

# Willoughby City Council

## Preliminary Site Investigation

Car park at the junction of Edinburgh Road and The Postern,  
Castlecrag NSW

**Purpose:**

To provide a preliminary site investigation to establish the likelihood of contamination on site and the requirement (or otherwise) for a detailed site investigation in support of planned rezoning.

**Prepared for:**

Willoughby City Council

**Document Date:**

31 March 2023

**Reference:**




S-05152.PSI.002\_Cnr Edinburgh Road & The Postern, Castlecrag\_202303

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## ABBREVIATIONS

Abbreviation	Definition
AEC	Area of Environmental Concern
AHD	Australian Heights Datum
CLM	Contaminated Lands Management
CSM	Conceptual Site Model
CBD	Central Business District
CoPC	Contaminant of Potential Concern
DP	Deposited Plan
EDP	EDP Consultants Pty Ltd
EPA	Environmental Protection Authority
LGA	Local Government Area
NEPM	National Environmental Protection Measures
NSW	New South Wales
PCAs	Potentially Contaminating Activity
PSI	Preliminary Site Investigation
SWMS	Safe Work Method Statement
WCC	Willoughby City Council

## EXECUTIVE SUMMARY

EDP Consultants Pty Ltd (EDP) was engaged by Willoughby City Council (WCC) to undertake a Preliminary Site Investigation (PSI) of the public car park at the junction of Edinburgh Road and the Postern, Castlecrag NSW 2068 (the site) to assess the potential risks resulting from current and/or historical site uses and support the rezoning for the site.

The PSI comprised a desktop study and site visit alongside the development of a preliminary conceptual site model to identify past and present potentially contaminating activities and potential contamination types. No intrusive investigative works were undertaken as part of this scope.

The 320 m<sup>2</sup> site is a public car park at Edinburgh Road and the Postern, Castlecrag NSW and it is being planned to be rezoned by WCC from B1 – Neighbourhood Centre to RE I - public open space. The immediate surrounding land is commercial land use with R3 - medium density residential and R2 - low-density residential land use to the north and west and environmental living to the southwest. A review of the site history and database searches indicated that the site has existed as a public car park since 1975 to present. No other potentially contaminative use has been identified during the review of the site history.

On 10 March 2023, a site visit was conducted where the site was observed to be flat with concrete and asphalt hardstand surface and is currently used as a public parking space for vehicles, with pedestrian and bicycle lane attached on the north of the site. Based on the work undertaken, no significant off-site uses were identified which might adversely affect the land quality of the subject site.

Based on the findings of this PSI, there is no evidence the site in its current state is presenting a current health or environmental risk. If the zoning of the site were to change to a recreational use, providing the site remains in a sealed state (as is currently), the risk to recreational users would continue to be considered low.

However, if there are plans to breach, remove or excavate into the current hardstand, it should be noted that the soil underneath the car park pavement has not been chemically characterised. As a result, confirmation of the soil quality is recommended to determine the suitability of the site for a recreational user (under the planned rezoning), and to ecological receptors. If breaching, removal or excavation of the hardstand occurs, the human health and ecological risks would be considered moderate, that is to say further investigation would be required to quantify the unknown risks. This would also apply to maintenance works, and it is recommended that a standard unexpected finds protocol should apply.

Based on EDP's findings, and uncertainties on the current contamination status, EDP consider the land is unsuitable in its current state for a future REI – Public Open Space zoning without confirmatory investigation. However, if further investigation is undertaken and identifies contamination, EDP consider the land can be made suitable for a REI – Public Open Space zoning after remediation.

## 1. INTRODUCTION AND BACKGROUND

EDP Consultants Pty Ltd (EDP) was engaged by Willoughby City Council (WCC) to undertake a Preliminary Site Investigation (PSI) of the car park at the southwest junction of Edinburgh Road and The Postern, Castlecrag NSW 2068 (the site) to assess the potential risks resulting from current or historical site uses.

The PSI was requested by WCC to support the proposed rezoning for the site. The PSI is part of the initial investigations by WCC to support proposed rezoning plans from the current BI – Neighbourhood Centre to REI – Public open space.

The site is currently used as a public car park for the adjacent light commercial and retail stores in the Griffin Centre.

The site locality and boundary are shown in **Appendix A – Figure 1**.

## 2. OBJECTIVES

The objective of this project is to provide a preliminary understanding of the contamination status and determine the likely risks the site may pose to human health or the environment as a result of current or legacy uses. Specifically, to:

- Identify past and present potential contaminating activities;
- Identify potential contamination types;
- Discuss the current site condition;
- Provide preliminary assessment of site contamination; and
- Assess the need for further investigations.

## 3. SCOPE OF WORKS

To achieve the stated objectives, the scope of works included the following:

- Desktop study including a review of information comprising:
  - Historical aerial photographs;
  - Historical titles;
  - Geological and topographical maps;
  - Hydrogeological information;
  - Online public records; and
  - Areas of environmental interest.
- Information provided in Land Insight's environmental due diligence report Enviroscreen report;
- Site visit, including preparation of a Safe Work Method Statement (SWMS); and
- Preparation of this PSI report detailing the findings of the investigation, including a preliminary CSM and recommendations.
- It should be noted that no intrusive works (such as soil, dust or water sampling) were undertaken as part of this PSI.

## 4. PREVIOUS ENVIRONMENTAL REPORTS

EDP was not provided with any previous environmental reports pertaining to the site and there are no known site investigation reports pertaining to the site.

## 5. SITE INFORMATION

### 5.1 Site Identification

Site identification details are summarised in **Table 1** and the location of the site and investigation area is shown on **Figure 1** and **Figure 2**, provided in **Appendix A**.

**Table 1: Site Identification**

Site Identification	
Site Owner	Willoughby City Council
Site Address:	Junction between Edinburgh Road and The Postern, Castlecrag NSW
Legal Identification:	No Lot or DP information
Local Government Area:	Willoughby City Council
Site Area:	320 m <sup>2</sup>
Current Zoning:	B1 - Neighbourhood Centre
Current Land Use:	Public car park.
Locality Map	Figure 1
Site Layout	Figure 2

### 5.2 Site Description

Based on available aerial imagery and the site visit on 10 March 2023, alongside review of available aerial imagery, the key site features are as follows:

- The site has a flat concrete and asphalt hardstand surface and is currently used as a public parking space for vehicles, with pedestrian and bicycle lane to the north.
- Peripheral sparse native vegetation, shrubs and a large tree is located along the northern boundary (in raised beds) (i.e. between the car park and Edinburgh Road) and the southern boundary of the site.

The layout of the site is shown on **Figure 2** as provided in **Appendix A** and photographs taken during the site visit are provided in **Appendix E**.

### 5.3 Surrounding Land Use

The site was located within a light commercial area of Castlecrag, NSW. The site was bound to the:

- **North** by Edinburgh Road and the intersect of Edinburgh Road and The Postern to the northeast followed by medium to low-density residential dwellings.
- **East** by The Postern road followed by low density residential dwellings, Cortile Reserve and a school (Glenaeon Rudolf Steiner School).
- **South** by medium to low-density residential dwellings followed by Turret Reserve on the south-east and a preschool (KU Castlecrag Preschool) on the south-west.
- **West** by commercial buildings (the Griffin Centre, comprising restaurants, including Bai Yok, Castlecrag Cellars, Motza) and medium to low-density residential dwellings.

## 6. ENVIRONMENTAL SETTING

### 6.1 Topography

A review of the environmental database search report from Land Insight (LIR) accessed 1 March 2023, indicated that the site is located at an elevation of approximately 88-90 m Australian Height Datum (AHD) with a gentle slope to the east. EDP estimates the relief on the site is approximately 2 m.

## 6.2 Soil Landscape

A review of the soil landscape information from the environmental database search report, 2023 accessed 1 March 2023, indicated the soil landscape is Blacktown (residual) type.

Given the established trees on site, EDP assumes the natural soil landscapes are present within the vegetated garden beds and nature strip on the northern and southern site boundary. However, the majority of the site is asphalt hardstand and no other soil landscape was observed.

## 6.3 Regional Geology

### 6.3.1 Geology

The environmental database search report, 2023 indicated that the geology of the site consists of Hawkesbury Sandstone formation with unmarked Triassic group of the Middle Triassic Epoch, described as medium-coarse grained quartz sandstone with minor shale and laminate lenses. The superficial geology is more likely to affect contamination than the solid geology under the site - since it is expected that any contamination that will make a difference to the rezoning will be in the upper soil materials, and not in the rock.

Additional details are provided in LIR, 2023 in **Appendix B**.

### 6.3.2 Salinity

Based on the environmental database search report, 2023 salinity is not considered to be an issue for the site and salinity impacts on groundwater resources and hydrology at on sites are not expected.

Additional details are provided in LIR, 2023 in **Appendix B**.

## 6.4 Acid Sulfate Soils

The review of the environmental database search report, 2023 accessed 01 March 2023 indicated the site is class 5 of Acid Sulfate Soils (ASS) and based on the Atlas of Australian Acid Sulfate Soils there is a low probability of occurrence of ASS occurring beneath the site. Class 5 areas are typically not ASS but located within 500 metres on adjacent class 1, 2, 3, or 4 land. As such, ASS is not considered to be a risk for this site.

Additional details are provided in LIR, 2023 in **Appendix B**.

## 6.5 Hydrology and Drainage

Surface water from the site is anticipated to discharge to stormwater infrastructure into Sailors Bay Creek on the east of the site. The nearest surface water receptor is Sailors Bay Creek, approximately 300 m to the south, which flows into Middle Harbour or Sugarloaf Creek to the north and east within the 500 m buffer zone of the site.

## 6.6 Hydrogeology

### 6.6.1 Aquifers and Groundwater

A review of the environmental database search report, 2023 indicates the aquifer at the site and within the surround area as porous, and extensive aquifers of low to moderate productivity. Based on the review of the topography of the site and the surrounding area, the groundwater is most likely to flow east towards Sailors Bay. However, this would need to be confirmed by a groundwater investigation.

The hydrogeological unit at the site and within the surrounding 500 m buffer area is described as Late Permian/Triassic sediments (porous media, consolidated). Drinking water catchment and Protected Riparian Corridor were not identified within the surrounding 2000 m buffer area of the site. The UPSS Environmentally Sensitive Zone for the site and the surrounding 2000 m buffer area of the site is Sydney Coast-Georges River.

Additional details are provided in LIR, 2023 in **Appendix B**.

### 6.6.2 Groundwater Bores

A review of the environmental database search report, 2023, identified 21 registered groundwater bores within a 2,000 m radius of the site, used for exploration or research, irrigation, recreation, and two unknown water supply purposes. Unfortunately, none of the 21 bores are within a reasonable distance from the site and therefore it is not possible using this information source to determine depth to water underlying the site or the extrapolate between the bore to determine site specific ground conditions.

Additional details are provided in LIR, 2023 in **Appendix B**.

## 6.7 Proximity to Local Sensitive Environments

Cortile Reserve and Turret Reserve are the sensitive parks noted to be present at this site, located approximately 130 m east and 165 m south respectively of the site. Additionally, educational facilities KU Castlecrag Preschool is approximately 142 m south-west of the site whilst Glenaeon Rudolf Steiner School Castlecrag is 174 m east of the site. The Castlecrag Uniting Church is located 142 m north to the site.

Wetlands Protection Area and Estuarine Wetland were identified within the surrounding 2000 m buffer area of the site. No groundwater vulnerability or groundwater exclusion zone were identified onsite and within the surrounding 500 m buffer area.

A review of the Bureau of Meteorology's Groundwater Depended Ecosystem Atlas (<http://www.bom.gov.au/water/groundwater/gde/map.shtml>), identified no groundwater dependent ecosystems (GDE) surrounding the site and in close proximity of the site.

Additional details are provided in LIR, 2023 in **Appendix B**.

## 6.8 Heritage

A review of the environmental database search report, 2023, indicated the following heritage conditions for the site:

- Heritage Register – Griffin (*Site ID: C4*), general local significance on site.
- Heritage Register – Community Centre (*Site ID: I 48*) general local significance approximately 94 m southwest of site.
- Heritage Register - House (including original interiors) (*Site ID: I 13*) of general local significance 121 m east of the site.
- Heritage Register - House (including original interiors) (*Site ID: I 15*) general local significance located 148 m east of the site.

Additional details are provided in LIR, 2023 in **Appendix B**.

## 6.9 Natural Hazards

A review of potential natural hazards and risks applicable to the site indicated the following for the site and within the surrounding 500 m buffer area:

- Landslip Erosion Risk – Very slight to negligible limitations, with very low risk onsite and extremely severe limitations, with very high risk within the 500 m dataset buffer area;
- Water Erosion Risk-Moderate to severe limitations, with moderate risk onsite and very severe-extremely severe limitations, with very high risk within the 500 m dataset buffer area;
- Bushfire History- No bushfire was identified within the 500 m dataset buffer area
- Fire Hazard – Bushfire prone land (vegetation buffer, vegetation category 1, and vegetation category 2) located within the 500 m dataset buffer area; and

Additional details are provided in LIR, 2023 in **Appendix B**.

## 7 SITE HISTORY

A review of the site history was undertaken to assess the historical use of the site, and to identify activities with potential to contaminate soil, groundwater and surface water at the site. The historical review included:

- Current and historical aerial photographs;
- Potentially contaminating activities;
- Other potential pollution sources; and
- Historical business directories.

### 7.3 Historical Aerial Photograph Review

A review of historical aerial photographs supplied is summarised in **Table 2**. Copies of the historical aerial photographs are provided in **Appendix C**.

**Table 2: Historical Land Use**

Year	Description of Site	Surrounding Land
1943	The site appeared undeveloped and part of it was predominantly vegetated shrubland.	Castlecrag Post office is observed on the west of the site and Cortile Reserve is observed on the east with sparsely vegetated areas. Low density residential dwellings are observed North of Edinburgh Road and the site. Commercial building is observed adjacent to site with parking. Castlecrag Community centre and Sailors Bay Creek is observed on the south of the site. Vegetation is observed to be cleared on the south-west of the site for development.
1953	The site appeared undeveloped and part of it was predominantly vegetated shrubland.	The surrounding areas appears to be more developed with low density residential dwellings mainly south-west of the site and around Cortile Reserve.
1961	The site appears undeveloped, but only a few large trees are observed	Commercial building adjacent the site appears to be renovated to a bigger commercial building. A low-density residential building is built directly south of the site. The surrounding areas appears to be more developed with low density residential dwellings.
1965	The site continues to be undeveloped; the large trees onsite appear to have been removed.	The surrounding area appears relatively unchanged from the 1961 aerial photograph.
1975	The site appears to be used as a carpark for the adjacent commercial building. Some large trees are observed	The surrounding area appears relatively unchanged from the 1966 aerial photograph.
1978	The site appears relatively unchanged from the 1975 aerial photograph.	The surrounding area appears relatively unchanged from the 1975 aerial photograph.
1986	The site appears relatively unchanged from the 1978 aerial photograph.	Castlecrag Post office appears to be renovated to a bigger commercial building. The remaining surrounding area appears relatively unchanged from the 1978 aerial photograph.
1991	The site appears relatively unchanged from the 1986 aerial photograph	A tennis court was built in the middle of Cortile Reserve. The surrounding area appears relatively unchanged from the 1986 aerial photograph.
1994	The site appears relatively unchanged from the 1991 aerial photograph	The surrounding area appears relatively unchanged from the 1991 aerial photograph.

Year	Description of Site	Surrounding Land
2005	The site appears relatively unchanged from the 1994 aerial photograph	The roundabout was built at the intersection between Edinburgh Road and the Postern. The remaining surrounding area appears relatively unchanged from the 1994 aerial photograph.
2007	The site appears relatively unchanged from the 2005 aerial photograph	The surrounding area appears relatively unchanged from the 2005 aerial photograph.
2011	The site appears relatively unchanged from the 2007 aerial photograph	Vegetated areas have been cleared south-west of the site; stockpile of soil material observed. The surrounding area appears relatively unchanged from the 2007 aerial photograph.
2014	The site appears relatively unchanged from the 2011 aerial photograph	Additional low density residential dwellings built south-west of the site. The surrounding area appears relatively unchanged from the 2011 aerial photograph.
2017	The site appears relatively unchanged from the 2014 aerial photograph	The surrounding area appears relatively unchanged from the 2014 aerial photograph.
2020	The site appears relatively unchanged from the 2017 aerial photograph	The surrounding area appears relatively unchanged from the 2017 aerial photograph.
2021	The site appears relatively unchanged from the 2010 aerial photograph	The low-density residential building directly south of the site was demolished and the area is an active construction site for a mid-rise apartment building. The surrounding area appears relatively unchanged from the 2020 aerial photograph.
2023	The site appears relatively unchanged from the 2021 aerial photograph	The surrounding area appears relatively unchanged from the 2021 aerial photograph.

### 7.3.1 Key land use changes

The 1943 aerial photograph indicates that the site was relatively undeveloped until 1975. The vegetated site was developed into a car park in 1975 with adjacent commercial buildings. Large trees separate the car park and pedestrian walkways for Edinburgh Street and The Postern. Based on the aerial photographs, no significant change in land use has occurred at the site between 1975 and 2023 and the site remains a small car park.

No significant off-site use or activity has been identified from a review of the historical aerial photographs, which might have caused an adverse effect on the land quality of the subject site.

## 7.4 NSW EPA Contaminated Lands Database

The closest NSW EPA Notified Contaminated Site is Willoughby Bus Depot which is located at the corner of Ann Street and Stan Street, Willoughby East approximately 880 m north-west of the site. This is unlikely to have an adverse environmental impact on the subject site.

Additional details are provided in LIR,2023 in **Appendix B**.

## 7.5 NSW EPA Notices, Approvals and Licences

A review of the environmental database search report, 2023 indicated there were two organisations delicensed within 500 m of the site:

- Hcoa Operations (Australia) Pty. Ltd (licence #6582) – delicensed for hazardous, industrial or group A waste generation or storage at Castlecrag Private Hospital located at 150 Edinburgh Road, Castlecrag, NSW 304 m east to the site;



- State Transit Authority of NSW (licence #7023) – delicensed for hazardous, industrial or group A waste generation or storage at Willoughby Bus Depot located at the corner of Ann & Stan Streets, Willoughby NSW, 881 m north-west to the site.

Additional details are provided in LIR,2023 in **Appendix B**.

## 7.6 Regulated Sites

A review of the environmental database search report, 2023 indicated the following:

- 7 Field Regiment RAA Depot – Post WWII and on the re-raising of the CMF in 1948, 7th Field Regiment, RAA was reformed at Warrane Road, Willoughby. Site was used as a depot/storage facility for field armaments, located approximately 1,267 m north-west of the site. The regiment depot to the Multi-User Facility located at Pymble NSW.
- North Shore Gasworks - James Walter Fell, ex-A.G. L., planned his own gas works for North Shore in 1877 and later became the North Shore Gas Company Ltd. Located 1,781 m north-west to site and became redundant and demolished in 1970.
- Willoughby Fire Station– Fire station built in 1915, located 1,219 m west to site. Potential historical use of PFAS. A review of the NSW EPA PFAS Investigation program indicated that the site was not subject to NSW Government PFAS Investigation and that no sites within the suburb of Castlecrag were currently under assessment due to potential PFAS contamination. (<https://www.epa.nsw.gov.au/your-environment/contaminated-land/pfas-investigation-program>)

Additional details are provided in LIR, 2023 in **Appendix B**.

## 8 SITE OBSERVATIONS

Site soil assessment was not completed as part of this PSI, only desktop review of all available information and a site visit.

During the site visit, the following was observed:

- The site serves as car park, with space available for less than 10 cars;
- Asphalt hardstand surface onsite;
- No odours, stains, or evidence of contaminating activities were observed;
- Garden bed/nature strip with trees and plants on the northern and southern boundary of the site;
- No evidence of ground disturbance or replacement of concrete was identified;
- No drains, lines, pit lids and trap were observed; and
- Active constructive site, south of the site.

Photolog provided in **Appendix A**.

## 9 PRELIMINARY CONCEPTUAL SITE MODEL

A preliminary conceptual site model (pCSM) has been developed in general accordance with the ASC NEPM (NEPM, 2013 – B2). Based on the information obtained during the preliminary site investigation process, a pCSM identifies:

- Potential or known contamination sources and the associated contaminants of concern (CoPC);
- On-site or off-site human or environmental receptors for the current or future land use which could be impacted by the contamination sources; and
- Whether there is an established or plausible pathway by which the contaminant sources impact receptors and pose unacceptable risk.

## 9.1 Sources of contaminants of potential concern (CoPC)

Based on the information gathered during the desktop study and visual observations made during the site visit, no areas of environmental concern (AEC) and no contaminants of potential concern have been identified at the site.

However, as the status of the soil material underneath the car park pavement is unknown, historical uncontrolled filling during the development of the car park could potentially be contaminated with CoPC.

In addition, as the site is currently used as a parking space, minor quantities of petrol or diesel from cars could cause CoPC, such as heavy metals, polycyclic aromatic hydrocarbons (PAH), benzene, toluene, ethylbenzene and xylene (BTEX) compounds and total recoverable hydrocarbons (TRH), to enter the underlying soil. However, no evidence of stains and odour was observed during the site visit.

## 9.2 Potential migration pathways

The potential migration pathways for CoPC from beneath the car park pavement are as following.

- Dermal contact, inhalation or ingestion of exposed impacted soils;
- Intake and uptake of CoPC by plants and trees grown on site following rezoning of the area;
- Leaching and migration of contaminants from soil material through groundwater infiltration.

## 9.3 Potential Receptors

Potential Receptor identified are:

- Future maintenance and construction workers;
- Site users and public;
- Current or future users of surrounding properties;
- Underlying aquifer;
- Nearby surface water bodies (Sailors Bay Creek); and
- Current and future flora and fauna that may inhabit or migrate through the site.

## 9.4 Source- Pathway-Receptor Assessment

### ▪ Maintenance and construction workers

Since no former contaminating use or activity has been identified, no CoPCs have been identified and therefore, based on the results of this investigation, there are low risks to maintenance and construction workers.

However, if intrusive works occur, then EDP recommends that an Unexpected Finds Protocol be adopted – i.e. that there is a procedure and watching brief to manage any unexpected observation during the works (such as staining, discolouration of soil or presence of asbestos).

### ▪ Site users and public

No risk has been identified to the current site users or public from this site.

### ▪ Current or future users of surrounding properties

No risk has been identified to the current or future users of the surrounding properties from this site.

### ▪ On-site soil

Given that EDP has not identified any former contaminating use, activities or CoPCs, there is a low risk to the on-site soil. However, if the sensitivity of the site use changes (i.e., sensitive vegetation is grown or site users have increased interaction with soil, then EDP recommends some additional work to quantify the risks.

### ▪ On-site and off-site groundwater

Given that EDP has not identified any former contaminating use, activities or CoPCs, there is a low risk to the on-site and off-site groundwater.

- **Terrestrial ecosystems.**

Under the current use, flora and fauna have direct and indirect exposure to contaminants in soil. However, there is no evidence of vegetation distress. As a result, there is a low risk to terrestrial ecosystems under the current site use. If the site is redeveloped as a recreational area, EDP recommends that this assessment is re-considered and limited soil data is collected to chemically characterise the shallow soils.

- **Nearby surface water bodies**

Given that EDP has not identified any former contaminating use, activities or CoPCs, there is a low risk to the nearby surface water bodies.

## 10. DISCUSSION & CONCLUSION

Review of the historical aerial photographs indicates that the site has remained unchanged over the years, mainly used as a parking space for the adjacent commercial building. The surrounding land use remains predominantly R2 - low-density residential dwellings with Cortile Reserve east of the site and Turret Reserve south of the site.

This PSI was prepared for WCC to inform planned rezoning of the site from the current 'BI- Neighbourhood Centre' to 'RE I - public open space' and assessment of whether the site is suitable for the proposed rezoning, or if further investigation is required.

Based on the review of historical imagery, information available online and site visit on 10 March 2023, no area of environmental concern (AEC) was identified on site and in the surrounding 500 m of the site. The activities of the regulated sites that were identified in Section 8.4 are considered to have a negligible impact on the site given the closest contaminating operation was 880 m metres away.

As the site is currently used as a parking space, leaks from cars could cause CoPC such as heavy metals, polycyclic aromatic hydrocarbons (PAH), benzene, toluene, ethylbenzene and xylene (BTEX) compounds and total recoverable hydrocarbons (TRH), however as the site has less than ten parking spaces, the likelihood and risk of this occurring is low and there was no oil leaks observed on the ground surface during the site visit.

Given the findings of the site history review, desktop searches, site visit and source pathway receptor assessment in the pCSM, there is no evidence the site in its current state is presenting a current health or environmental risk. If the zoning of the site were to change to a recreational use, providing the site remains in a sealed state (as is currently), the risk to recreational users would continue to be considered low.

However, as the status of the soil underneath the car park pavement is unknown, confirmation of the soil status would be needed to determine the suitability of the site if there is plans to breach, remove or excavate into the current hardstand. If breaching, removal or excavation of the hardstand is planned, the risk would be considered moderate and further investigation would be required.

Based on EDP's findings, and uncertainties on the current contamination status, EDP consider the land is unsuitable in its current state for a future REI – Public Open Space zoning without confirmatory investigation. However, if further investigation is undertaken and identifies contamination, EDP consider the land can be made suitable for a REI – Public Open Space zoning after remediation.

## 11. RECOMMENDATIONS

Based on the findings of this PSI the following is recommended:

- The site is currently suitable for use as a car park under the current zoning BI – Neighbourhood Centre;
- The site is likely to be suitable for rezoning as a Recreational area (REI – Public open space); however, subject to the development plans, limited soil testing of the shallow soils should be undertaken to characterise the underlying soils and verify that the site is suitable for use (in terms of ecological risk to sensitive planting - if used - and to validate any area where soil/dust ingestion and dermal contact is more likely (e.g., play area); and

An unexpected finds protocol be prepared for any intrusive works or development at the site. This could simply be a document to instruct contractors to contact the Council (environmental health team) if any visual or olfactory

(staining or asbestos/fibrous fragments) are identified during works and to seek appropriate environmental support and advice.

## 12. REFERENCES

- NSW Work Health and Safety Act 2011;
- NSW Work Health and Safety Regulation 2017;
- NSW EPA Protection of the Environment Operations (POEO) Act 1997;
- NSW EPA POEO (Waste) Regulation 2014;
- Contaminated Land Management (CLM) Act 1997;
- NSW EPA Consultants Reporting on Contaminated Land, April 2020;
- NSW EPA Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997, 2015;
- National Environment Protection (Assessment of Site Contamination) Measure, Amendment, 2013 (NEPM 2013);
- Land Insight, Enviro-Screen Report, February 2023 (Ref: LI-3211 ESR); and
- NSW EPA, The NSW Government PFAS Investigation Program, accessed 24 March 2023.  
(<https://www.epa.nsw.gov.au/your-environment/contaminated-land/pfas-investigation-program>)

## STATEMENT OF LIMITATIONS

This document has been prepared in response to specific instructions from the client to whom the report has been addressed. The work has been undertaken with the usual care and thoroughness of the consulting profession. The work is based on generally accepted standards, practices of the time the work was undertaken. No other warranty, expressed or implied, is made as to the professional advice included in this report.

The report has been prepared for the use by the client and the use of this report by other parties may lead to misinterpretation of the issues contained in this report. To avoid misuse of this report, EDP advise that the report should only be relied upon by the client and those parties expressly referred to in the introduction of the report. The report should not be separated or reproduced in part and EDP should be retained to assist other professionals who may be affected by the issues addressed in this report to ensure the report is not misused in any way.

EDP is not a professional quantity surveyor (QS) organisation. Any areas, volumes, tonnages or any other quantities noted in this report are indicative estimates only. The services of a professional QS organisation should be engaged if quantities are to be relied upon.

### **Reliance on Information Provided by Others**

EDP notes that where information has been provided by other parties in order for the works to be undertaken, EDP cannot guarantee the accuracy or completeness of this information the client therefore waives any claim against the company and agrees to indemnify EDP for any loss, claim or liability arising from inaccuracies or omissions in information provided to EDP by third parties. No indications were found during our investigations that information contained in this report, as provided to EDP, is false.

### **Recommendations for Further Study**

The industry recognised methods used in undertaking the works may dictate a staged approach to specific investigations. The findings therefore of this report may represent preliminary findings in accordance with these industry recognised methodologies. In accordance with these methodologies, recommendations contained in this report may include a need for further investigation or analytical analysis. The decision to accept these recommendations and incur additional costs in doing so will be at the sole discretion of the client and EDP recognises that that the client will consider their specific needs and the business risks involved. EDP does not accept any liability for losses incurred as a result of the client not accepting the recommendations made within this report.

## Appendix A: Figures and photolog





# Car park at junction of Edinburgh Road and The Postern, Castlecrag NSW

FIGURE I: SITE LOCATION



LEGEND:


	Approximate site area boundary

Image courtesy of <https://www.nearmap.com/au/>

DETAILS:

<b>Figure Name:</b>	I- Site Location
<b>Client Name:</b>	Willoughby City Council
<b>EDP Reference:</b>	S-05152.PSI.002
<b>Date:</b>	Wednesday, 1 March 2023





Car park at the junction of Edinburg Road and The Postern, Castlecrag NSW

FIGURE 2: SITE LAYOUT



LEGEND:


	Approximate site area boundary

Image courtesy of <https://www.nearmap.com/au/>

DETAILS:

<b>Figure Name:</b>	2 - Site Layout
<b>Client Name:</b>	Willoughby City Council
<b>EDP Reference:</b>	S-05152.PSI.002
<b>Date:</b>	Wednesday, 1 March 2023

Photographic Log

Site Details:	Car park at the junction of Edinburg Road and The Postern, Castlecrag NSW
EDP Reference:	S-05152.PSI.002



Photo 1: Car park at the junction of Edinburg Road and The Postern, Castlecrag (viewing from Edinburg Road)



Photo 2: Car park at the junction of Edinburg Road and The Postern, Castlecrag (viewing from footpath on Edinburg Road)



Photo 3: Car park at the junction of Edinburg Road and The Postern, Castlecrag (viewing from footpath on Edinburg Road)



Photo 4: Ground surface of Car park at the junction of Edinburg Road and The Postern, Castlecrag



Photo 5: Ground surface of Car park at the junction of Edinburg Road and The Postern, Castlecrag



Photo 6: Ground surface of Car park at the junction of Edinburg Road and The Postern, Castlecrag

End of Photographic Log



## Appendix B: LIR Enviro-Screen Report

# Enviro-Screen Report

Cnr Edinburgh Road & The Postern  
Castlecrag, NSW

14 February 2023

Report n°:  
LI-3211 ESR








# Understanding your report

Thank you for ordering your report from Land Insight. If you have any feedback, questions or queries, please get in touch with us at [orders@landinsight.co.au](mailto:orders@landinsight.co.au).

Your Report has been produced by Land Insight and contains information related to current and historical land use information, environmental risks and hazards.

The information presented in this report includes Land Insights' comprehensive research into current and historical land use derived from Land Insight's proprietary National Land Use Atlas (NLUA), environmental risk information and data available from public databases, third party providers, local and state authorities. The report also includes detailed property and soil setting information, hydrogeology, identification of potential pollution and contamination along with ground and natural hazards. The records identified are presented within a 200 to 2000m radius (buffer zone) from the boundaries of the Property searched, depending on the screened constraint. The report is separated and grouped into easy to navigate sections as per Summary below:

	<b>Section 1 PROPERTY SETTING</b>	Sensitive Receptors, Planning Controls Heritage, Soil and Land Information, Geology and Topography
	<b>Section 2 HYDROGEOLOGY</b>	Groundwater Bores and Other Borehole investigations, Groundwater Dependent Ecosystems (GDE), Hydrogeology Units, aquifer and Wetland and more.
	<b>Section 3 ENVIRONMENTAL REGISTERS LICENCES AND INCIDENTS</b>	Contaminated Land Public Register, Sites Regulate by Other Jurisdictional Body (Former Gaswork sites / PFAS sites), Licensing and Regulated Sites, National Pollutant Inventory (NPI) and more.
	<b>Section 4 POTENTIALLY CONTAMINATED AREAS</b>	Former Potentially Contaminated Land, Current and Historical Potentially Contaminating activities (PCA).
	<b>Section 5 NATURAL HAZARDS</b>	Erosion risk, Flood hazards, Bushfire prone land and Bushfire history.

**This report includes** data listed on page 4 (table of contents). All sources of data and definitions are provided in the Product Guide (Attached). For a full list of references, metadata, publications or additional information not provided in this report, please contact [orders@landinsight.co.au](mailto:orders@landinsight.co.au).

**This report does not include** information derived from a physical inspection. It is important to note that a site inspection can present information relevant to other risks and hazards that may not be identified by this Report.

Due to the ongoing nature of database development and frequency of updates provided by various state government regulators and data sources, the data displayed within this report is only current from date of production. While every effort is made to ensure the details in your Report are correct, Land Insight cannot guarantee the accuracy or completeness of the information and/or data provided.

**This Report, and your use of it, is regulated by Land Insight's Terms and Conditions. For more information, see Land Insight's Product Guide.**

# Data maintaince schedule

Dataset name	Update frequency	Dataset buffer
<b>Section 1 - Property Setting</b>		
Sensitive Receptors	Quarterly	200m
Planning Controls	Quarterly	500m
State and Local Heritage	Quarterly	200m
Federal Heritage (World, Commonwealth, National)	Annually	200m
Soil Landscape and Land Use Information	Annually	500m
Salinity Hazard	Annually	500m
Radon Level	Annually	500m
Acid Sulfate Soil (ASS)	Annually	500m
Geology	Annually	500m
Naturally Occurring Asbestos Potential	Annually	500m
Topography	As required	500m
<b>Section 2 - Hydrogeology</b>		
Groundwater Aquifers	Annually	2000m
Wetlands	Annually	2000m
Groundwater Bores	Annually	2000m
Drinking Water Catchments	Annually	2000m
Groundwater Prohibition/Restricted Use/Exclusion Zones	As required	2000m
Hydrogeologic Unit	Annually	500m
Groundwater Dependent Ecosystems	Annually	500m
Other Borehole/Groundwater Bore Locations	Annually	500m
<b>Section 3 - Environmental Registers, Licences and Incidents</b>		
Contaminated Land Public Register	Monthly	1000m
<b>Licences, Approvals, Audits, Authorisations &amp; Assessments</b>		
▪ Licences	Monthly	1000m
▪ Surrendered Licences	Monthly	1000m
▪ Clean Up and Penalty Notices	Monthly	1000m
▪ Permissions	Monthly	1000m
▪ Audits	Monthly	1000m
▪ Authorisations	Monthly	1000m
<b>Sites Regulated by other Jurisdictional Body</b>		
▪ Defence Sites - Regional Contamination Investigation Program (RCIP)	Quarterly	2000m
▪ Defence Sites - Current and Former	Ongoing	2000m
▪ Unexploded Ordnance (UXO) Sites - Department of Defence (DoD)	Annually	2000m
▪ Former Gasworks Sites	Ongoing	2000m
▪ PFAS Investigation Sites (EPA PFAS Investigation Program/s, AirServices Australia etc.)	Monthly	2000m
NPI Industrial Facilities	Annually	500m
<b>Section 4 - Potentially Contaminated Areas</b>		
▪ Contaminated Legacy Areas	Ongoing	500m
▪ Derelict Mines and Quarries	Ongoing	500m
▪ Historical Landfills	Ongoing	500m
▪ Potentially Contaminating Activities (PCA)	Ongoing	200m
Historic Commercial & Trade Directory Data (1900 - 2020)	Not required	200m
<b>Section 5 - Natural Hazards</b>		
Bushfire Prone Areas	Bi-annual	500m
Bushfire History	Bi-annual	500m
Erosion Hazard	Bi-annual	500m
Flood Hazard	Ongoing	500m

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  - Land Insight Product Guide and Terms and Conditions





## Section 1 Property Setting



### 1.1 SENSITIVE RECEPTORS

Map 1.1 (200m Buffer)

Sensitive receptor	Type	Distance (m)	Direction
Cortile Reserve	Parks	130.2	East
Castlecrag Uniting Church	Places of Worship and Religious Organisations	141.6	North
KU Castlecrag Preschool	Education	141.7	South-west
Turret Reserve	Parks	164.7	South
Glenaeon Rudolf Steiner School Castlecrag	Education	174.2	East

### 1.2a PLANNING CONTROLS

Map 1.2a (500m Buffer)

#### Zoning

Zoning	Type	Details	Distance (m)	Direction
B1	Neighbourhood Centre	Willoughby Local Environmental Plan 2012	0.0	Onsite
RE1	Public Recreation		12.3	South-east
C4	Environmental Living		16.9	East
R3	Medium Density Residential		20.7	North
R2	Low Density Residential		21.2	North
SP2	Infrastructure		113.6	West
C2	Environmental Conservation		144.4	South-west

## 1.2b PLANNING OVERLAYS

## Map 1.2b (500m Buffer)

### Environmental Planning Instruments

Name	Type	Details	Distance (m)	Direction
Acid Sulfate Soils	Acid Sulfate Soils Map	Willoughby Local Environmental Plan 2012	0.0	Onsite
Coal Seam Gas Exclusions	SEPP (MPPEI) 2007 Coal Seam Gas Exclusions Map	State Environmental Planning Policy (Resources and Energy) 2021	0.0	Onsite
Maximum Floor Space Ratio (n:1)	Floor Space Ratio Map	Willoughby Local Environmental Plan 2012	0.0	Onsite
Height of Building	Height of Buildings Map		0.0	Onsite
Local Provisions	Dual Occupancy Restriction Map		16.9	East
Lot Size	Lot Size Map		16.9	East
Coastal Environment Area	SEPP (Coastal Management) 2018 Coastal Environment Area Map	State Environmental Planning Policy (Resilience and Hazards) 2021	93.9	South-west
Coastal Use Area	SEPP (Coastal Management) 2018 Coastal Use Area Map		93.9	South-west
Foreshore Building Line	Foreshore Building Line Map	Willoughby Local Environmental Plan 2012	229.5	South
Land Reservation Acquisition	Land Reservation Acquisition Map		402.6	South-east
Coastal Wetlands Proximity Area	SEPP (Coastal Management) 2018 Coastal Wetlands and Littoral Rainforest Map	State Environmental Planning Policy (Resilience and Hazards) 2021	426.3	North-east
Water Zoning	SREP (Sydney Harbour Catchment) 2005 Zoning Map		469.9	South-east
Wetlands Protection Area	SREP (Sydney Harbour Catchment) 2005 Wetlands Protection Area Map		497.8	South-east

### Other Planning Information

Name	Category	Details	Distance (m)	Direction
-	-	-	-	-

## 1.3 HERITAGE

## Map 1.3 (200m Buffer)

### State and Local Heritage Registers

Site ID	Site Name	Type	Details	Distance (m)	Direction
C4	Griffin	Heritage Register	Conservation Area - General. Significance is Local.	0.0	Onsite
I48	Community Centre	Heritage Register	Item - General. Significance is Local.	94.2	South-west
I13	House (including original interiors)	Heritage Register	Item - General. Significance is Local.	120.8	East
I15	House (including original interiors)	Heritage Register	Item - General. Significance is Local.	147.6	East



## Australian Heritage Database Register

Site ID	Site Name	Type	Details	Distance (m)	Direction
106369	Sydney Cultural Crescent Rock Art	National Heritage List	Class = Indigenous Status = Assessment initiated by AHC	0.0	Onsite

Commonwealth Heritage List, National Heritage List and World Heritage Area.

### 1.4a SOIL AND LAND USE INFORMATION

### Map 1.4a (500m Buffer)

#### Soil Landscape

Code	Soil Landscape	Soil Group	Description	Distance (m)	Direction
REbt	Blacktown	Residual	Landscape—gently undulating rises on Wianamatta Group shales. Local relief to 30 m, slopes usually >5%. Broad rounded crests and ridges with gently inclined slopes. Cleared Eucalypt woodland and tall open-forest (dry sclerophyll forest). Soils—shallow to moderately deep (>100 cm) hardsetting mottled texture contrast soils, red and brown podzolic soils (Dr3.21, Dr3.31, Db2.11, Db2.21) on crests grading to yellow podzolic soils (Dy2.11, Dy3.11) on lower slopes and in drainage lines. Limitations—localised seasonal waterlogging, localised water erosion hazard, moderately reactive highly plastic subsoil, localised surface movement potential.	0.0	Onsite
ERgy	Gynea	Erosional	Landscape—undulating to rolling rises and low hills on Hawkesbury Sandstone. Local relief 20–80 m, slopes 10–25%. Rock outcrop <25%. Broad convex crests, moderately inclined side slopes with wide benches, localised rock outcrop on low broken scarps. Extensively cleared open forest (dry sclerophyll forest) and eucalypt woodland. Soils—shallow to moderately deep (30–100 cm) yellow earths (Gn2.24) and earthy sands (Uc5.11, Uc5.2) on crests and insides of benches; shallow (<20 cm) siliceous sands (Uc1.21) on leading edges of benches; localised gleyed podzolic soils (Dg4.21) and yellow podzolic soils (Dy4.11, Dy5.11, Dy5.41) on shale lenses; shallow to moderately deep (<100 cm) siliceous sands (Uc1.2) and leached sands (Uc2.21) along drainage lines. Limitations—steep slopes, water erosion hazard, rock outcrop, localised rockfall hazard, localised noncohesive soils, shallow highly permeable soil, very low soil fertility.	110.9	South-west
COha	Hawkesbury	Colluvial	Landscape—rugged, rolling to very steep hills on Hawkesbury Sandstone. Local relief 40–200 m, slopes >25%. Rock outcrop >50%. Narrow crests and ridges, narrow incised valleys, steep sideslopes with rocky benches, broken scarps and boulders. Mostly uncleared Eucalypt open-woodland (dry sclerophyll forest) and tall open-forest (wet sclerophyll forest). Soils—shallow (<50 cm), discontinuous lithosols/siliceous sands (Uc1.21) associated with rock outcrop; earthy sands (Uc5.11, Uc5.23), yellow earths (Gn2.24) and some locally deep sands on inside of benches and along joints and fractures; localised yellow and red podzolic soils (Dy4.11, Dy5.21, Dr5.11, Dr5.21)	217.1	North

Code	Soil Landscape	Soil Group	Description	Distance (m)	Direction
			associated with shale lenses; siliceous sands (Uc1.2) and secondary yellow earths (Gn2.41) along drainage lines. Limitations—steep slopes, mass movement hazard, rockfall hazard, water erosion hazard, shallow soils, rock outcrop, non-cohesive soils (localised), stony, highly permeable soils of low fertility.		
RElh	Lucas Heights	Residual	Landscape—gently undulating crests and ridges on plateau surfaces of the Mittagong Formation (alternating bands of shale and fine grained sandstones). Local relief to 30 m, slopes <10%. Rock outcrop is absent. Low open-forest and woodland (dry sclerophyll). Soils—moderately deep (50–150 cm), hardsetting yellow podzolic soils and yellow soloths (Dy2.41). Limitations—localised water erosion hazard, localised shallow soils, stony soils with low soil fertility and low available water capacity.	332.3	North-west
WATER	Water	Water	N/A	474.4	South-east

### Salinity

Salinity Hazard	Type	Details	Distance (m)	Direction
-	-	-	-	-

### Radon

Radon Level (Bq/m <sup>3</sup> )	Distance (m)	Direction
7	0.0	Onsite

Typical radon levels in Australia are low and the values shown are the average values for each census district. For specific location, factors such as the local geology and house type could lead to different values. (ARPANSA).

## 1.4b ACID SULFATE SOIL

### Map 1.4b (500m Buffer)

#### State and Local Acid Sulfate Soil Registers

Name	Classification	Description	Distance (m)	Direction
Acid Sulfate Soils	Class 5	Class 5: Acid sulfate soils are not typically found in Class 5 areas. Areas classified as Class 5 are located within 500 metres on adjacent class 1,2,3 or 4 land.   Development consent requirement: Works within 500 metres of adjacent Class 1, 2a, 2b, 3 or 4 land that is below 5 metres Australian Height Datum and by which the watertable is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2a, 2b, 3 or 4 land.	0.0	Onsite
Soil Acidification Hazard	Moderate to severe limitations	Soil Acidification Hazard	0.0	Onsite

Name	Classification	Description	Distance (m)	Direction
	Severe limitations	Soil Acidification Hazard	109.5	South-west
	Moderate to severe limitations	Soil Acidification Hazard	332.7	North-west
Acid Sulfate Soils	Class 2	Class 2 : Acid sulfate soils in a class 2 area are likely to be found below the natural ground surface.   Development consent required.	479.0	North-east

To ensure that development does not disturb, expose or drain acid sulfate soils and cause environmental damage, development consent may be required for the carrying out of works within areas and land shown on the Acid Sulfate Soils Map.

### National Acid Sulfate Soil Register

Name	Classification	Description	Distance (m)	Direction
Atlas of Australian Acid Sulfate Soils	Low Probability of occurrence	Acid sulfate soil generally within upper 1m in wet / riparian areas.	0.0	Onsite
	Extremely low probability of occurrence	Acid sulfate soil generally within upper 1m in wet / riparian areas.	194.2	East
	High Probability of occurrence	Acid sulfate soil generally within upper 1m.	479.6	North-east
	High Probability of occurrence	Acid sulfate soil generally within upper 1m in wet / riparian areas.	484.0	South-east

Source: ASRIS Atlas of Australian Sulfate Soils (CSIRO). Acid Sulfate Soils (ASS) are all those soils in which sulfuric acid may be produced, is being produced, or has been produced in amounts that have a lasting effect on main soil characteristics.

## 1.5 GEOLOGY AND TOPOGRAPHY

## Map 1.5 (500m Buffer)

### Geology

Map Sheet	Code	Formation	Age	Group	Dominant Lithology	Description	Distance (m)	Direction
<b>Sydney 1:100,000 Geological Sheet</b>	Tuth	Hawkesbury Sandstone	Middle Triassic	Ungrouped Triassic units	Sandstone	Medium- to coarse-grained quartz sandstone with minor shale and laminite lenses.	0.0	Onsite
	Twia	Ashfield Shale	Middle Triassic	Wianamatta Group	Shale	Black to light grey shale and laminite.	205.9	North-west
	QH_af	Alluvial floodplain deposits	Holocene	Alluvium	Clastic sediment	Silt, very fine- to medium-grained lithic to quartz-rich sand, clay.	458.4	North-east
	QH_edw	Estuarine fluvial delta front	Holocene	Estuarine deposits	Clastic sediment	Very fine- to fine-grained (sporadically medium-grained) lithic-quartz sand (fluvially-deposited), silt, clay, shell material.	474.4	South-east

### Naturally Occurring Asbestos Potential (NOA)

Category	On the Property?	Within Buffer?
Not identified	-	-

### Topography

<b>Topography</b> (Onsite)	88 – 90 mAHD
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## Section 2 Hydrogeology



### 2.1 HYDROGEOLOGY AND GROUNDWATER BORES

#### Map 2.1 (2000m Buffer)

	On the Property?	Within Buffer?
<b>Aquifer Type</b>	Porous, extensive aquifers of low to moderate productivity	Porous, extensive aquifers of low to moderate productivity
<b>Drinking Water Catchments</b>	Not identified	Not identified
<b>Protected Riparian Corridor</b>	Not identified	Not identified
<b>UPSS Environmentally Sensitive Zone</b>	Sydney Coast-Georges River	Sydney Coast-Georges River
<b>Wetlands</b>	Not identified	Wetlands Protection Area Estuarine Wetland

#### Groundwater Bores

Map ID	Groundwater Bore ID	Authorised Purpose	Completion Date	Drilled Depth (m)	Final Depth (m)	SWL (m)	Salinity (mg/l)	Yield (L/s)	Distance (m)	Direction
5	GW111234	Monitoring	11/08/2010	4.5	4.5	2.4	<Null>	<Null>	913.8	North-west
3	GW111232	Monitoring	16/11/2010	4.5	4.5	2.4	<Null>	<Null>	939.4	North-west
4	GW111233	Monitoring	11/08/2010	4.3	4.3	1.8	<Null>	<Null>	941.0	North-west
12	GW113501	Monitoring	20/04/2007	7.0	7.0	<Null>	<Null>	<Null>	947.1	South-west
10	GW113499	Monitoring	19/04/2007	5.0	5.0	<Null>	<Null>	<Null>	954.0	South-west
9	GW113498	Monitoring	20/04/2007	6.0	6.0	<Null>	<Null>	<Null>	965.1	South-west
11	GW113500	Monitoring	19/04/2007	6.0	6.0	<Null>	<Null>	<Null>	968.5	South-west
7	GW113496	Monitoring	20/04/2007	8.0	8.0	<Null>	<Null>	<Null>	971.3	South-west

Map ID	Groundwater Bore ID	Authorised Purpose	Completion Date	Drilled Depth (m)	Final Depth (m)	SWL (m)	Salinity (mg/l)	Yield (L/s)	Distance (m)	Direction
6	GW113495	Monitoring	20/04/2007	5.0	5.0	<Null>	<Null>	<Null>	973.2	South-west
8	GW113497	Monitoring	23/04/2007	8.0	8.0	<Null>	<Null>	<Null>	976.8	South-west
15	GW113504	Monitoring	23/04/2007	4.5	4.5	<Null>	<Null>	<Null>	979.8	South-west
14	GW113503	Monitoring	20/04/2007	5.0	5.0	<Null>	<Null>	<Null>	983.3	South-west
13	GW113502	Monitoring	14/04/2007	4.0	4.0	<Null>	<Null>	<Null>	985.5	South-west
20	GW107666	Unknown	11/12/2006	<Null>	<Null>	<Null>	<Null>	<Null>	1062.4	East
2	GW108481	Unknown	11/12/2007	216.0	216.0	<Null>	245.00 mg/L	0.05	1109.3	North-west
19	GW107970	Recreation	1/01/2004	199.0	199.0	110	<Null>	0.15	1379.2	South-east
17	GW114503	Monitoring	28/10/2010	8.0	8.0	2.5	<Null>	<Null>	1451.8	West
18	GW114504	Monitoring	28/10/2010	8.0	8.0	2.5	<Null>	<Null>	1461.3	West
16	GW114502	Monitoring	28/10/2010	8.0	8.0	2.5	<Null>	<Null>	1476.7	West
1	GW026513	Irrigated agriculture	1/12/1966	64.0	64.0	6	Fresh	0.95	1515.4	North-west
21	GW116824	Null	N/A	144.0	144.0	23.06	<Null>	<Null>	1624.4	East

Note: The use of the symbol "-" or N/A indicates that no records were found.

## Groundwater Bores Driller Lithology Details

Groundwater Bore ID	From Depth – To Depth (m)	Lithology	Distance (m)	Direction
GW111234	0m-0.2m Concrete 0.2m-0.95m Fill, sandy clay, some gravel and ironstone 0.95m-1.1m Fill, sandy clay, fine sand 1.1m-1.5m Fill, clayey gravelly sand 1.5m-4.5m Silty clay, low plasticity, dark grey to brown		913.8	North-west
GW111232	0m-0.2m Concrete 0.2m-0.3m Fill, sandy gravel 0.3m-0.5m Fill clayey sand 0.5m-0.75m Fill sandy clay 0.75m-1.4m Fill sandy clay, l/plasticity 1.4m-1.5m Clayey sand 1.5m-2.2m Silty clay m/plasticity 2.2m-2.3m Silty clay, traces of gravel 2.3m-4.5m Silty clay, red to brown with grey		939.4	North-west
GW111233	0m-0.15m Concrete 0.15m-0.3m Fill, sand, fine to medium grained 0.3m-0.8m Fill, gravelly sand, fine to medium grained 0.8m-1.6m Fill, sandy clay, low plasticity 1.6m-2m Silty clay, medium plasticity, brown 2m-2.15m Silty clay, grey to brown 2.15m-4.3m Silty clay, l/plasticity, some white to yellow sands, ironstone banding		941.0	North-west
GW113501	#N/A		947.1	South-west
GW113499	#N/A		954.0	South-west
GW113498	#N/A		965.1	South-west
GW113500	#N/A		968.5	South-west
GW113496	#N/A		971.3	South-west
GW113495	#N/A		973.2	South-west
GW113497	#N/A		976.8	South-west
GW113504	#N/A		979.8	South-west

Groundwater Bore ID	From Depth – To Depth (m)	Lithology	Distance (m)	Direction
GW113503	#N/A		983.3	South-west
GW113502	#N/A		985.5	South-west
GW107666	#N/A		1062.4	East
GW108481	0m-3.5m Clay and fill 3.5m-25m Sandstone l/brown 25m-26m Shale 26m-52m Sandstone grey 52m-54m Sandstone and shale,bedd. s/spots 54m-81m Sandstone grey 81m-85m Sandstone,shale bedding 85m-115m Sandstone grey 115m-116.5m Sandstone fine quartz 116.5m-121m Sandstone grey 121m-122m Shale,black hard 122m-145m Sandstone grey 145m-145.5m Sandstone f/quartz 145.5m-154m Sandstone grey 154m-158m Sandstone,shale bedding 158m-158.5m Sandstone fine quartz 158.5m-172m Sandstone grey 172m-173m Sandstone fine quartz 173m-216m Sandstone grey		1109.3	North-west
GW107970	0m-2m Yellow clay 2m-5m Red clay 5m-36m Yellow sandstone 36m-48m Shale 48m-126m Grey sandstone 126m-132m Shale 132m-199m Grey sandstone		1379.2	South-east
GW114503	0m - 0.2m Fill, Gravel 0.2m - 0.4m Fill, Silty Clay 0.4m - 1.6m Fill Silty Clay Soft Moist 1.6m - 5m Residual Clay Very Stiff Below 2.5m 5m - 6m Residual Clay Very Stiff Moist,Grey Red 6m - 7m Sandy Clay Becoming Soft,Bec.Moist 7m - 8m Residual Clayey Sand,Dense,Moist,Dark Grey		1451.8	West
GW114504	0m - 0.2m Fill, Gravel,Loose,Dry,Purple ,Coarse 0.2m - 0.4m Fill.Silty Clay Very Soft,Moist,Low Plasticity 0.4m - 1.4m Fill Silty Clay,Soft,Moist 1.4m - 5m Residual Clay Stiff Bec. Very Stiff 5m - 6m Residual Clay Vey Stiff,Moist 6m - 8m Residual Sandy Clay Stiff Bec.Soft		1461.3	West
GW114502	0.2m - 0.6m Fill, Silty Clay Very Soft 0.6m - 1.6m Fill Silty Clay, Soft, Moist 1.6m - 4.3m Residual Clay Stiff 4.3m - 5m Residual Clay Very Stiff 5m - 7m Residual Sandy Clay 7m - 8m Residual Clayey Sand,Dense,Moist,Sandstone		1476.7	West
GW026513	0m-9.14m Clay soil 9.14m-12.19m Sandstone white soft 12.19m-13.71m Shale water supply 13.71m-22.86m Sandstone white soft 22.86m-31.08m Sandstone 31.08m-35.05m Sandstone white 35.05m-36.57m Shale 36.57m-39.01m Sandstone white 39.01m-39.62m Shale 39.62m-57.91m Sandstone white 57.91m-59.43m Sandstone white soft water supply 59.43m-60.35m Shale sandy 60.35m-64m Driller		1515.4	North-west
GW116824	#N/A		1624.4	East

Note: The use of the symbol "-" or N/A indicates that no records were found.



## 2.2 HYDROGEOLOGY AND OTHER BOREHOLES

### Map 2.2 (500m Buffer)

	On the Property?	Within Buffer?
Groundwater Vulnerability	Not identified	Not identified
Groundwater Exclusion Zones <sup>1,2</sup>	Not identified	Not identified
Hydrogeologic Unit	Late Permian/Triassic sediments (porous media - consolidated)	Late Permian/Triassic sediments (porous media - consolidated)

<sup>1</sup> - Botany Groundwater Management Zones (BGMZ): Zone 1 – the use of groundwater remains banned; Zones 2 to 4 – domestic groundwater use is banned, especially for drinking water, watering gardens, washing windows and cars, bathing, or to fill swimming pools.

<sup>2</sup> - Williamstown Groundwater Management Zones (WGMZ): Primary Management Zone – this area has significantly higher levels of PFAS detected and therefore, the strongest advice applies. Secondary Management Zone – this area has some detected levels of PFAS; Broader Management Zone – the topography and hydrology of the area means PFAS detections could occur now and into the future.

### Groundwater Dependent Ecosystems (GDE)

	On the Property?	Within Buffer?
Aquatic	Not identified	Not identified
Terrestrial	Not identified	Not identified

Aquatic - Ecosystems that rely on the Surface expression of groundwater.

Terrestrial - Ecosystems that rely on the Subsurface expression of groundwater.

### Other Known Borehole Investigations (Coal Seam Gas (CSG), Petroleum Wells and Other Boreholes)

Borehole ID	Purpose	Project	Client/ Licence	Date Drilled	Depth (m)	Distance (m)	Direction
MIN_44025	<Null>	DPI Minerals Borehole Register - Sydney Water,	Sydney Water,		110.0	301.5	South
44025	Intrusive Investigation	Northern Storage Tunnel - NST	Sydney Water		110.0	301.5	South

Note: The use of the symbol "-" or N/A indicates that no records were found.





## Section 3 Environmental Registers, Licences and Incidents



### 3.1 CONTAMINATED LAND PUBLIC REGISTER

#### Map 3.1 (1000m Buffer)

#### Contaminated Sites

Register Type	Site Name	Address	Description	Details	Distance (m)	Direction
EPA Notified Contaminated Sites	Willoughby Bus Depot	Corner Ann Street and Stan STREET WILLOUGHBY EAST	Other Industry	Regulation under CLM Act not required	881.3	North-west

If the record does not contain a complete street address and/or cannot be located, the records' geographic location will be approximated and reported as being within the surrounding area.

Table 3.1.1 Contaminated Land Public Register		
State	Regulatory Body	Information included in this search (by state)
ACT	EPA (Environment Protection Authority)	Contaminated Land Search Register of Contaminated Sites
NSW	EPA (Environment Protection Authority)	Sites Notified as Contaminated Records of Notices
NT	EPA (Environment Protection Authority)	Contaminated Land Audit Pollution Abatement Notice
QLD	DES (Department of Environment and Science)	Environmental Management Register (EMR) Contaminated Land Register (CLR)
SA	EPA (Environment Protection Authority)	Site Contamination Index
TAS	EPA (Environment Protection Authority)	Regulated Sites and Premises Lutana and Parts of Hobarts Eastern Shore
VIC	EPA (Environment Protection Authority)	Priority Sites Register Pollution Abatement Notice

Table 3.1.1 Contaminated Land Public Register		
WA	DWER (Department of Water and Environmental Regulation)	Contaminated Sites Database

This search contains information retrieved from the relevant state authority, agency/department, or government authority that notifies and identifies contaminated land. The list only contains contaminated sites that the regulatory body is aware of or that have been notified by owners or occupiers as contaminated land. The sites are recorded on the register at various stages of the assessment and/or remediation process. If a site is not on the list, it does not necessarily mean the site is not contaminated.

## 3.2 LICENCES, APPROVALS & ASSESSMENTS

## Map 3.2 (500m Buffer)

### Licences

Licence N°	Type	Licence holder	Location Name	Premise Address	Activity	Dist. (m)*	Direct
6582	Delicensed	Hcoa Operations (Australia) Pty Limited	Castlecrag Private Hospital	150 Edinburgh Road, Castlecrag NSW	Hazardous, Industrial or Group A Waste Generation or Storage	304.2	East
7023	Delicensed	State Transit Authority Of NSW	Willoughby Bus Depot	Cnr Ann & Stan Streets, Willoughby NSW	Hazardous, Industrial or Group A Waste Generation or Storage	881.3	North-west

If the record does not contain a complete street address and/or cannot be located, the records' geographic location will be approximated and reported as being within the surrounding area.

\* Not mapped - Licences that are applied to larger areas and/or without specific definition; such as waterways, forests etc will still be identified in the search results but will not be show within the map.

### Audits

N°	Type	Licence holder	Location Name	Premise Address	Activity	Dist. (m)*	Direction
-	Not identified	-	-	-	-	-	-

If the record does not contain a complete street address and/or cannot be located, the records' geographic location will be approximated and reported as being within the surrounding area.

### Clean Up, Penalty Notices and Orders

N°	Type	Licence holder	Location Name	Premise Address	Details	Dist. (m)*	Direction
-	-	-	-	-	-	-	-

If the record does not contain a complete street address and/or cannot be located, the records' geographic location will be approximated and reported as being within the surrounding area.

### 3.3a SITES REGULATED BY OTHER JURISDICTIONAL BODY

Map 3.3a (2000m Buffer)

#### Contaminated Legacy Areas

Site Name	Description	Distance (m)	Direction
Not identified	-	-	-

*Includes known contaminated areas such as James Hardies Asbestos waste legacy areas, Pasminco Smelter and Uranium processing site.*

#### Defence, Military Sites and UXO Areas

Site name	Type*	Details	Distance (m)	Direction
7 Field Regiment RAA Depot	Defence Area / Military Sites	Post WWII and on the re-raising of the CMF in 1948, 7th Field Regiment, RAA was reformed at Warrane Road, Willoughby. Site was used as A depot/storage facility for field armaments. The regiment moved from the Willoughby depot to the now Multi-User Facility located at Pymble NSW.	1267.1	North-west

\*RCIP (Regional Contamination Investigation Program). UXO (Unexploded Ordnance Areas)

#### Former Gasworks Sites

Site name	Description	Distance (m)	Direction
North Shore Gasworks	Gas was first introduced to Sydney by the Australian Gas Light Company in 1841. James Walter Fell, ex-A.G.L., planned his own gasworks for the North Shore and in 1877 produced gas for what later became the North Shore Gas Company Ltd. As the mains extended northwards, Willoughby Council examined the possibilities of purchasing gas from the Gas Company or else building a local works. The Gas Company built a gasholder near Eastern Valley Way and Warrane Road. This was at the bottom of a hill and not as much a blot on the landscape as were many other holders in Sydney. With the advent of natural gas in the 1970s the holder became redundant and was demolished because the gas is now held at high pressure in the mains.	1781.3	North-west

#### PFAS Sites

Site name	Description	Source	Distance (m) *	Direction
Willoughby Fire Station	Fire station built in 1915. Potential historical use of PFAS.	Fire and Rescue NSW	1219.8	West

### 3.3b OTHER POTENTIAL POLLUTION SOURCES

Map 3.3b (500m Buffer)

#### Derelict Mines and Quarries

Site name	Description	Distance (m)	Direction
Not identified	-	-	-

#### Historical Landfills

Site name	Description	Distance (m)	Direction
Not identified	-	-	-

#### National Pollutant Inventory (NPI)

Facility name	Address	Primary ANZSIC Class	Latest report	Distance (m)	Direction
Not identified	-	-	-	-	-



## Section 4 Potentially Contaminated Areas



### 4.1 POTENTIALLY CONTAMINATING ACTIVITIES

Map 4.1 (200m Buffer)

#### Liquid Fuel Facilities

Site name	Category	Location	Status*	Distance (m)	Direction
Not identified	-	-	-	-	-

#### Waste Management Facilities & Recycling Centres

Site name	Category	Location	Status*	Distance (m)	Direction
Not identified	-	-	-	-	-

**\*Status:** Data is current as when this report was created.

The operational status of the business is determined using the available data sources and does not indicate real-time conditions at the site.

Current: business is operating on the day this report was issued.

Former: business that have been closed or discontinued within 2 years from the date of this report.

Liquid Fuel Facilities Datasets, representing the spatial locations of liquid fuel depots, refineries, terminals and petrol stations present in the Australian Government National Liquid Fuel Facilities Dataset and Petrol stations identified by Land Insights. Waste Management Facilities, representing the spatial locations of reprocessing facilities, transfer stations and landfills present in the Australian Government National Waste Management Facilities Dataset and Waste/Recycling facilities identified by Land Insights.

A more comprehensive list of all Potentially Contaminating Activities is available in the Due Diligence Insight report.



## 4.2 HISTORICAL BUSINESS DIRECTORIES

(not mapped)

YEAR	Activity	Name	Address	Positional accuracy	Distance (m)	Direction
1950	Hardware - Retail	Nesbitt's Hardware Store	120 Edinburg Road, Castle Crag, NSW	Address	12.4	South
1965	Sausage Casing Mfrs	GLOBUS CASING CO PTY LTD	122-128, Edinburgh Rd, NSW	Address	12.4	South
2005	Plastic & Reconstructive Surgery; Medical Practitioners	North Shore Plastic Surgery	116 Edinburgh Rd, CASTLECrag, NSW, 2068	Address	21.2	West
1940	Grocers - Retail	Chandler J K	118 Edinburgh Road, Willoughby, NSW	Address	21.3	South
2015	Airlines & Agents	Travelplan Ski Holidays	118 Edinburgh Rd Castlecrag NSW 2068	Address	25.2	South
1990	Cheque Printing & Encoding	Micro Electronic (Aust) Pty Ltd	3 The Postern, Castlecrag, NSW	Address	27.5	South-west
1940	Stores - General	Lane H G	114 Edinburgh Road, Willoughby, NSW	Address	32.6	West
1940	Dairies	Warner JR	110 Edinburgh Road, Willoughby, NSW	Address	32.9	North-west
1965	Motor Service Stations	Bennett J H & D A	112, Edinburgh Rd, NSW	Address	32.9	North-west
1965	Motor Service Stations	ESSO SERVICE STATIONS	112, Edinburgh Rd, NSW	Address	32.9	North-west
1970	Motor Service Stations	Esso Australia Ltd	112 Edinburgh Road, Castle Crag, NSW	Address	32.9	North-west
1965	Caravans	CASTLECrag CARAVAN HIRE & SALES	108, Edinburgh Rd, NSW	Address	42.8	South-west
1965	Trailers Semi-Trailers Parts	Castle Crag Caravan Hire & Sales	108, Edinburgh Rd, NSW	Address	42.8	South-west
1970	MOTOR GARAGES/ENGINEERS CASTLE Crag	Esso Servicer, center,	108 Edinburgh Rd., NSW	Address	42.8	South-west
1970	WELDERS—ELECTRIC &/OR OXY	Esso Servicer, center,	108 Edinburgh Road, Castlecrag	Address	42.8	South-west
1950	Hardware - Retail	Kings Hardware	91 Edinburgh Road, Castle Crag, NSW	Address	54.4	North-west
1965	Butchers	King K	91, Edinburgh Rd, NSW	Address	54.4	North-west
1965	Hardware—Retail	Kings Hardware	91, Edinburgh Rd, NSW	Address	54.4	North-west
1970	HARDWARE DEALERS/IRONMONGERS CASTLE Crag	King's Hardware,	91 Edinburgh Rd., NSW	Address	54.4	North-west
1970	PAINT, VARNISH, OILS/COLOUR MERCHANTS	King's Hardware,	91 Edinburgh Road, Castlecrag	Address	54.4	North-west
1980	Hardware - Retail	Kings Hardware	91 Edinburgh Road, Castlecrag, NSW	Address	54.4	North-west
1965	Bottle Closures	KORK-N-SEAL (AUST) PTY LTD	102, Edinburgh Rd, NSW	Address	69.3	West
1965	Bottles—Cork & Crown Seals	Kork-N-Seal (Aust) Pty Ltd	102, Edinburgh Rd, NSW	Address	69.3	West
1965	Fruiterers & Greengrocers	Maniscalco A	87, Edinburgh Rd, NSW	Address	71.8	West

YEAR	Activity	Name	Address	Positional accuracy	Distance (m)	Direction
2005	Building Contractors-- Alterations & Repairs; Building Contractors-- Alterations, Extensions & Renovations	Bermuda Constructions, Castlecrag	44 The Parapet, CASTLECrag,NSW,2068	Address	75.8	South-east
1980	Photographers- Commercial & Industrial	Purcell Pat Photography	4 Rutland Avenue, Castlecrag,NSW	Address	77.3	North
1950	Radio Repairs & Service	Castle Crag Radio & Electrical Service	85 Edinburgh Road, Castlecrag,NSW	Address	80.9	West
1980	Chemists - Pharmaceutical	Castlecrag Chem-Mart	100 Edinburgh Road, Castlecrag,NSW	Address	81.4	West
2015	Greengrocers & Fruiterers	Castlecrag Fruiterers	Shp 2/ 100 Edinburgh Rd Castlecrag NSW 2068	Address	81.4	West
2015	Chemists - Retail Pharmacies	Castlecrag Pharmacy	100 Edinburgh Rd Castlecrag NSW 2068	Address	81.6	West
2010	Bakeries	Ganache Patisserie Francaise	85 Edinburgh Rd CASTLECrag 2068 NSW	Address	81.6	West
2010	Greengrocers & Fruiterers	Fresh Patch	Shop 2-4 100 Edinburgh Rd CASTLECrag 2068 NSW	Address	86.0	West
2005	Fruiterers & Greengrocers	Fresh Patch	Shop 2-4, 100 Edinburgh Rd, CASTLECrag,NSW,2068	Address	86.2	West
1965	Builders & Contractors	Mattei H	83,EdinburghRd,NSW	Address	89.1	West
2015	Bakeries	Ganache Patisserie Francaise	85 Edinburgh Rd Castlecrag NSW 2068	Address	90.5	North-west
1950	Chemists - Pharmaceutical	Coster P V	79 Edinburgh Road, CastleCrag,NSW	Address	98.9	West
1965	Chemists— Pharmaceutical	Stening G S	79,EdinburghRd,NSW	Address	98.9	West
1970	CHEMISTS— PHARMACEUTICAL	Stening, G. S.,	79 Edinburgh Road,Castlecrag	Address	98.9	West
1980	Nurserymen - Retail	Fernishings	79 Edinburgh Road, Castlecrag,NSW	Address	98.9	West
1970	Carriers Light	Hill P&E	8 Rutland Avenue, Castlecrag,NSW	Address	106.4	North
1965	Nursery & Kindergarten Equipment	Gillespie's Hire&Sales Service	115,EdinburghRd,NSW	Address	118.3	East
2005	Building Contractors	Accent Constructions Pty Ltd	14 The Postern,CASTLECrag,NSW,2068	Address	121.7	South-west
1980	Builders & Contractors	Dunstan A L Pty Ltd	11 Rutland Avenue, Castlecrag,NSW	Address	138.4	North
1950	Motor Body Painters & Sprayers	Johnson L C	71 Edinburgh Road, Willoughby,NSW	Address	141.9	West
1965	Taxis	Castlecrag Hire Cars	103,EasternValleyWy,NSW	Address	156.0	North-west
1980	Data Processing Equipment	Positronics Pty Ltd	107 Eastern Valley Way, Castlecrag,NSW	Address	169.5	North-west
1980	Electronic Equipment Mfrs &/or W'salers	Positronics Pty Ltd	107 Eastern Valley Way, Castlecrag,NSW	Address	169.5	North-west
1965	Engineers—Consulting	Thomas D S	1,TheParapet,NSW	Address	176.3	East
1980	Monumental Masons	Sydney Stoneart (E I Kroboth)	98 Eastern Valley Way, Castlecrag,NSW	Address	184.3	South-west

YEAR	Activity	Name	Address	Positional accuracy	Distance (m)	Direction
1980	Excavating &/or Earth Moving Contractors	Aardvark Excavators	17 Raeburn Avenue, Castlecrag,NSW	Address	191.7	North
1990	Pest Control	Lower North Shore Pest Eradication	29 The Rampart,Castlecrag,NSW	Address	192.7	South-east
1950	Timber Merchants	Hurdis W F	28 The Parapet Street, Castle Crag,NSW	Address	194.0	South-east
2005	Advertising Agencies	Guy Morgan Advertising	1 Warners Ave, CASTLECRAG,NSW,2068	Address	198.3	West
1965	Builders & Contractors	Yales K R	31,TheRampart,NSW	Address	199.0	South-east
1970	MOTOR GARAGES/ENGINEERS CASTLE CRAG	Amaroo Service Centre,	Cnr. Eastern Valley Way & Edinburgh Rd.,NSW	Street		West
1970	Motor Service Stations	Ampol Petroleum Ltd	Eastern Valley Way, Castlecrag,NSW	Street		North-west

Land Insight uses a number of address geocoding techniques and has characterised them based on completeness (match rates) and positional accuracy. When a historical street address is incomplete or a match is not found, a record identified as being in the surrounding area will be included for reference and the accuracy of the data is approximate only. An explanation of the positional accuracy records is defined in the table below.

Historical data positional accuracy and georeferencing results explanation		
Positional accuracy	Georeferenced	Description
Address	Located to the address level	<i>When street address and names fully match.</i>
Street	Located to the street centroid	<i>When street names match but no exact address was found. Location is approximate.</i>
Place	Located to the structure, building or complex	<i>When building, residential complex or structure name match but no exact address was found. Location is approximate.</i>
Suburb	Located to the suburb area	<i>When suburb name match but no exact address was found. Location is approximate.</i>

The data used in this section was extracted from range of historical commercial trade directories and business listings. The business addresses were geocoded using historical information and the accuracy of the data may vary due to changes to the physical address at a given locality over time or the quality of the original records. From 2005, the historical business records in this section are considered more accurate as information was extracted from digital directories with geographic coordinate location information available. On this basis, reliance on the historic listing data should be considered when assessing the risk of contamination from an activity at the site. The presence of a business listing does not definitively confirm the actual activity that has occurred at the site. For more information on how these records were geocoded and the methodology used by Land Insight, contact us at [info@landinsight.co](mailto:info@landinsight.co).

Historical business directory listings have been filtered to match activities and industries identified as PCAs in Section 4.2. Please note that any record not identified within this section (due to error or unforeseen omission) does not necessarily mean that the screened area is not potentially contaminated or free of any risks.





## Section 5 Natural Hazards



### 5.1 Fire Hazard

#### Map 5.1 (500m Buffer)

#### Bushfire Prone Areas

Category	Type	Details	Distance (m)	Direction
Bushfire Prone Land	Vegetation Buffer	Potential Impact Area	140.7	South-west
	Vegetation Category 2	Low Risk Area	170.7	South-west
	Vegetation Category 1	High Risk Area	305.7	North

#### Bushfire History

Type	Season	Details	Distance (m)	Direction
Not identified			-	-

### 5.2 Flood and Erosion Hazards

#### Map 5.2 (500m Buffer)

#### Erosion Hazard

Category	Type	Details	Distance (m)	Direction
Landslip Erosion Risk	Very slight to negligible limitations	Very Low	0.0	Onsite
	Extremely severe limitations	Very High	218.6	North
Water Erosion Risk	Moderate to severe limitations	Moderate	0.0	Onsite

Category	Type	Details	Distance (m)	Direction
	Very severe limitations	Very High	109.5	South-west
	Extremely severe limitations	Very High	218.6	North
Wind Erosion Risk	Very slight to negligible limitations	Very Low	0.0	Onsite
	Moderate to severe limitations	Moderate	109.5	South-west
	Moderate limitations	Moderate	218.6	North

## Flood Hazard

Category	Type	Details	Distance (m)	Direction
Probable Maximum Flood (PMF)	Flood Mapping Precinct	Scotts Creek Flood Study - March 2008	313.3	North-west

### Generalised flood information definitions and explanations

**Annual Exceedance Probability (AEP)** - The probability of a flood event of a given size occurring in any one year, usually expressed as a percentage annual chance

0.2%AEP	A flood event of this size is considered rare but may still occur. A flood of size or larger has a 1 in 500 chance or a 0.2% probability of occurring in any year
1% AEP	A flood of this size or larger has a 1 in 100 chance or a 1% probability of occurring in any year
2% AEP	A flood of this size or larger has a 1 in 50 chance or a 2% probability of occurring in any year.
5% AEP	A flood of this size or larger has a 1 in 20 chance or a 5% probability of occurring in any year
20%AEP	A flood of this size or larger has a 1 in 5 chance or a 20% probability of occurring in any year.

**Average Recurrence Interval (ARI).** The long-term average number of years between the occurrence of a flood as big as, or larger than, the selected event. For example, floods reaching a height as great as, or greater than, the 20 year ARI flood event will occur on average once every 20 years

**Flood Liable Land** - Synonymous with flood prone land, i.e. land susceptible to flooding by the Probable Maximum Flood (PMF) event. Note that the term flood liable land covers the whole floodplain, not just the part below the flood planning level

**Flood Planning Area (FPA)** - Councils develop Flood Planning Areas (FPAs) as part of Flood Overlay mapping to guide future building and development in flood prone areas. The FPAs are designed to recognise the flood hazard for different flooding types.

**Flood Hazard** - Flood hazard is a combination of frequency of flooding, the flood depth, and the speed or velocity at which the water can travel.

**Probable Maximum Flood (PMF)** - The largest flood that could conceivably be expected to occur at a particular location, usually estimated from probable maximum precipitation. The PMF defines the maximum extent of flood prone land, that is, the floodplain. It is difficult to define a meaningful Annual Exceedance Probability for the PMF, but it is commonly assumed to be of the order of  $10^4$  to  $10^7$  (once in 10,000 to 10,000,000 years)



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## Appendix C: LIR Historical Aerial Photographs



An aerial photograph of a vibrant turquoise river winding through a rugged, rocky landscape. The river is flanked by steep, rocky banks and dense, green and yellowish vegetation. The water's clarity reveals the rocky bottom in some areas. A yellow rectangular box is overlaid on the right side of the image, containing the title and location information.

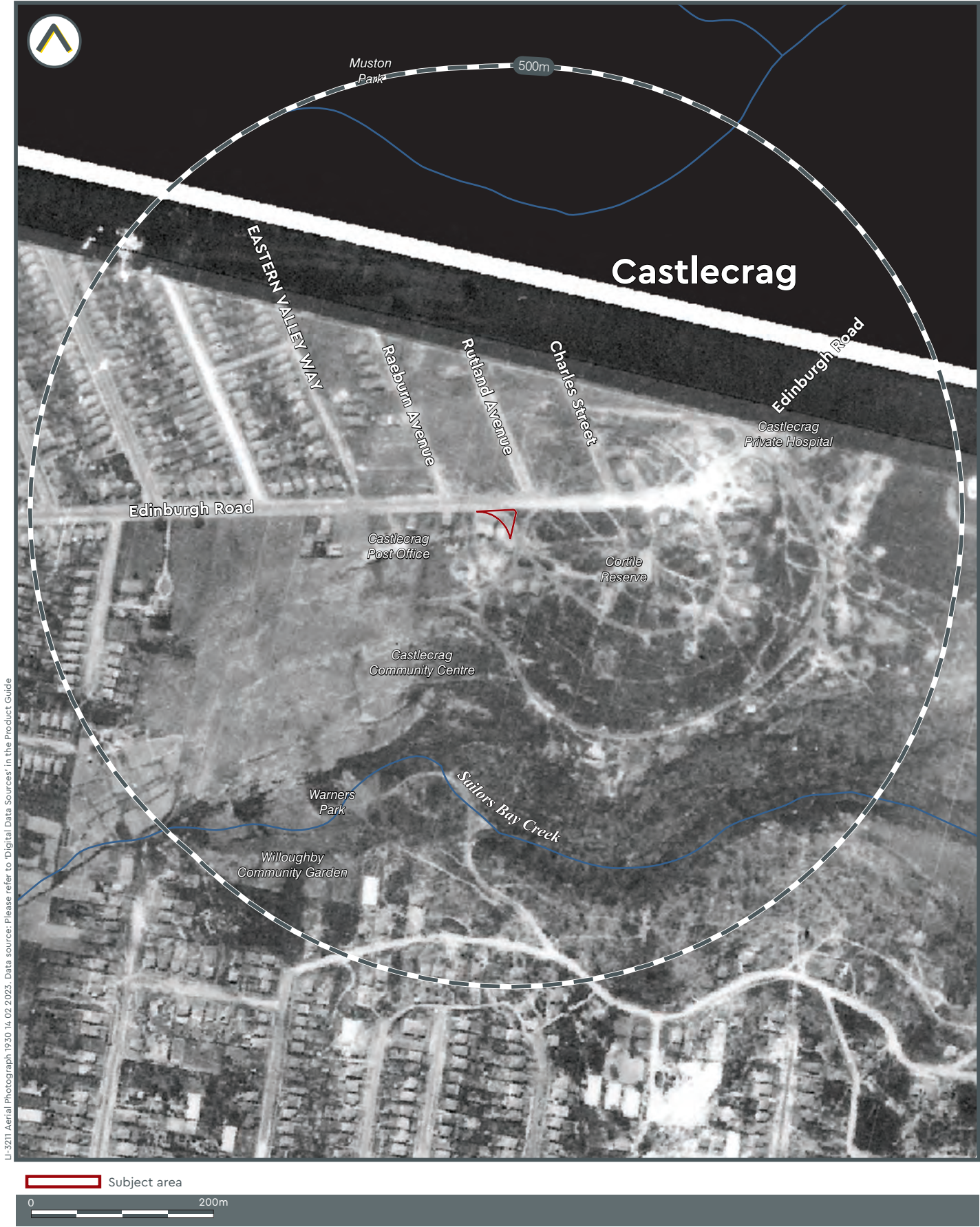
# Appendix B

## HISTORIC IMAGERY

Cnr Edinburgh Road & The Postern  
Castlecrag, NSW



Historic Aerial Photograph - 1930



LI-3211 Aerial Photograph 1930 14.02.2023. Data source: Please refer to 'Digital Data Sources' in the Product Guide



Historic Aerial Photograph - 1943

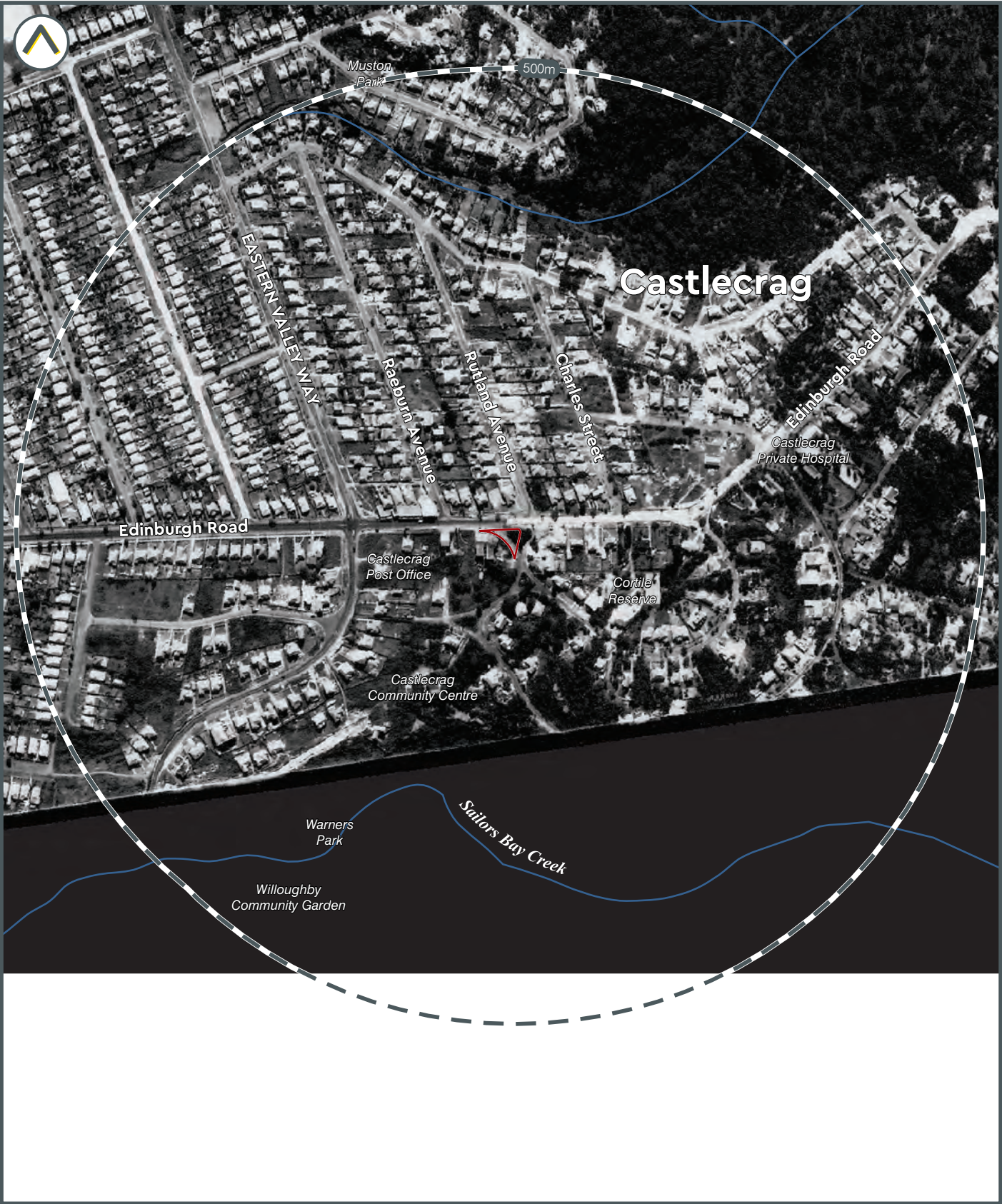


LI-3211 Aerial Photograph 1943 14 02 2023. Data source: Please refer to 'Digital Data Sources' in the Product Guide





Historic Aerial Photograph - 1953



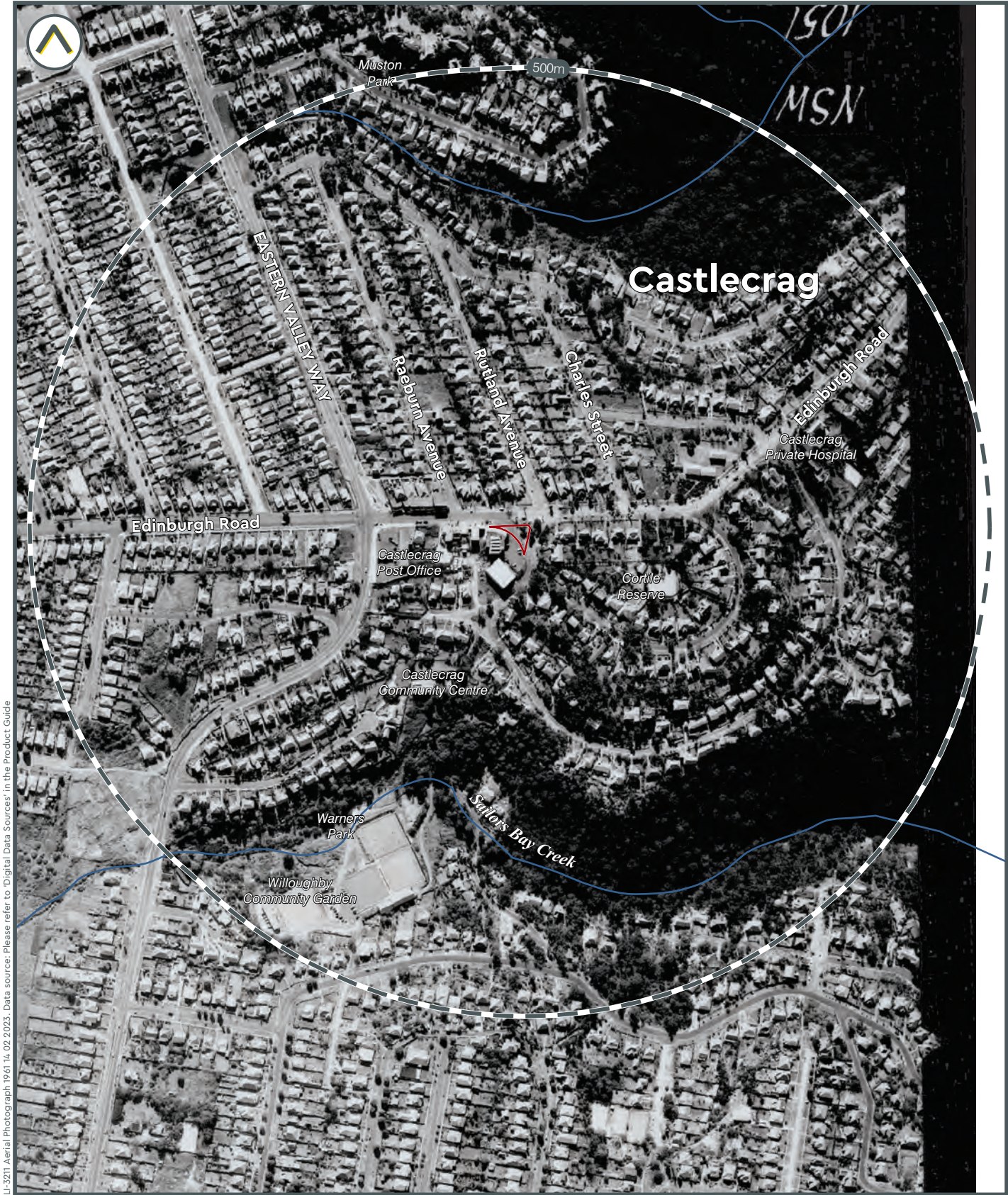
LI-3211 Aerial Photograph 1953 14 02 2023. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m



Historic Aerial Photograph - 1961



LI-3211 Aerial Photograph 1961 14.02.2023. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m



Historic Aerial Photograph - 1965





## Historic Aerial Photograph - 1975





Historic Aerial Photograph - 1978



LI-3211 Aerial Photograph 1975 14 02 2023. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m



Historic Aerial Photograph - 1986



LI-3211 Aerial Photograph 1986 14 02 2023. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m



## Historic Aerial Photograph - 1991





Historic Aerial Photograph - 1994



LI-3211 Aerial Photograph 1994, 14.02.2023. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m

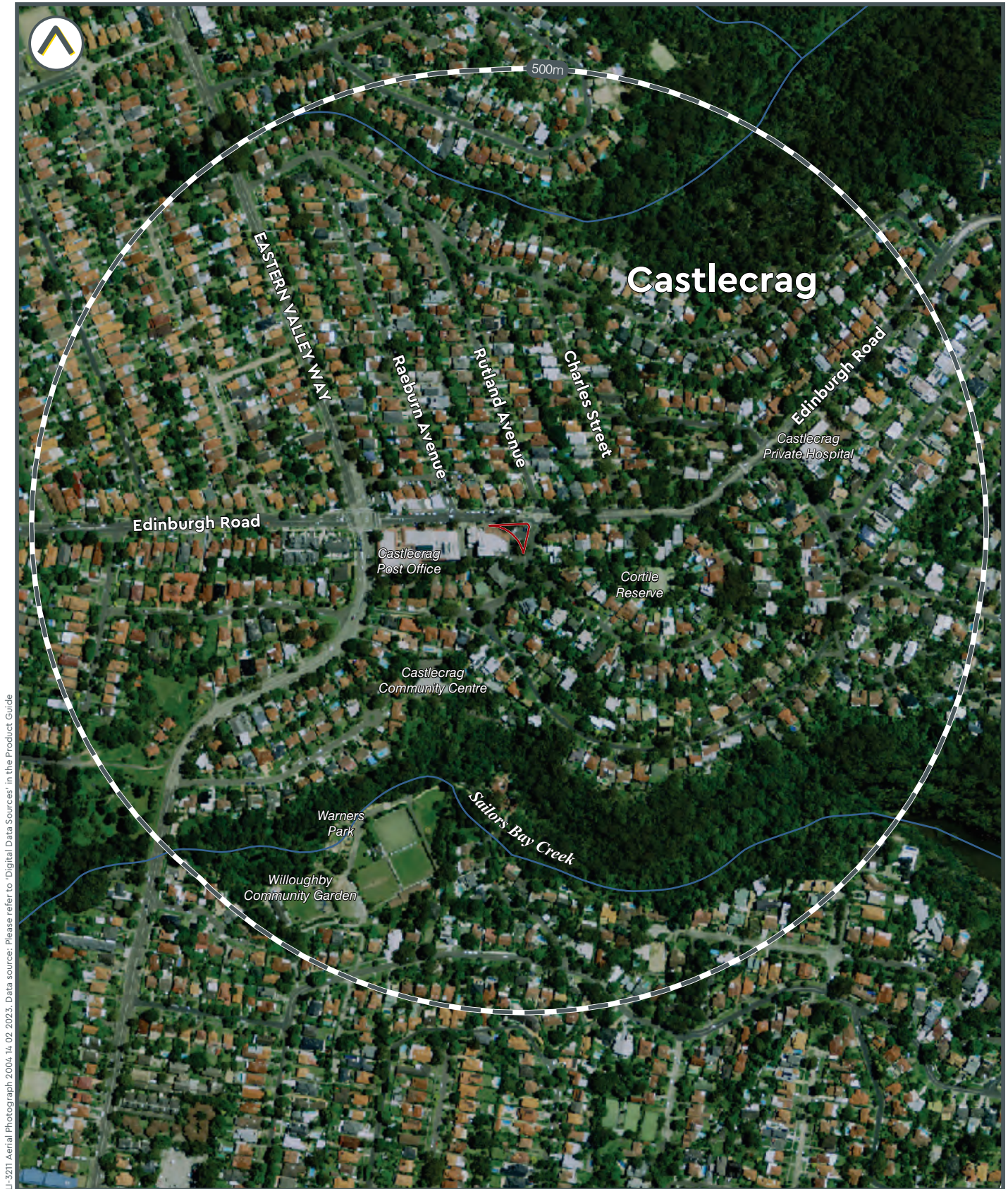


Historic Aerial Photograph - 2004





## Historic Aerial Photograph - 2007



LI-3011 Aerial Photograph 2004/14.02.2023. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m



Historic Aerial Photograph - 2011



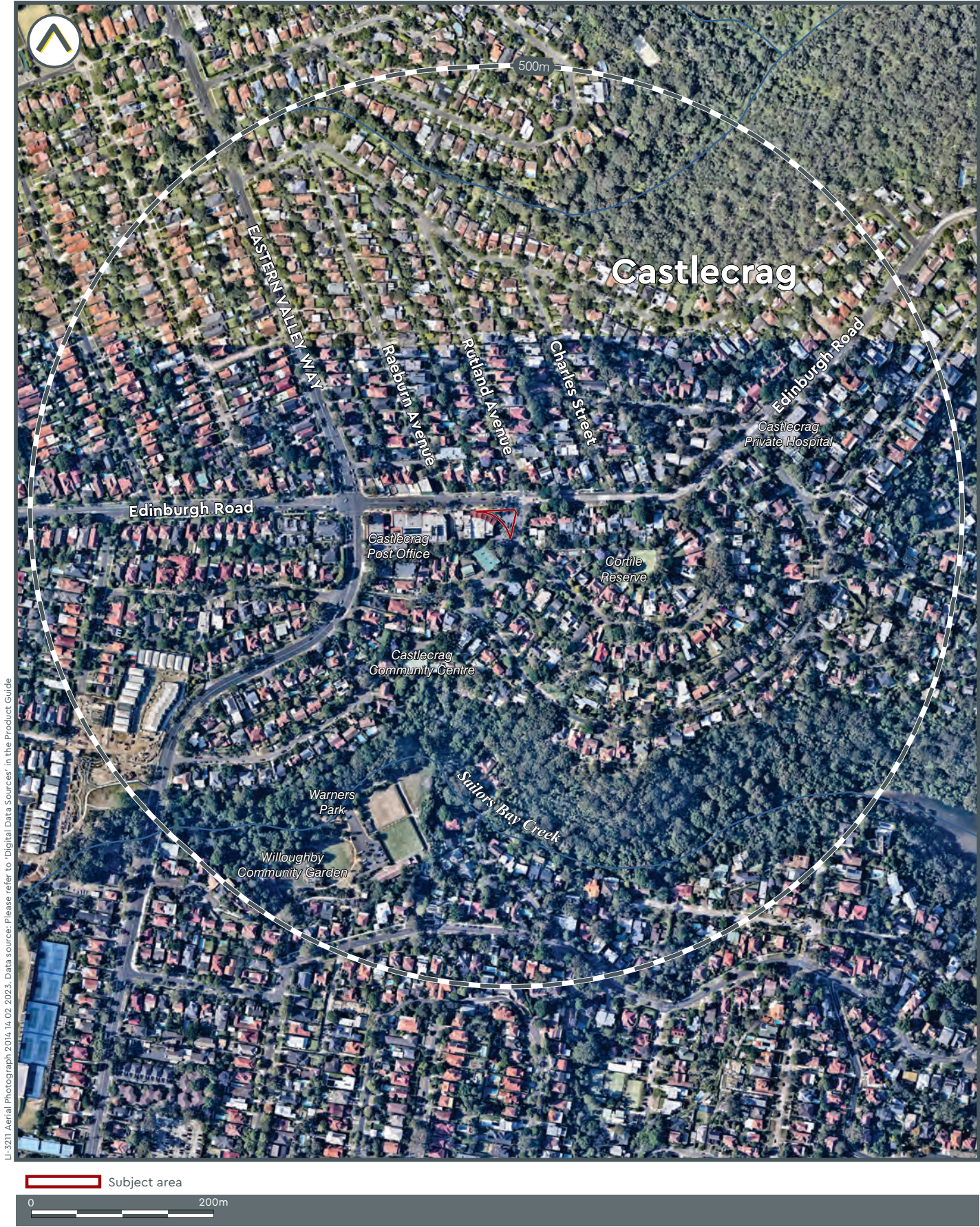
LI-3211 Aerial Photograph 2011, 14.02.2023. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m

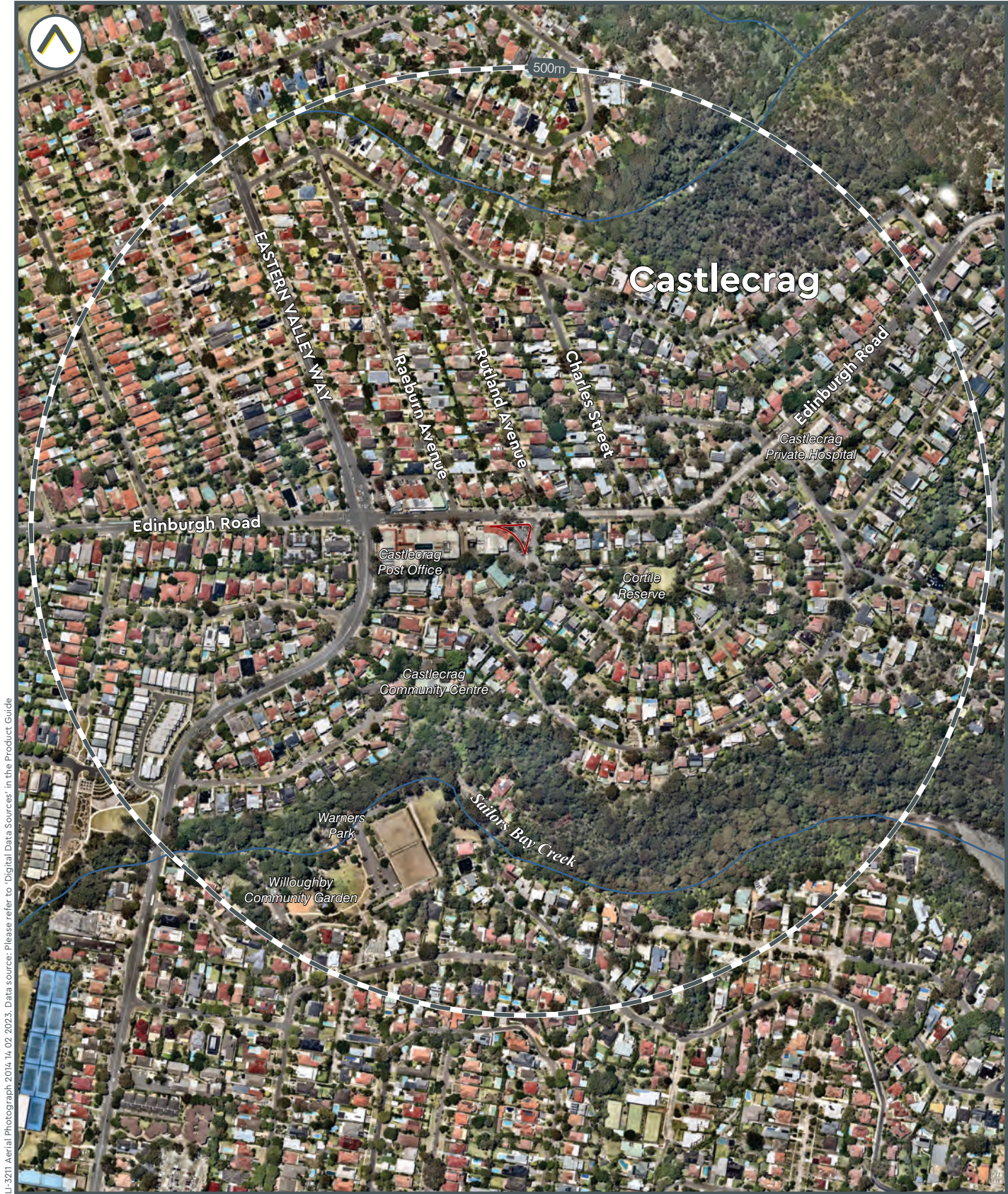


Historic Aerial Photograph - 2014





Historic Aerial Photograph - 2017



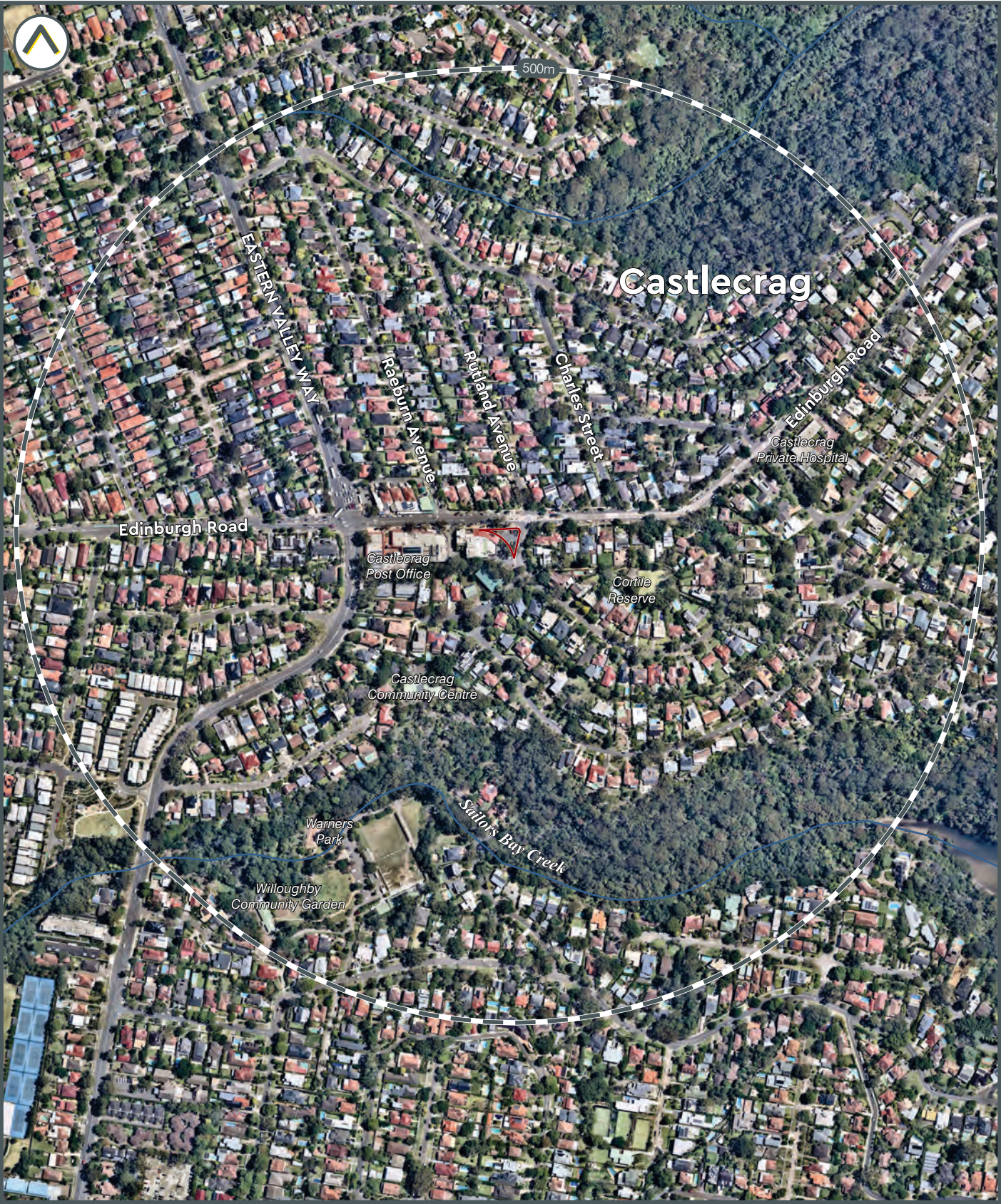
LI-3211 Aerial Photograph 2014, 14.02.2023. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m



Historic Aerial Photograph - 2020



LI-3211 Aerial Photograph 2020 14.02.2023. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m



Historic Aerial Photograph - 2023



LI-3211 Aerial Photograph 2023 14 02 2023. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m





## Appendix E: LIR Report Maps



# Appendix A

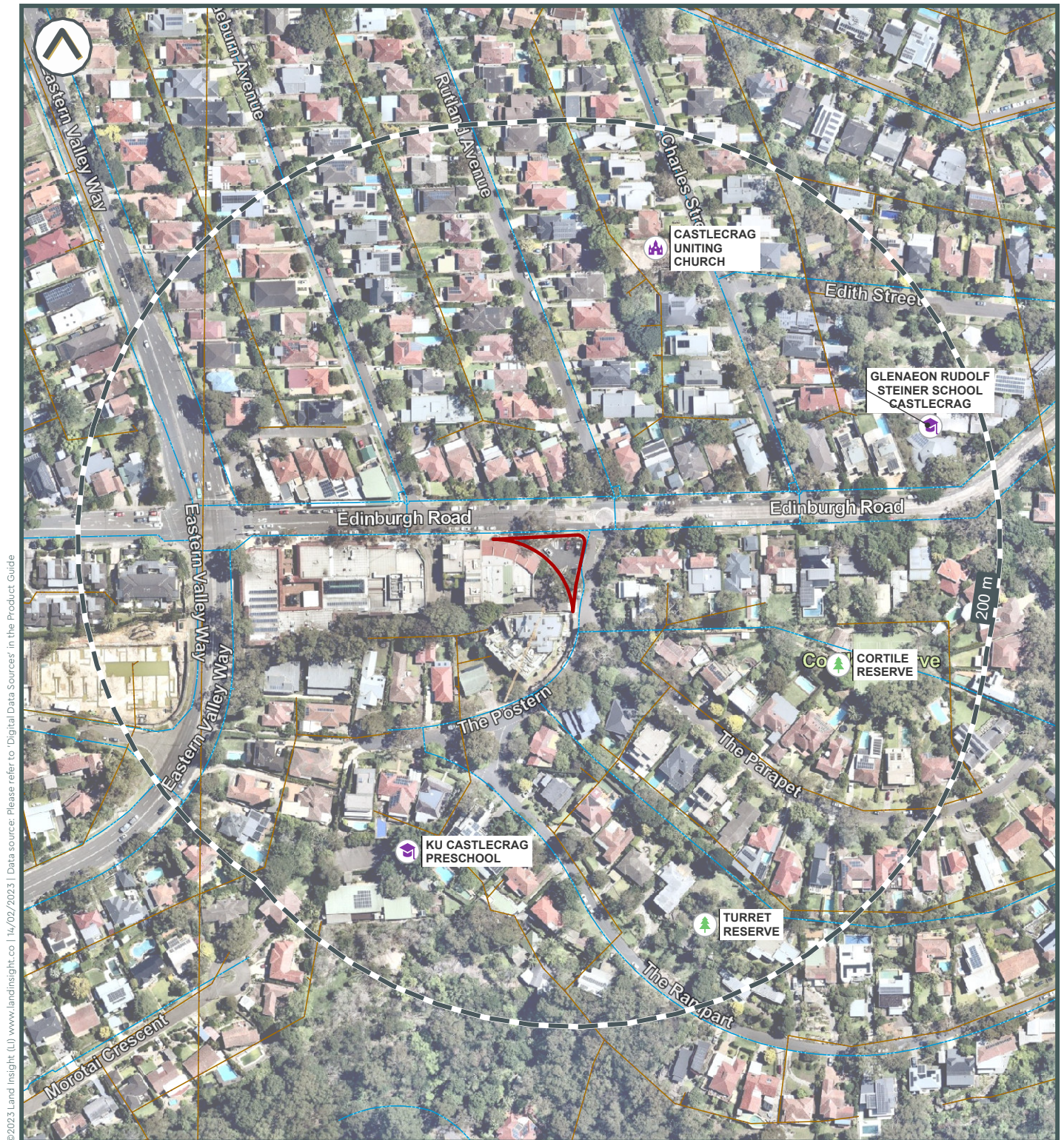
## REPORT MAPS

Cnr Edinburgh Road & The Postern  
Castlecrag, NSW





Subject Area and Sensitive Receptors



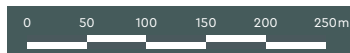
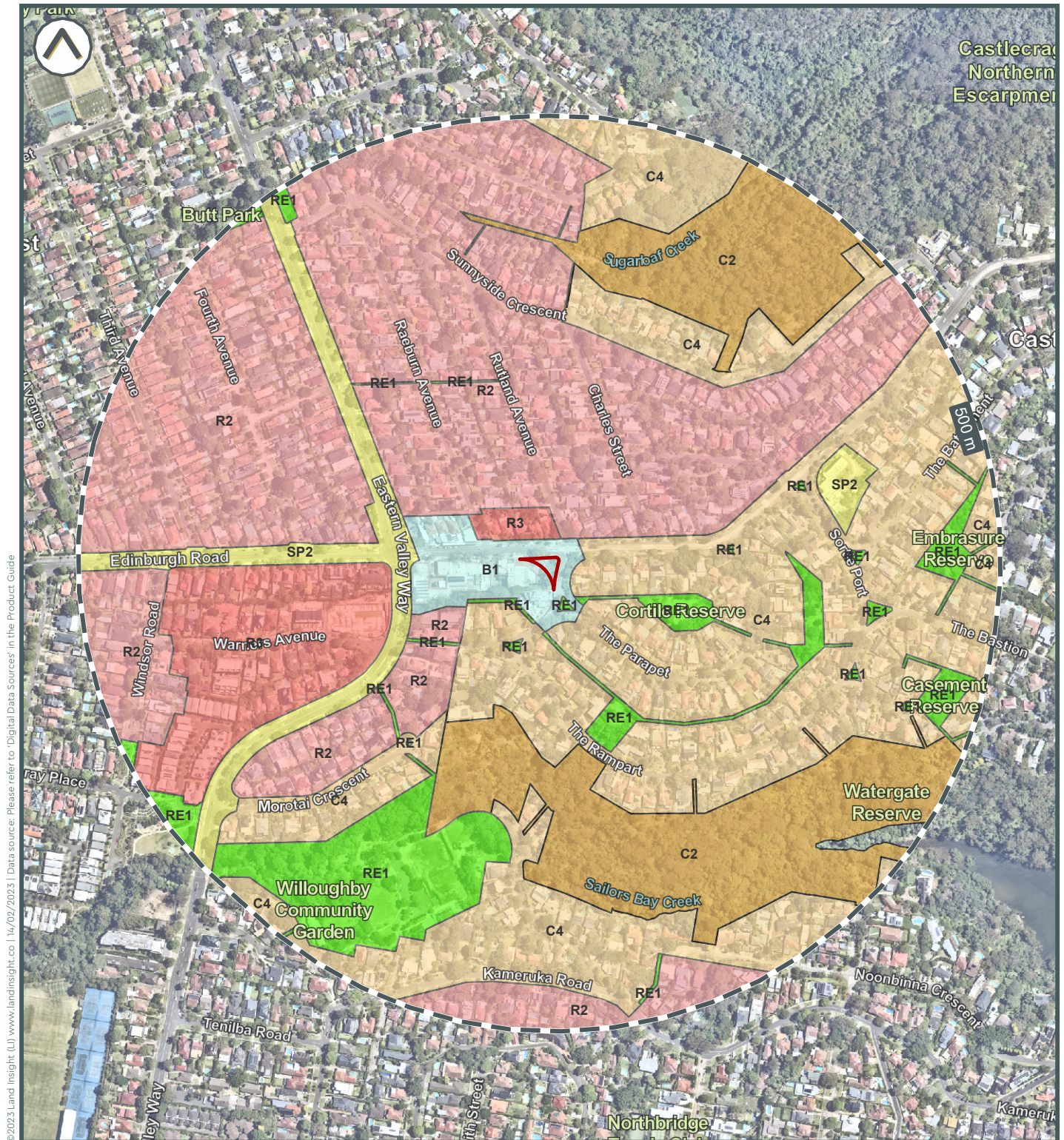
- Subject area
- Education
- Places of Worship and Religious Organisations
- Parks
- Sewer main
- Water main







Zoning



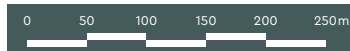




Planning Overlays



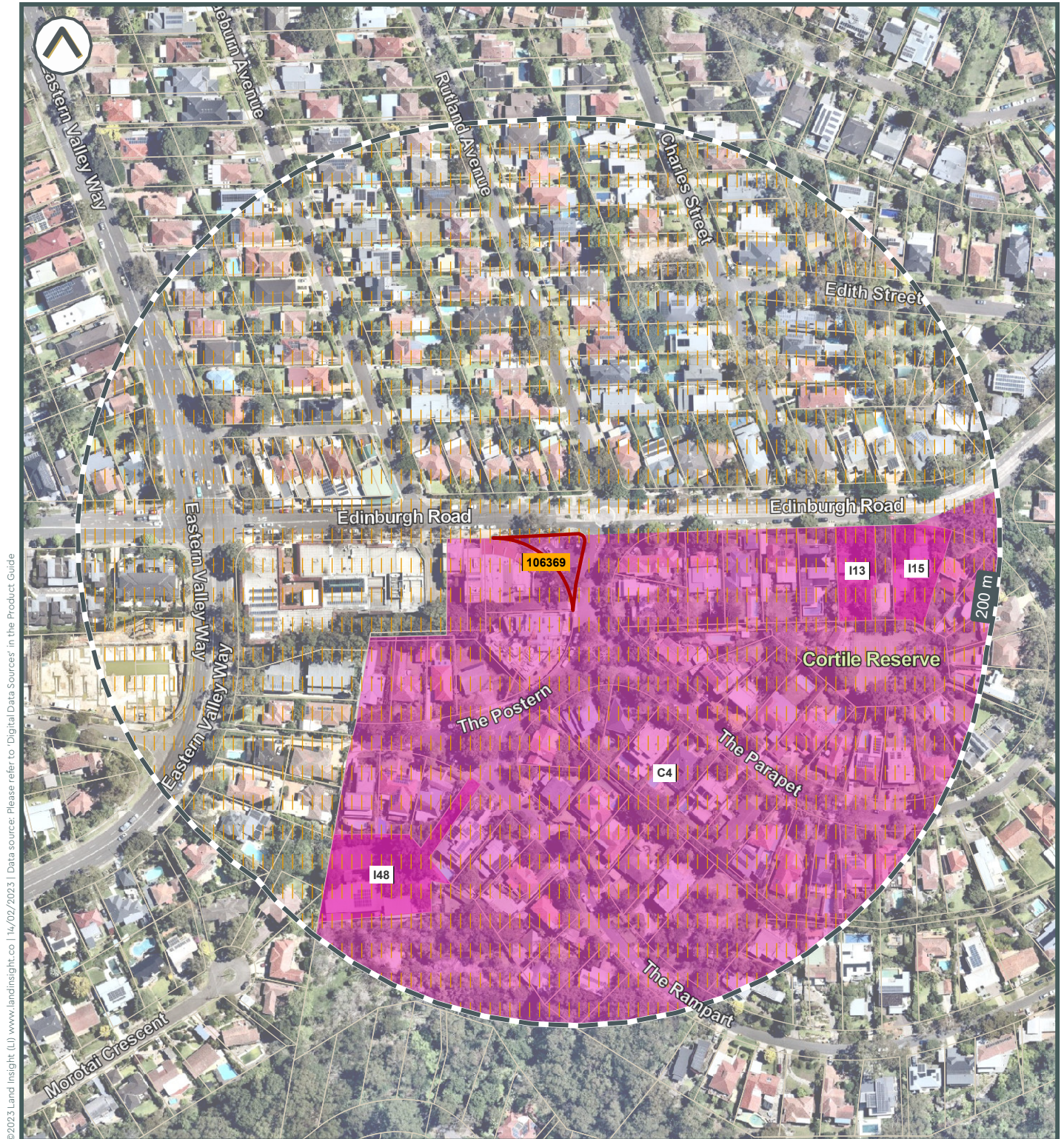
- |                                 |   |                              |                                    |                                 |
|---------------------------------|---|------------------------------|------------------------------------|---------------------------------|
| Subject area                    | State Environmental Planning Policy (Resilience and Hazards) 2021 | Acid Sulfate Soils           | Environmental Planning Instruments | Local Provisions                |
| Coastal Wetlands Proximity Area |   | Coal Seam Gas Exclusions     |                                    | Lot Size                        |
| Coastal Environment Area        |   | Foreshore Building Line      |                                    | Maximum Floor Space Ratio (n:1) |
| Coastal Use Area                |   | Height of Building           |                                    | Water Zoning                    |
|                                 |   | Land Reservation Acquisition |                                    | Wetlands Protection Area        |







Heritage



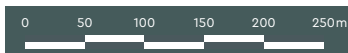
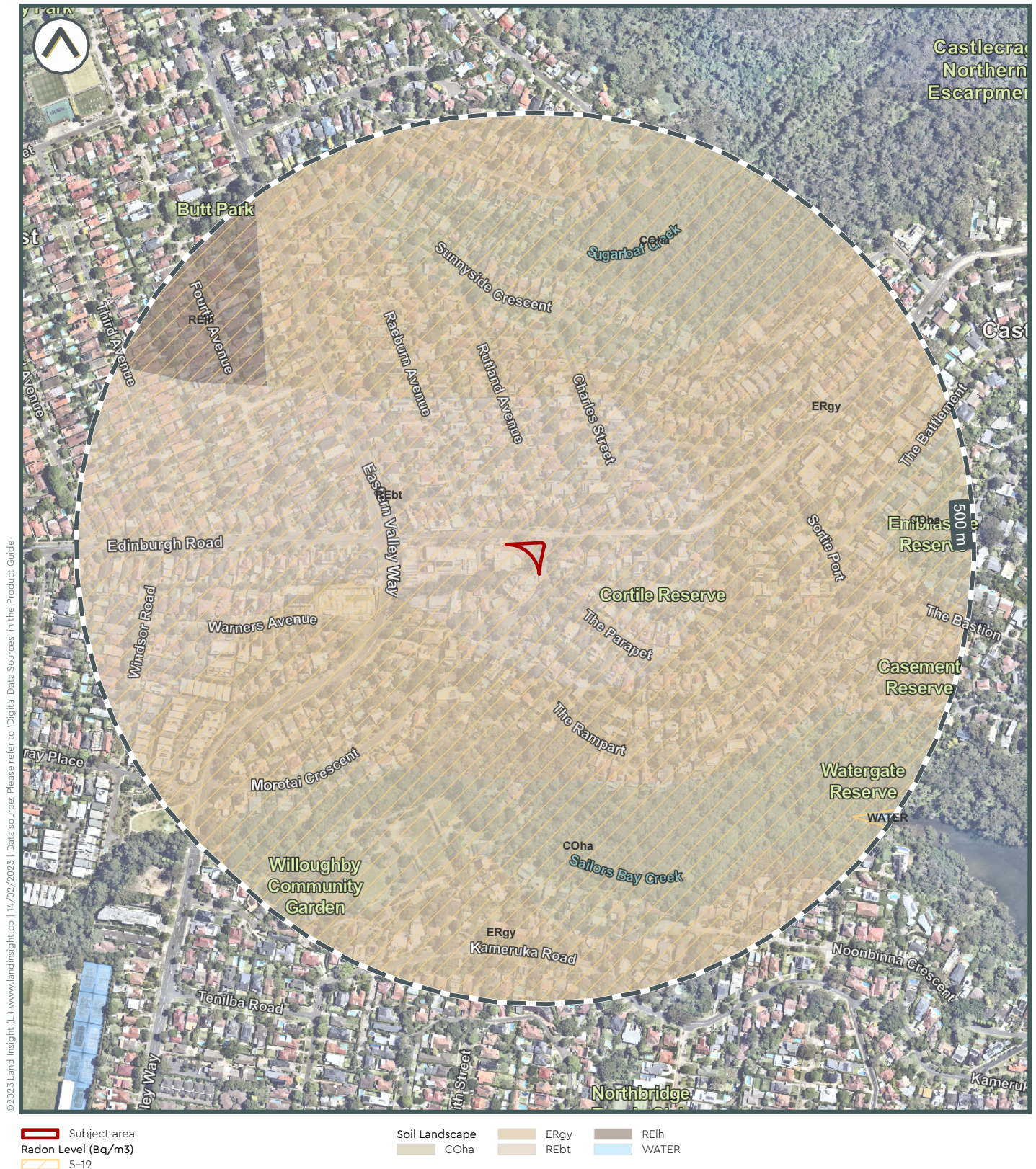
- Subject area
- National Heritage Database
- State and Local Heritage Registers
- National Heritage List
- Heritage Register







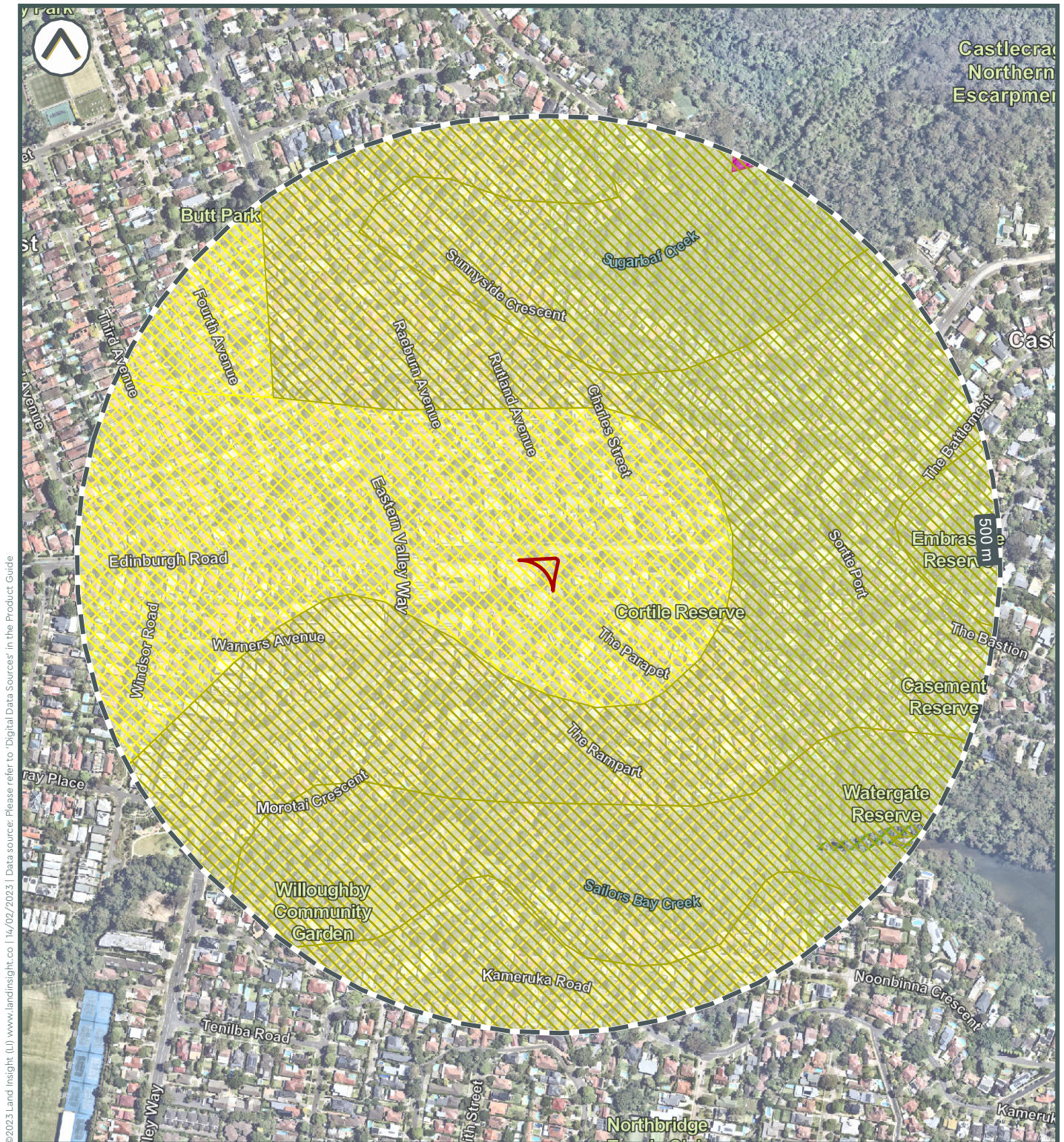
Soil Landscape and Salinity



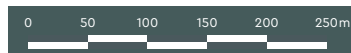




Acid Sulfate Soils



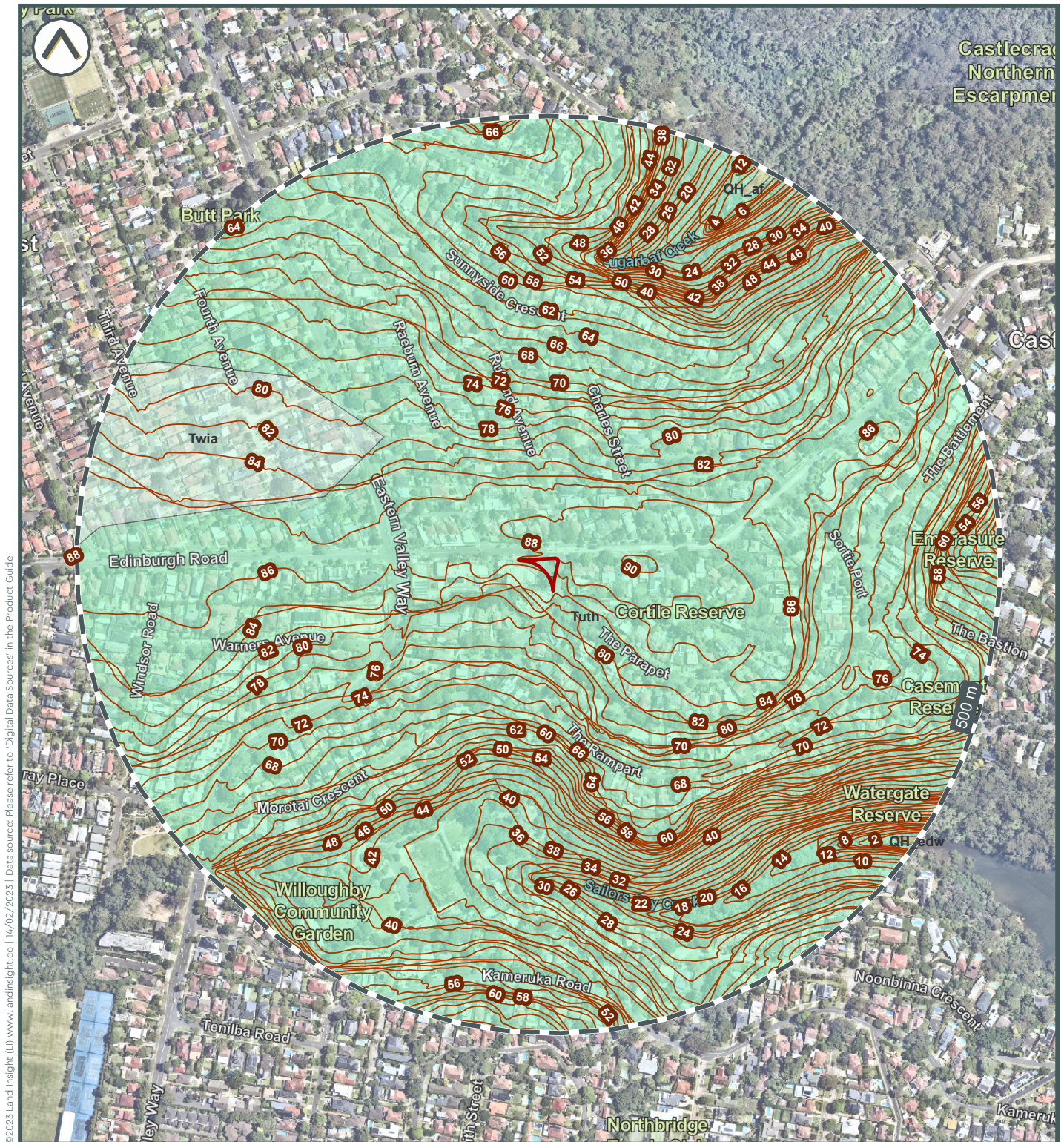
- |   |  |                                |
|---|--|--------------------------------|
| Subject area  | Coastal Acid Sulfate Soils Class 2           | Moderate to severe limitations |
| Atlas of Australian Acid Sulfate Soils High Probability of occurrence | Class 5                                      |                                |
| Low Probability of occurrence   | Inland Acid Sulfate Soils Severe limitations |                                |
| Extremely low probability of occurrence                               |  |                                |







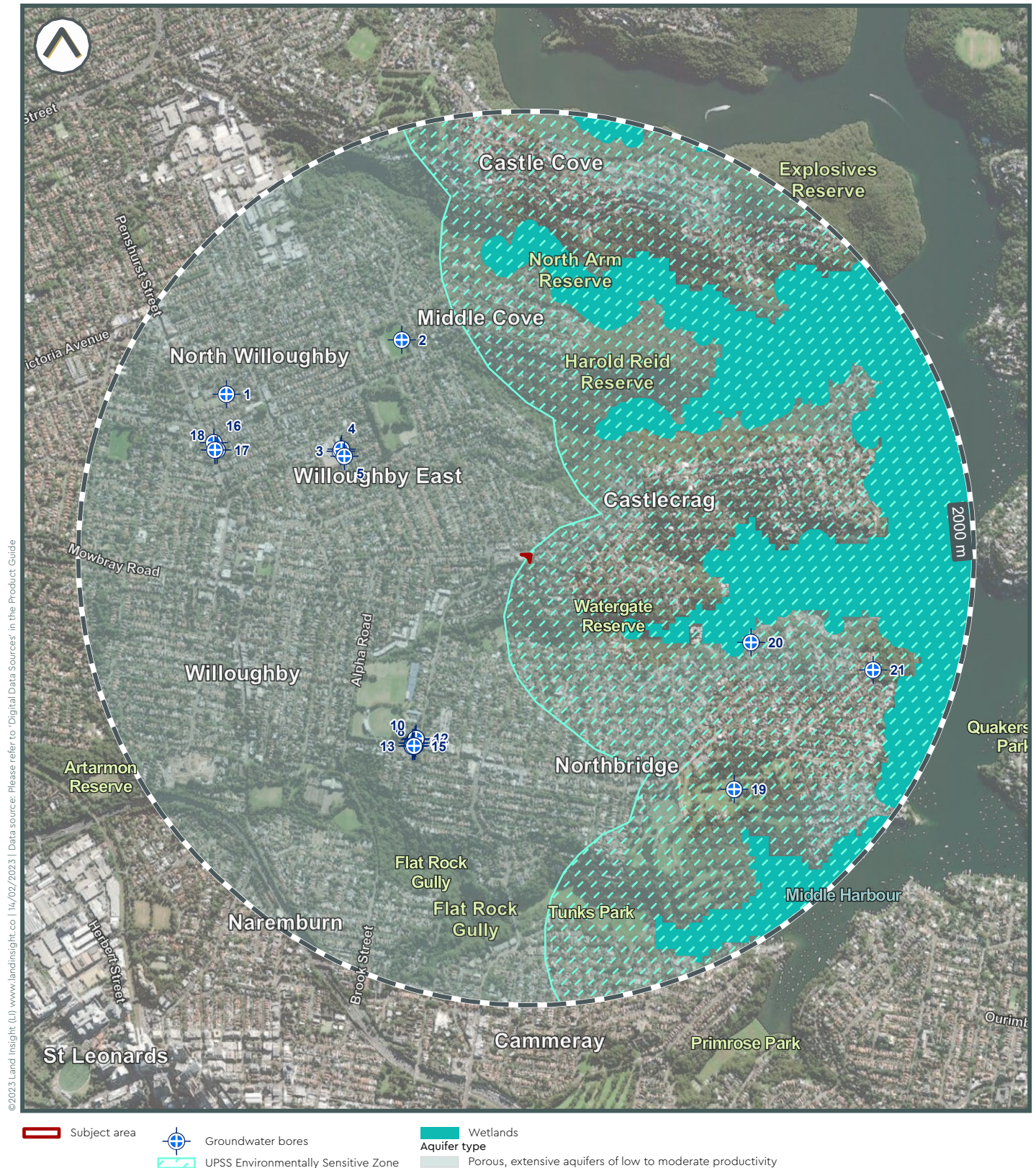
Geology and Topography



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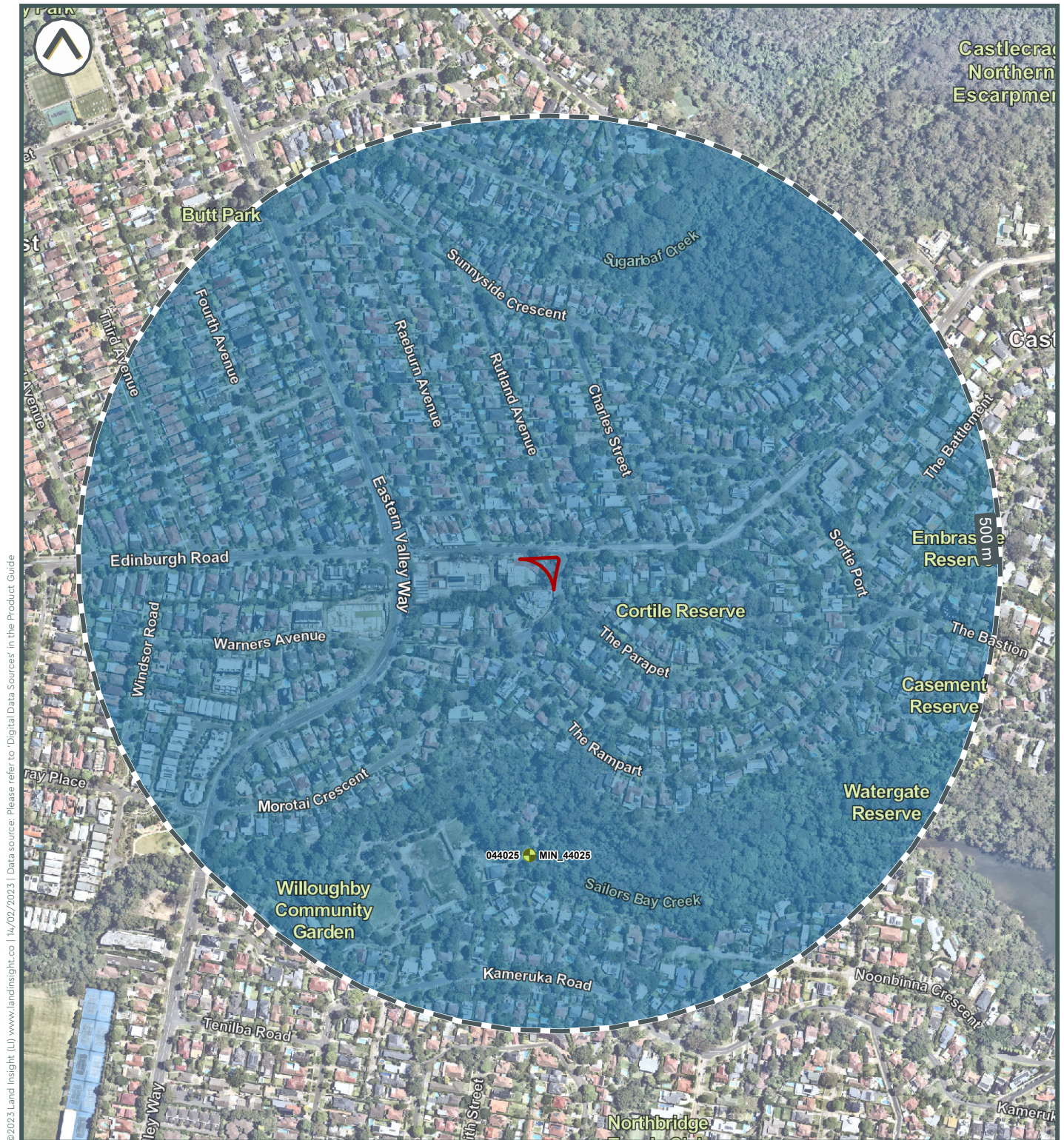


**Hydrogeology and Groundwater Boreholes**

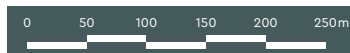




Hydrogeology and Other Boreholes



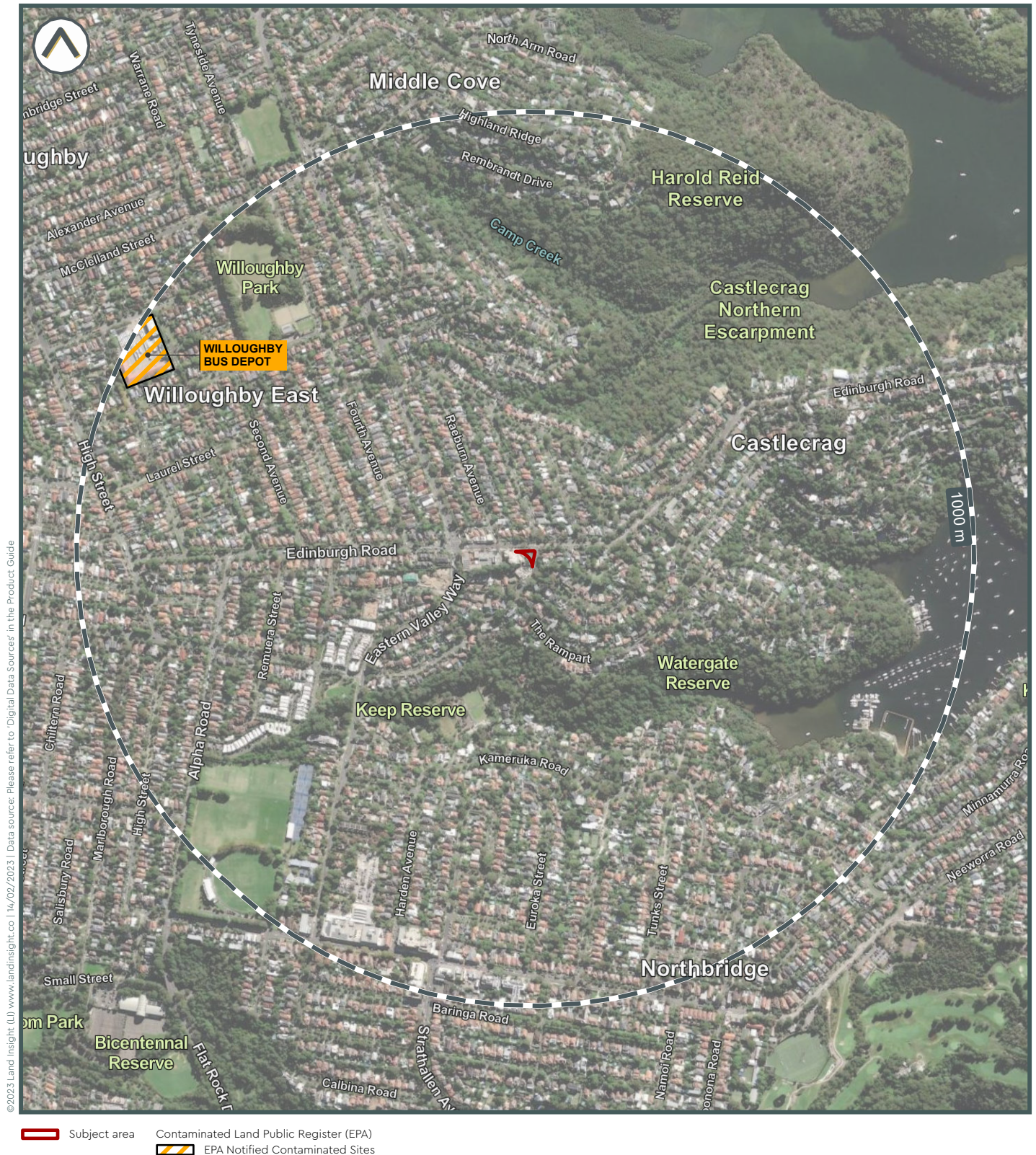
- Subject area
- Other borehole/monitoring well location
- Hydrogeologic Unit
  - Late Permian/Triassic sediments (porous media – consolidated)







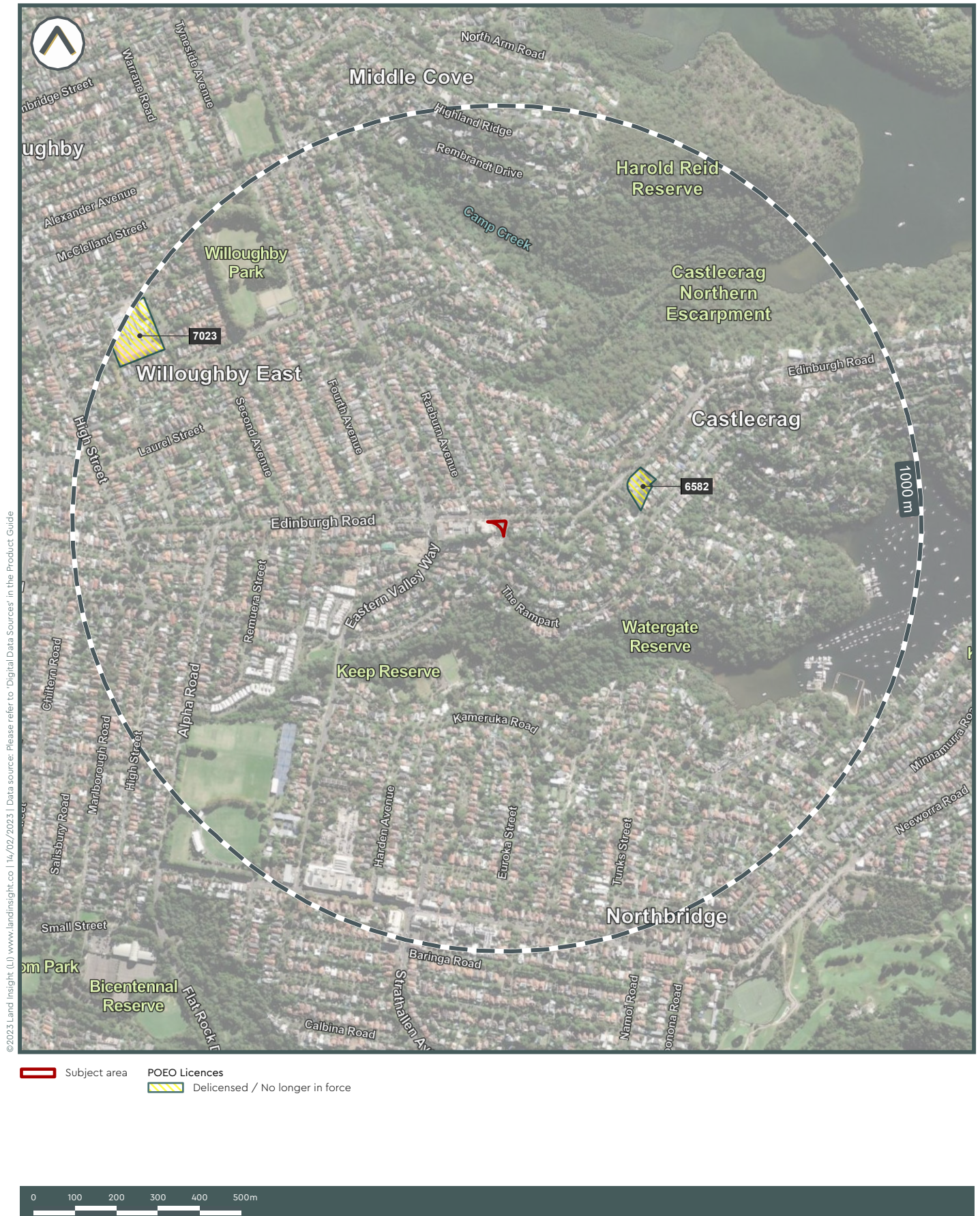
Contaminated Land Public Register







**Licences, Approvals & Assessments**







**Sites Regulated by Other Jurisdictional Body**



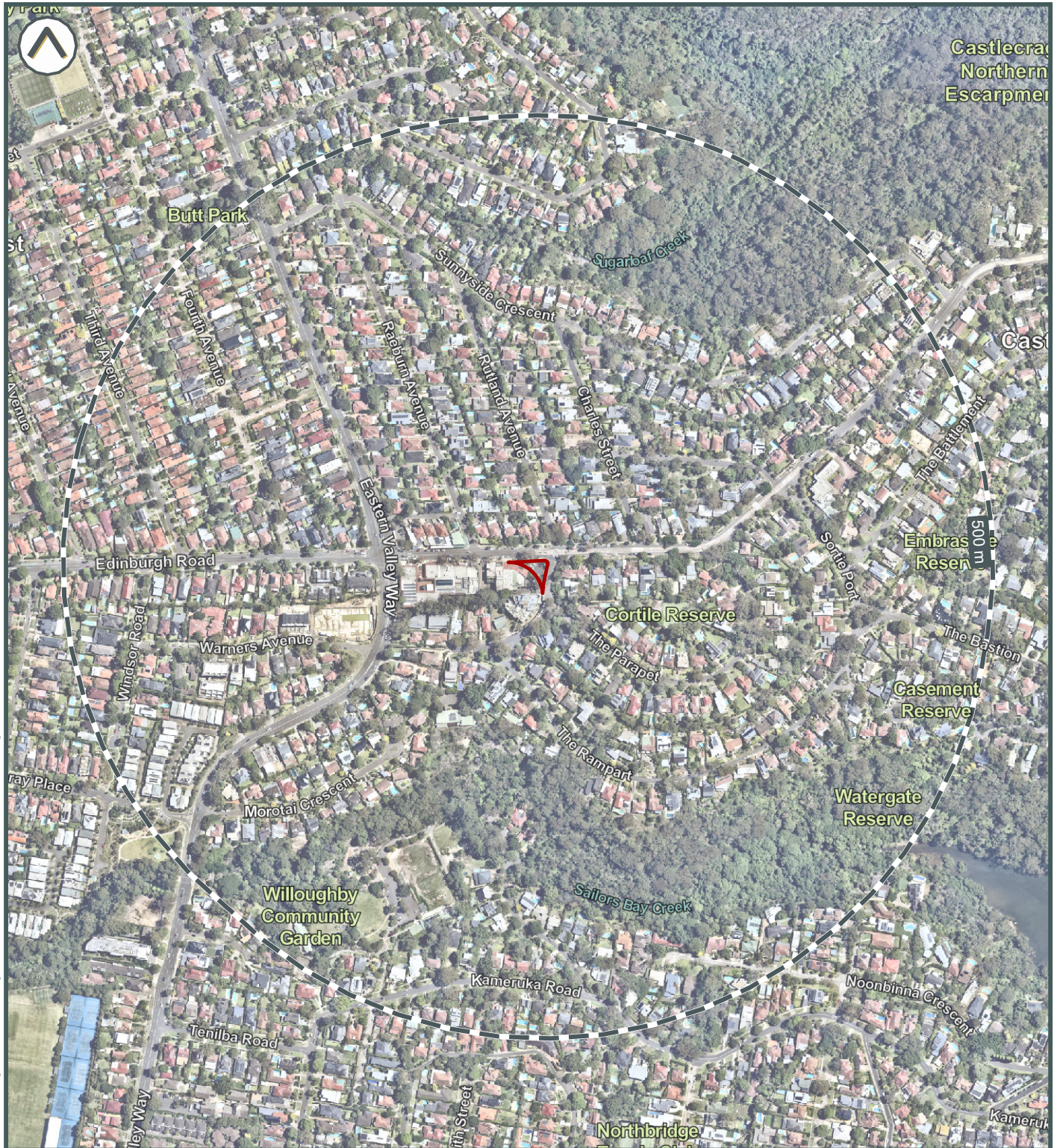
- Subject area
- PFAS sites
- Former Gasworks
- Defence Area / Military Sites



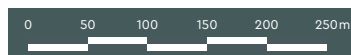




**Other Potential Pollution Sources**



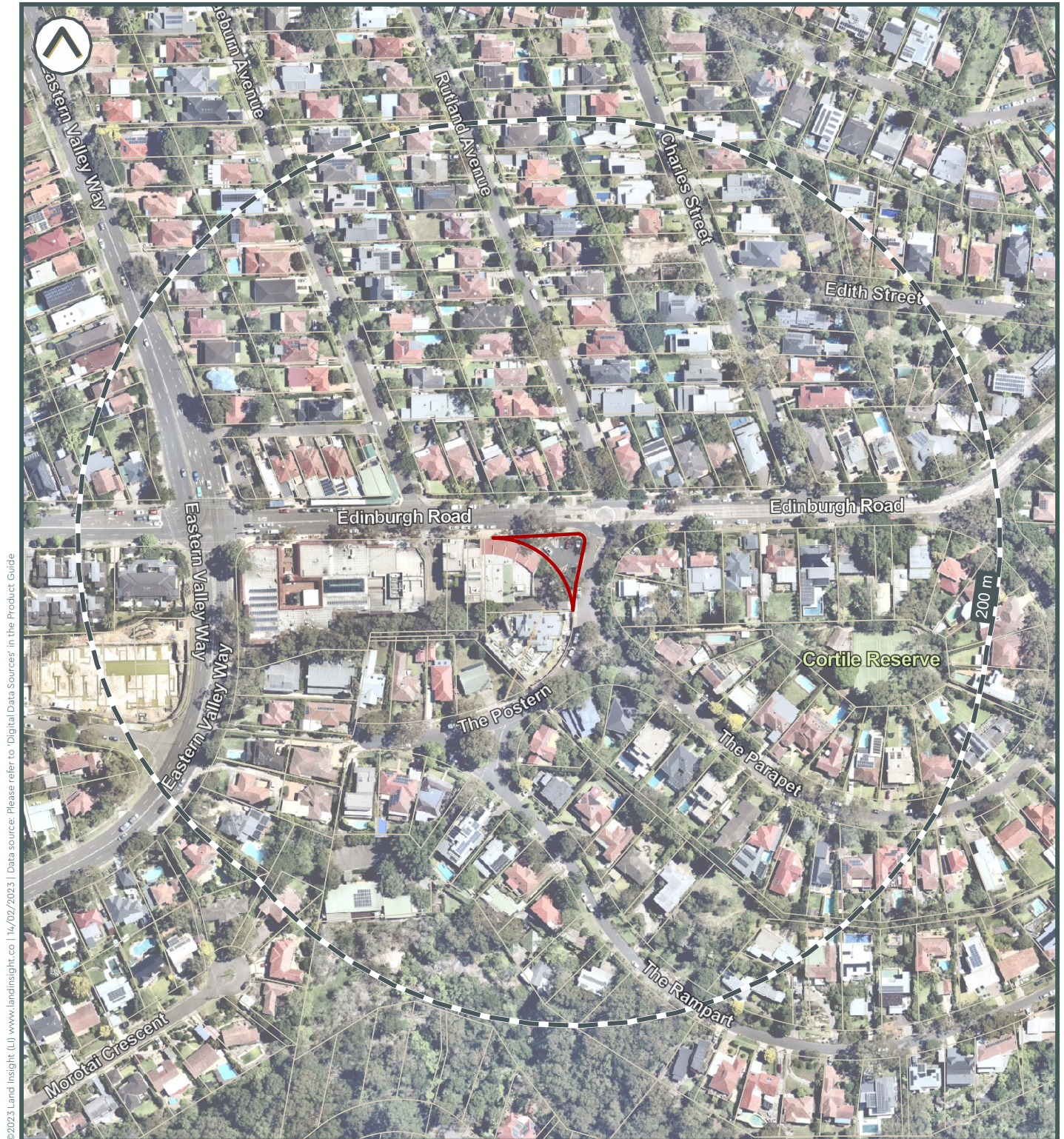
Subject area







Potentially Contaminating Activities (PCAs)



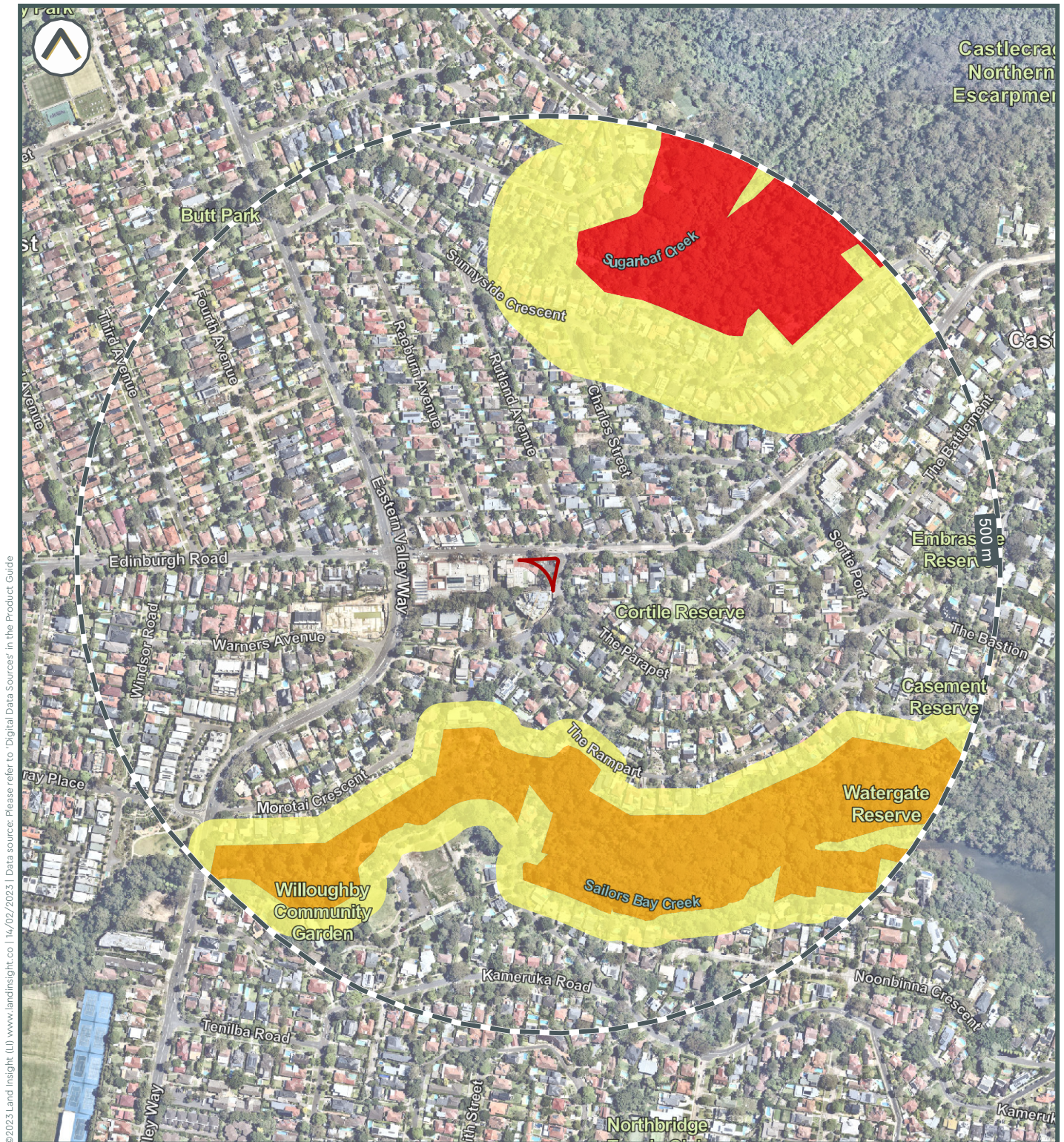
- Subject area    Fuel Terminals & Depots    Waste and Recycling Facilities  
Petrol Stations



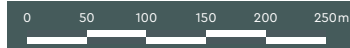




Fire Hazards



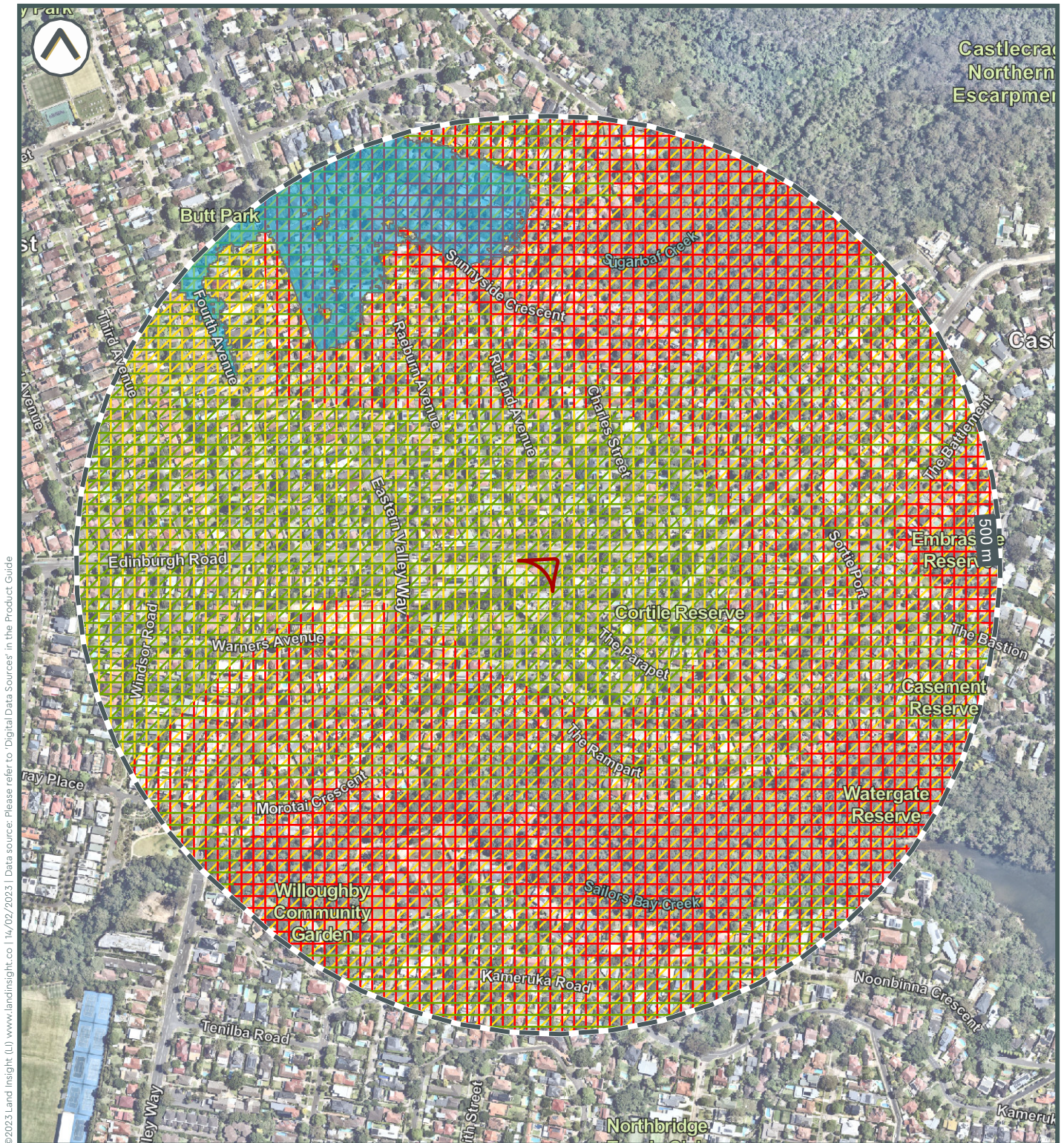
- Subject area
- Vegetation Buffer
- Bushfire Prone Area
- Vegetation Category 1
- Vegetation Category 2



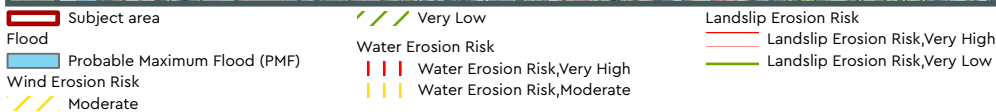




**Flood and Erosion Hazards**



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