 2020	SW11 Water N20-De26739 Dec 11, 2020	MW1-B Water N20-De26751 Dec 11, 2020
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>						
Perfluorobutanoic acid (PFBA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorohexanoic acid (PFHxA) <sup>N11</sup>	0.01	ug/L	< 0.01	0.02	0.02	< 0.01
Perfluoroheptanoic acid (PFHpA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA) <sup>N11</sup>	0.01	ug/L	< 0.02	< 0.03	< 0.03	< 0.02
Perfluorononanoic acid (PFNA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTTrDA) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	45	53	55	75
13C5-PFPeA (surr.)	1	%	51	68	66	115
13C5-PFHxA (surr.)	1	%	51	70	68	104
13C4-PFHpA (surr.)	1	%	85	96	79	156
13C8-PFOA (surr.)	1	%	95	95	99	127
13C5-PFNA (surr.)	1	%	76	77	68	90
13C6-PFDA (surr.)	1	%	106	83	103	96
13C2-PFUnDA (surr.)	1	%	108	83	89	88
13C2-PFDoDA (surr.)	1	%	70	53	69	61
13C2-PFTeDA (surr.)	1	%	50	55	82	34

Client Sample ID			SW9 Water N20-De26737 Dec 10, 2020	SW10 Water N20-De26738 Dec 10, 2020	SW11 Water N20-De26739 Dec 11, 2020	MW1-B Water N20-De26751 Dec 11, 2020
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>Perfluoroalkyl sulfonamido substances</b>						
Perfluorooctane sulfonamide (FOSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluorooctanesulfonamidoacetic acid (N-EtFOSAA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	113	119	112	102
D3-N-MeFOSA (surr.)	1	%	95	113	98	72
D5-N-EtFOSA (surr.)	1	%	110	111	87	78
D7-N-MeFOSE (surr.)	1	%	75	69	68	86
D9-N-EtFOSE (surr.)	1	%	83	71	89	81
D5-N-EtFOSAA (surr.)	1	%	123	66	77	148
D3-N-MeFOSAA (surr.)	1	%	145	80	94	132
<b>Perfluoroalkyl sulfonic acids (PFSA)</b>						
Perfluorobutanesulfonic acid (PFBS) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	0.02	< 0.01
Perfluorononanesulfonic acid (PFNS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	<sup>NO9</sup> 0.03	< 0.01
Perfluoroheptanesulfonic acid (PFHpS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	<sup>NO9</sup> 0.04	< 0.01
Perfluorodecanesulfonic acid (PFDS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	94	96	102	117
18O2-PFHxS (surr.)	1	%	113	114	115	127
13C8-PFOS (surr.)	1	%	110	106	96	121
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA)</b>						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTS (surr.)	1	%	116	98	125	123
13C2-6:2 FTSA (surr.)	1	%	INT	181	INT	141
13C2-8:2 FTSA (surr.)	1	%	171	111	143	81
13C2-10:2 FTSA (surr.)	1	%	150	102	126	137
<b>PFASs Summations</b>						
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	< 0.01	0.07	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.02	< 0.03	0.04	< 0.02
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.02	< 0.03	0.07	< 0.02
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	< 0.05	0.11	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	< 0.1	0.12	< 0.1

Client Sample ID			BB116 Water N20-De26752 Dec 11, 2020	MW2 Water N20-De26753 Dec 11, 2020	BB114 Water N20-De26754 Dec 11, 2020	BB01 Water N20-De26755 Dec 11, 2020
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>						
Perfluorobutanoic acid (PFBA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorohexanoic acid (PFHxA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroheptanoic acid (PFHpA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA) <sup>N11</sup>	0.01	ug/L	< 0.02	< 0.02	< 0.02	< 0.02
Perfluorononanoic acid (PFNA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTeDA) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	95	104	97	88
13C5-PFPeA (surr.)	1	%	131	128	128	120
13C5-PFHxA (surr.)	1	%	113	112	115	101
13C4-PFHpA (surr.)	1	%	138	160	135	146
13C8-PFOA (surr.)	1	%	130	129	126	122
13C5-PFNA (surr.)	1	%	89	75	84	85
13C6-PFDA (surr.)	1	%	94	81	96	88
13C2-PFUnDA (surr.)	1	%	96	76	84	76
13C2-PFDoDA (surr.)	1	%	50	44	59	49
13C2-PFTeDA (surr.)	1	%	27	16	21	22
<b>Perfluoroalkyl sulfonamido substances</b>						
Perfluorooctane sulfonamide (FOSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	128	109	114	118
D3-N-MeFOSA (surr.)	1	%	97	75	80	90
D5-N-EtFOSA (surr.)	1	%	104	68	72	92
D7-N-MeFOSE (surr.)	1	%	93	81	102	98
D9-N-EtFOSE (surr.)	1	%	103	84	85	95
D5-N-EtFOSAA (surr.)	1	%	120	78	119	62
D3-N-MeFOSAA (surr.)	1	%	126	81	104	73
<b>Perfluoroalkyl sulfonic acids (PFSAs)</b>						
Perfluorobutanesulfonic acid (PFBS) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorononanesulfonic acid (PFNS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroheptanesulfonic acid (PFHpS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanesulfonic acid (PFDS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	115	119	114	115



Client Sample ID			BB116 Water N20-De26752 Dec 11, 2020	MW2 Water N20-De26753 Dec 11, 2020	BB114 Water N20-De26754 Dec 11, 2020	BB01 Water N20-De26755 Dec 11, 2020
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>Perfluoroalkyl sulfonic acids (PFSA)</b>						
18O2-PFHxS (surr.)	1	%	123	119	117	128
13C8-PFOS (surr.)	1	%	118	116	111	111
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA)</b>						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTS (surr.)	1	%	113	125	127	114
13C2-6:2 FTSA (surr.)	1	%	122	132	138	106
13C2-8:2 FTSA (surr.)	1	%	66	63	75	68
13C2-10:2 FTSA (surr.)	1	%	78	58	152	69
<b>PFASs Summations</b>						
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.02	< 0.02	< 0.02	< 0.02
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.02	< 0.02	< 0.02	< 0.02
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	< 0.1	< 0.1	< 0.1

Client Sample ID			BB02 Water N20-De26756 Dec 11, 2020	BB03 Water N20-De26757 Dec 11, 2020	D01_20201210 Water N20-De26758 Dec 10, 2020	D01_20201211 Water N20-De26762 Dec 11, 2020
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>Perfluoroalkyl carboxylic acids (PFCA)</b>						
Perfluorobutanoic acid (PFBA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	0.02	< 0.01
Perfluorohexanoic acid (PFHxA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	0.03	< 0.01
Perfluoroheptanoic acid (PFHpA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA) <sup>N11</sup>	0.01	ug/L	< 0.02	< 0.02	< 0.03	< 0.02
Perfluorononanoic acid (PFNA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTeDA) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	72	76	66	75
13C5-PFPeA (surr.)	1	%	94	102	88	97
13C5-PFHxA (surr.)	1	%	81	101	80	97
13C4-PFHpA (surr.)	1	%	105	114	112	122
13C8-PFOA (surr.)	1	%	82	108	97	108
13C5-PFNA (surr.)	1	%	72	87	79	82
13C6-PFDA (surr.)	1	%	78	105	89	98
13C2-PFUnDA (surr.)	1	%	90	99	92	112
13C2-PFDoDA (surr.)	1	%	66	73	61	74
13C2-PFTeDA (surr.)	1	%	126	66	57	66

Client Sample ID			BB02 Water N20-De26756 Dec 11, 2020	BB03 Water N20-De26757 Dec 11, 2020	D01_20201210 Water N20-De26758 Dec 10, 2020	D01_20201211 Water N20-De26762 Dec 11, 2020
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>Perfluoroalkyl sulfonamido substances</b>						
Perfluorooctane sulfonamide (FOSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluorooctanesulfonamidoacetic acid (N-EtFOSAA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	96	120	115	114
D3-N-MeFOSA (surr.)	1	%	120	114	107	113
D5-N-EtFOSA (surr.)	1	%	128	109	102	110
D7-N-MeFOSE (surr.)	1	%	102	119	82	100
D9-N-EtFOSE (surr.)	1	%	104	108	77	99
D5-N-EtFOSAA (surr.)	1	%	78	142	68	130
D3-N-MeFOSAA (surr.)	1	%	83	151	83	122
<b>Perfluoroalkyl sulfonic acids (PFSA)</b>						
Perfluorobutanesulfonic acid (PFBS) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorononanesulfonic acid (PFNS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroheptanesulfonic acid (PFHpS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanesulfonic acid (PFDS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	86	107	116	116
18O2-PFHxS (surr.)	1	%	87	111	114	114
13C8-PFOS (surr.)	1	%	96	116	112	119
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA)</b>						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTS (surr.)	1	%	80	105	103	105
13C2-6:2 FTS (surr.)	1	%	89	135	154	130
13C2-8:2 FTS (surr.)	1	%	60	76	99	93
13C2-10:2 FTS (surr.)	1	%	88	108	91	111
<b>PFASs Summations</b>						
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.02	< 0.02	< 0.03	< 0.02
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.02	< 0.02	< 0.03	< 0.02
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	< 0.05	0.05	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	< 0.1	< 0.1	< 0.1

Client Sample ID			D01_20201209	TB01	TB02
Sample Matrix			Water	Water	Water
Eurofins Sample No.			N20-De26764	N20-De26765	N20-De26766
Date Sampled			Dec 11, 2020	Dec 11, 2020	Dec 11, 2020
Test/Reference	LOR	Unit			
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>					
Perfluorobutanoic acid (PFBA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorohexanoic acid (PFHxA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoroheptanoic acid (PFHpA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA) <sup>N11</sup>	0.01	ug/L	< 0.02	< 0.02	< 0.02
Perfluorononanoic acid (PFNA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTeDA) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	99	68	92
13C5-PFPeA (surr.)	1	%	116	84	120
13C5-PFHxA (surr.)	1	%	110	75	106
13C4-PFHpA (surr.)	1	%	139	100	137
13C8-PFOA (surr.)	1	%	116	79	114
13C5-PFNA (surr.)	1	%	106	71	85
13C6-PFDA (surr.)	1	%	91	67	88
13C2-PFUnDA (surr.)	1	%	94	84	89
13C2-PFDoDA (surr.)	1	%	60	62	52
13C2-PFTeDA (surr.)	1	%	28	116	36
<b>Perfluoroalkyl sulfonamido substances</b>					
Perfluorooctane sulfonamide (FOSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	103	79	103
D3-N-MeFOSA (surr.)	1	%	91	108	97
D5-N-EtFOSA (surr.)	1	%	86	143	137
D7-N-MeFOSE (surr.)	1	%	99	100	102
D9-N-EtFOSE (surr.)	1	%	98	101	101
D5-N-EtFOSAA (surr.)	1	%	92	78	77
D3-N-MeFOSAA (surr.)	1	%	121	85	97
<b>Perfluoroalkyl sulfonic acids (PFSAs)</b>					
Perfluorobutanesulfonic acid (PFBS) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorononanesulfonic acid (PFNS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoroheptanesulfonic acid (PFHpS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorodecanesulfonic acid (PFDS) <sup>N15</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	112	79	110



Client Sample ID			D01_20201209	TB01	TB02
Sample Matrix			Water	Water	Water
Eurofins Sample No.			N20-De26764	N20-De26765	N20-De26766
Date Sampled			Dec 11, 2020	Dec 11, 2020	Dec 11, 2020
Test/Reference	LOR	Unit			
<b>Perfluoroalkyl sulfonic acids (PFSA)</b>					
18O2-PFHxS (surr.)	1	%	125	83	116
13C8-PFOS (surr.)	1	%	122	87	120
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA)</b>					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) <sup>N11</sup>	0.05	ug/L	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) <sup>N11</sup>	0.01	ug/L	< 0.01	< 0.01	< 0.01
13C2-4:2 FTS (surr.)	1	%	96	58	93
13C2-6:2 FTSA (surr.)	1	%	123	62	106
13C2-8:2 FTSA (surr.)	1	%	65	51	71
13C2-10:2 FTSA (surr.)	1	%	78	83	70
<b>PFASs Summations</b>					
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	< 0.01	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.02	< 0.02	< 0.02
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.02	< 0.02	< 0.02
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	< 0.05	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	< 0.1	< 0.1

## Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Dec 15, 2020	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Dec 15, 2020	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAAs)	Brisbane	Dec 15, 2020	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Dec 15, 2020	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

## Australia

**Melbourne**  
6 Monterey Road  
Dandenong South VIC 3175  
Phone : +61 3 8564 5000  
NATA # 1261  
Site # 1254 & 14271

**Sydney**  
Unit F3, Building F  
16 Mars Road  
Lane Cove West NSW 2066  
Phone : +61 2 9900 8400  
NATA # 1261 Site # 18217

**Brisbane**  
1/21 Smallwood Place  
Murarrie QLD 4172  
Phone : +61 7 3902 4600  
NATA # 1261 Site # 20794

**Perth**  
2/91 Leach Highway  
Kewdale WA 6105  
Phone : +61 8 9251 9600  
NATA # 1261  
Site # 23736

**Newcastle**  
4/52 Industrial Drive  
Mayfield East NSW 2304  
PO Box 60 Wickham 2293  
Phone : +61 2 4968 8448

## New Zealand

**Auckland**  
35 O'Rorke Road  
Penrose, Auckland 1061  
Phone : +64 9 526 45 51  
IANZ # 1327

**Christchurch**  
43 Detroit Drive  
Rolleston, Christchurch 7675  
Phone : 0800 856 450  
IANZ # 1290

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

**Company Name:** ERM Hunter Valley  
**Address:** Level 1 / 45 Watt Street  
Newcastle  
NSW 2300  
  
**Project Name:** WPCA BADGERYS CK RD  
**Project ID:** 0571466

**Order No.:**  
**Report #:** 763324  
**Phone:** (02) 4964 2150  
**Fax:** (02) 4964 2152

**Received:** Dec 14, 2020 10:00 AM  
**Due:** Dec 21, 2020  
**Priority:** 5 Day  
**Contact Name:** Ian Batterley

**Eurofins Analytical Services Manager : Andrew Black**

Sample Detail						AUS Leaching Procedure	Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
Mayfield Laboratory								
External Laboratory								
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
1	SW1	Dec 10, 2020		Water	N20-De26729			X
2	SW2	Dec 10, 2020		Water	N20-De26730			X
3	SW3	Dec 10, 2020		Water	N20-De26731			X
4	SW4	Dec 10, 2020		Water	N20-De26732			X
5	SW5	Dec 10, 2020		Water	N20-De26733			X
6	SW6	Dec 10, 2020		Water	N20-De26734			X
7	SW7	Dec 10, 2020		Water	N20-De26735			X
8	SW8	Dec 10, 2020		Water	N20-De26736			X
9	SW9	Dec 10, 2020		Water	N20-De26737			X



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Murarrie QLD 4172  
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### Perth

2/91 Leach Highway  
Kewdale WA 6105  
Phone : +61 8 9251 9600  
NATA # 1261  
Site # 23736

### Newcastle

4/52 Industrial Drive  
Mayfield East NSW 2304  
PO Box 60 Wickham 2293  
Phone : +61 2 4968 8448

## New Zealand

### Auckland

35 O'Rourke Road  
Penrose, Auckland 1061  
Phone : +64 9 526 45 51  
IANZ # 1327

### Christchurch

43 Detroit Drive  
Rolleston, Christchurch 7675  
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## Sample Detail

AUS Leaching Procedure

Moisture Set

Per- and Polyfluoroalkyl Substances (PFASs)

**Melbourne Laboratory - NATA Site # 1254 & 14271**

**Sydney Laboratory - NATA Site # 18217**

**Brisbane Laboratory - NATA Site # 20794**

**Perth Laboratory - NATA Site # 23736**

**Mayfield Laboratory**

**External Laboratory**

10	SW10	Dec 10, 2020		Water	N20-De26738			X
11	SW11	Dec 11, 2020		Water	N20-De26739			X
12	SED-1	Dec 10, 2020		Soil	N20-De26740		X	X
13	SED-2	Dec 10, 2020		Soil	N20-De26741		X	X
14	SED-3	Dec 10, 2020		Soil	N20-De26742		X	X
15	SED-4	Dec 10, 2020		Soil	N20-De26743		X	X
16	SED-5	Dec 10, 2020		Soil	N20-De26744		X	X
17	SED-6	Dec 10, 2020		Soil	N20-De26745		X	X
18	SED-7	Dec 10, 2020		Soil	N20-De26746		X	X
19	SED-8	Dec 10, 2020		Soil	N20-De26747		X	X
20	SED-9	Dec 10, 2020		Soil	N20-De26748		X	X

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**Contact Name:** Ian Batterley

**Eurofins Analytical Services Manager : Andrew Black**

## Sample Detail

AUS Leaching Procedure

Moisture Set

Per- and Polyfluoroalkyl Substances (PFASs)

Melbourne Laboratory - NATA Site # 1254 & 14271

Sydney Laboratory - NATA Site # 18217

Brisbane Laboratory - NATA Site # 20794

Perth Laboratory - NATA Site # 23736

Mayfield Laboratory

External Laboratory

21	SED-10	Dec 11, 2020		Soil	N20-De26749		X	X
22	SED-11	Dec 11, 2020		AUS Leachate	N20-De26750	X		X
23	MW1-B	Dec 11, 2020		Water	N20-De26751			X
24	BB116	Dec 11, 2020		Water	N20-De26752			X
25	MW2	Dec 11, 2020		Water	N20-De26753			X
26	BB114	Dec 11, 2020		Water	N20-De26754			X
27	BB01	Dec 11, 2020		Water	N20-De26755			X
28	BB02	Dec 11, 2020		Water	N20-De26756			X
29	BB03	Dec 11, 2020		Water	N20-De26757			X
30	D01_20201210	Dec 10, 2020		Water	N20-De26758			X

## Australia

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Dandenong South VIC 3175  
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16 Mars Road  
Lane Cove West NSW 2066  
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NATA # 1261 Site # 20794

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**Project Name:** WPCA BADGERYS CK RD  
**Project ID:** 0571466

**Order No.:**  
**Report #:** 763324  
**Phone:** (02) 4964 2150  
**Fax:** (02) 4964 2152

**Received:** Dec 14, 2020 10:00 AM  
**Due:** Dec 21, 2020  
**Priority:** 5 Day  
**Contact Name:** Ian Batterley

**Eurofins Analytical Services Manager : Andrew Black**

Sample Detail						AUS Leaching Procedure	Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
Mayfield Laboratory								
External Laboratory								
31	D02_20201210	Dec 10, 2020		Soil	N20-De26760		X	X
32	D01_20201211	Dec 11, 2020		Water	N20-De26762			X
33	D01_20201209	Dec 11, 2020		Water	N20-De26764			X
34	TB01	Dec 11, 2020		Water	N20-De26765			X
35	TB02	Dec 11, 2020		Water	N20-De26766			X
36	SED-2	Dec 10, 2020		AUS Leachate	N20-De32042	X		X
37	SED-4	Dec 10, 2020		AUS Leachate	N20-De32043	X		X
38	SED-6	Dec 10, 2020		AUS Leachate	N20-De32044	X		X
39	SED-10	Dec 10, 2020		AUS Leachate	N20-De32045	X		X



## Australia

### Melbourne

6 Monterey Road  
Dandenong South VIC 3175  
Phone : +61 3 8564 5000  
NATA # 1261  
Site # 1254 & 14271

### Sydney

Unit F3, Building F  
16 Mars Road  
Lane Cove West NSW 2066  
Phone : +61 2 9900 8400  
NATA # 1261 Site # 18217

### Brisbane

1/21 Smallwood Place  
Murarrie QLD 4172  
Phone : +61 7 3902 4600  
NATA # 1261 Site # 20794

### Perth

2/91 Leach Highway  
Kewdale WA 6105  
Phone : +61 8 9251 9600  
NATA # 1261  
Site # 23736

### Newcastle

4/52 Industrial Drive  
Mayfield East NSW 2304  
PO Box 60 Wickham 2293  
Phone : +61 2 4968 8448

## New Zealand

### Auckland

35 O'Rorke Road  
Penrose, Auckland 1061  
Phone : +64 9 526 45 51  
IANZ # 1327

### Christchurch

43 Detroit Drive  
Rolleston, Christchurch 7675  
Phone : 0800 856 450  
IANZ # 1290

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

**Company Name:** ERM Hunter Valley  
**Address:** Level 1 / 45 Watt Street  
Newcastle  
NSW 2300  
  
**Project Name:** WPCA BADGERYS CK RD  
**Project ID:** 0571466

**Order No.:**  
**Report #:** 763324  
**Phone:** (02) 4964 2150  
**Fax:** (02) 4964 2152

**Received:** Dec 14, 2020 10:00 AM  
**Due:** Dec 21, 2020  
**Priority:** 5 Day  
**Contact Name:** Ian Batterley

**Eurofins Analytical Services Manager : Andrew Black**

## Sample Detail

AUS Leaching Procedure

Moisture Set

Per- and Polyfluoroalkyl Substances (PFASs)

Melbourne Laboratory - NATA Site # 1254 & 14271

Sydney Laboratory - NATA Site # 18217

Brisbane Laboratory - NATA Site # 20794

Perth Laboratory - NATA Site # 23736

Mayfield Laboratory

External Laboratory

Test Counts

5

11

39

## Internal Quality Control Review and Glossary

### General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

### Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

**\*\*NOTE:** pH duplicates are reported as a range NOT as RPD

### Units

**mg/kg:** milligrams per kilogram

**mg/L:** milligrams per litre

**ug/L:** micrograms per litre

**ppm:** Parts per million

**ppb:** Parts per billion

**%:** Percentage

**org/100mL:** Organisms per 100 millilitres

**NTU:** Nephelometric Turbidity Units

**MPN/100mL:** Most Probable Number of organisms per 100 millilitres

### Terms

<b>Dry</b>	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
<b>LOR</b>	Limit of Reporting.
<b>SPIKE</b>	Addition of the analyte to the sample and reported as percentage recovery.
<b>RPD</b>	Relative Percent Difference between two Duplicate pieces of analysis.
<b>LCS</b>	Laboratory Control Sample - reported as percent recovery.
<b>CRM</b>	Certified Reference Material - reported as percent recovery.
<b>Method Blank</b>	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
<b>Surr - Surrogate</b>	The addition of a like compound to the analyte target and reported as percentage recovery.
<b>Duplicate</b>	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
<b>USEPA</b>	United States Environmental Protection Agency
<b>APHA</b>	American Public Health Association
<b>TCLP</b>	Toxicity Characteristic Leaching Procedure
<b>COC</b>	Chain of Custody
<b>SRA</b>	Sample Receipt Advice
<b>QSM</b>	US Department of Defense Quality Systems Manual Version 5.3
<b>CP</b>	Client Parent - QC was performed on samples pertaining to this report
<b>NC</b>	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
<b>TEQ</b>	Toxic Equivalency Quotient

### QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

### QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

**Quality Control Results**

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
<b>Method Blank</b>							
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
<b>Method Blank</b>							
<b>Perfluoroalkyl sulfonamido substances</b>							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
<b>Method Blank</b>							
<b>Perfluoroalkyl sulfonic acids (PFSA's)</b>							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
<b>Method Blank</b>							
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)</b>							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
<b>LCS - % Recovery</b>							
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>							
Perfluorobutanoic acid (PFBA)	%	135			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	135			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	135			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	137			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	128			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	138			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	129			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	139			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	147			50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	%	130			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	127			50-150	Pass	



Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
<b>LCS - % Recovery</b>									
<b>Perfluoroalkyl sulfonamido substances</b>									
Perfluorooctane sulfonamide (FOSA)			%	116			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)			%	121			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)			%	103			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)			%	135			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)			%	128			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)			%	110			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)			%	143			50-150	Pass	
<b>LCS - % Recovery</b>									
<b>Perfluoroalkyl sulfonic acids (PFSA's)</b>									
Perfluorobutanesulfonic acid (PFBS)			%	131			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)			%	124			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)			%	119			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)			%	125			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)			%	126			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)			%	115			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)			%	124			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)			%	135			50-150	Pass	
<b>LCS - % Recovery</b>									
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)</b>									
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			%	147			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)			%	125			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			%	140			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)			%	119			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
<b>Spike - % Recovery</b>									
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>									
				Result 1					
Perfluorobutanoic acid (PFBA)	N20-De26753	CP	%	121			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	N20-De26753	CP	%	135			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	N20-De26753	CP	%	141			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	N20-De26753	CP	%	124			50-150	Pass	
Perfluorooctanoic acid (PFOA)	N20-De26753	CP	%	125			50-150	Pass	
Perfluorononanoic acid (PFNA)	N20-De26753	CP	%	126			50-150	Pass	
Perfluorodecanoic acid (PFDA)	N20-De26753	CP	%	141			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	N20-De26753	CP	%	133			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	N20-De26753	CP	%	144			50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	N20-De26753	CP	%	135			50-150	Pass	
Perfluorotetradecanoic acid (PFTTeDA)	N20-De26753	CP	%	127			50-150	Pass	
<b>Spike - % Recovery</b>									
<b>Perfluoroalkyl sulfonamido substances</b>									
				Result 1					
Perfluorooctane sulfonamide (FOSA)	N20-De26753	CP	%	131			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	N20-De26753	CP	%	105			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	N20-De26753	CP	%	123			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	N20-De26753	CP	%	144			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	N20-De26753	CP	%	122			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	N20-De26753	CP	%	124			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	N20-De26753	CP	%	129			50-150	Pass	
<b>Spike - % Recovery</b>									
<b>Perfluoroalkyl sulfonic acids (PFSA's)</b>				Result 1					
Perfluorobutanesulfonic acid (PFBS)	N20-De26753	CP	%	124			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	N20-De26753	CP	%	102			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	N20-De26753	CP	%	112			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	N20-De26753	CP	%	135			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	N20-De26753	CP	%	132			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	N20-De26753	CP	%	99			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	N20-De26753	CP	%	133			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	N20-De26753	CP	%	132			50-150	Pass	
<b>Spike - % Recovery</b>									
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)</b>				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSa)	N20-De26753	CP	%	125			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSa)	N20-De26753	CP	%	139			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSa)	N20-De26753	CP	%	139			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSa)	N20-De26753	CP	%	134			50-150	Pass	
<b>Spike - % Recovery</b>									
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>				Result 1					
Perfluorobutanoic acid (PFBA)	N20-De26765	CP	%	124			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	N20-De26765	CP	%	141			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	N20-De26765	CP	%	131			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	N20-De26765	CP	%	131			50-150	Pass	
Perfluorooctanoic acid (PFOA)	N20-De26765	CP	%	130			50-150	Pass	
Perfluorononanoic acid (PFNA)	N20-De26765	CP	%	129			50-150	Pass	
Perfluorodecanoic acid (PFDA)	N20-De26765	CP	%	133			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	N20-De26765	CP	%	146			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	N20-De26765	CP	%	140			50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	N20-De26765	CP	%	135			50-150	Pass	
Perfluorotetradecanoic acid (PFTTeDA)	N20-De26765	CP	%	130			50-150	Pass	
<b>Spike - % Recovery</b>									
<b>Perfluoroalkyl sulfonamido substances</b>				Result 1					
Perfluorooctane sulfonamide (FOSA)	N20-De26765	CP	%	135			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	N20-De26765	CP	%	98			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	N20-De26765	CP	%	90			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	N20-De26765	CP	%	135			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	N20-De26765	CP	%	116			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	N20-De26765	CP	%	109			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	N20-De26765	CP	%	145			50-150	Pass	
<b>Spike - % Recovery</b>									
<b>Perfluoroalkyl sulfonic acids (PFSA's)</b>				Result 1					
Perfluorobutanesulfonic acid (PFBS)	N20-De26765	CP	%	113			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	N20-De26765	CP	%	106			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	N20-De26765	CP	%	122			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	N20-De26765	CP	%	140			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	N20-De26765	CP	%	138			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	N20-De26765	CP	%	105			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	N20-De26765	CP	%	134			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	N20-De26765	CP	%	147			50-150	Pass	
<b>Spike - % Recovery</b>									
<b>n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)</b>				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	N20-De26765	CP	%	131			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	N20-De26765	CP	%	116			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	N20-De26765	CP	%	139			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	N20-De26765	CP	%	135			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
<b>Duplicate</b>									
<b>Perfluoroalkyl carboxylic acids (PFCAs)</b>				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	N20-De26752	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	N20-De26752	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	N20-De26752	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	N20-De26752	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	N20-De26752	CP	ug/L	< 0.02	< 0.02	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	N20-De26752	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	N20-De26752	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	N20-De26752	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	N20-De26752	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	N20-De26752	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	N20-De26752	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	



Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	N20-De26752	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	N20-De26752	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	N20-De26752	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	N20-De26752	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	N20-De26752	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	N20-De26752	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	N20-De26752	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonic acids (PFSA's)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	N20-De26752	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorononanesulfonic acid (PFNS)	N20-De26752	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	N20-De26752	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	N20-De26752	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	N20-De26752	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	N20-De26752	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	N20-De26752	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	N20-De26752	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	N20-De26752	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	N20-De26752	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	N20-De26752	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	N20-De26752	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD		
Perfluorobutanoic acid (PFBA)	N20-De26764	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
Perfluoropentanoic acid (PFPeA)	N20-De26764	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanoic acid (PFHxA)	N20-De26764	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanoic acid (PFHpA)	N20-De26764	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanoic acid (PFOA)	N20-De26764	CP	ug/L	< 0.02	< 0.02	<1	30%	Pass
Perfluorononanoic acid (PFNA)	N20-De26764	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorodecanoic acid (PFDA)	N20-De26764	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroundecanoic acid (PFUnDA)	N20-De26764	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorododecanoic acid (PFDoDA)	N20-De26764	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorotridecanoic acid (PFTrDA)	N20-De26764	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorotetradecanoic acid (PFTeDA)	N20-De26764	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass

Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	N20-De26764	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	N20-De26764	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	N20-De26764	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	N20-De26764	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	N20-De26764	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	N20-De26764	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	N20-De26764	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonic acids (PFSA's)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	N20-De26764	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorononanesulfonic acid (PFNS)	N20-De26764	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	N20-De26764	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	N20-De26764	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	N20-De26764	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	N20-De26764	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	N20-De26764	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	N20-De26764	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	N20-De26764	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	N20-De26764	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	N20-De26764	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	N20-De26764	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD		
Perfluorobutanoic acid (PFBA)	N20-De26766	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
Perfluoropentanoic acid (PFPeA)	N20-De26766	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanoic acid (PFHxA)	N20-De26766	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanoic acid (PFHpA)	N20-De26766	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanoic acid (PFOA)	N20-De26766	CP	ug/L	< 0.02	< 0.02	<1	30%	Pass
Perfluorononanoic acid (PFNA)	N20-De26766	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorodecanoic acid (PFDA)	N20-De26766	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroundecanoic acid (PFUnDA)	N20-De26766	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorododecanoic acid (PFDoDA)	N20-De26766	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorotridecanoic acid (PFTrDA)	N20-De26766	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorotetradecanoic acid (PFTeDA)	N20-De26766	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass

Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	N20-De26766	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	N20-De26766	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	N20-De26766	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	N20-De26766	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	N20-De26766	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	N20-De26766	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	N20-De26766	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	N20-De26766	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorononanesulfonic acid (PFNS)	N20-De26766	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	N20-De26766	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	N20-De26766	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	N20-De26766	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	N20-De26766	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	N20-De26766	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	N20-De26766	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	N20-De26766	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	N20-De26766	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	N20-De26766	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	N20-De26766	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass



## Comments

### Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

### Qualifier Codes/Comments

Code	Description
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

## Authorised By

Andrew Black                      Analytical Services Manager  
 Sarah McCallion                Senior Analyst-PFAS (QLD)



**Glenn Jackson**

### General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

\* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

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**ERM's Sydney Office**

15, 309 Kent Street  
Sydney NSW 2000

T: 02 8584 8888

F: 02 8584 8800

[www.erm.com](http://www.erm.com)