

# Willoughby City Council Preliminary Site Investigation

316 Penshurst Street, North Willoughby, NSW 2068

**Purpose:**

To provide a preliminary site investigation to establish the likelihood of contamination at the site as well as the potential for more detailed site investigation in support of planned rezoning.

**Prepared for:**

Willoughby City Council

**Document Date:**

31 March 2023


**Reference:**

S-05152.PSI.001\_316 Penshurst Street, North Willoughby NSW 2068\_20230310

<b>Author Name</b>	Israel Doyi
<b>Mobile</b>	0405184578
<b>Email</b>	Israel.Doyi@edp-au.com
<b>Website</b>	www.edp-au.com

## DOCUMENT CONTROL

Project Details:	
Report Name:	Preliminary Site Investigation, 316 Penshurst Street, North Willoughby
Client Name:	Willoughby City Council
EDP Reference:	S-05152.PSI.001
Prepared By:	Israel Doyi
Reviewed By:	Hamish Donovan

Revision No.:	Revision Date:	Reason for Issue:	Authorised:	
			Name and Position:	Signature:
I	17/03/2023	First Draft to Client	Mark Challoner Principal Environmental Consultant	

## CONTENTS

Executive Summary.....	v
1. Introduction and Background.....	1
2. Objectives .....	1
3. Scope of Works.....	1
4. Constraints and Data Gaps.....	2
5. Previous Environmental Reports.....	2
5.1 Soil Validation Report, BP Willoughby Service Station.....	2
5.2 Monitoring Well Install and Groundwater Monitoring Event – BP Willoughby Station .....	3
6. Site Information .....	3
6.1 Site Identification .....	3
6.2 Site Description.....	4
6.3 Surrounding Land Use .....	4
7. Environmental Setting .....	4
7.1 Topography and Drainage .....	4
7.2 Soil Landscape.....	4
7.3 Geology .....	4
7.3.1 Salinity .....	5
7.4 Acid Sulfate Soils .....	5
7.5 Hydrogeology .....	5
7.5.1 Aquifers and Groundwater .....	5
7.5.2 Groundwater Bores .....	5
7.6 Proximity to Local Sensitive Environments .....	6
7.7 NSW EPA Contaminated Lands Database.....	6
7.8 NSW EPA Notices, Approvals and Licences .....	6
7.9 Regulated Sites .....	6
7.10 Council Planning Certificate.....	6
7.11 Natural Hazards .....	7
8. Technical Framework.....	7
9. Site History .....	7
9.1 Historical Aerial Photograph Review .....	7
9.1.1 Key land-use changes on-site .....	8
9.2 Site Visit.....	9
10. Preliminary Conceptual Site Model .....	9
10.1 Potential sources of on-site contamination .....	10
10.2 Contaminants of potential concern (CoPC).....	10
10.3 Potential migration pathways.....	10
10.4 Sources to Sensitive Receptor Linkages .....	11
10.4.1 Human Receptors and Pathways:.....	11
10.4.2 Ecological Receptors and Pathways.....	11

11. Discussion & Conclusion.....	11
12. Recommendations.....	11
Statement of Limitations .....	13
Appendix A: Figures and photolog.....	14
Appendix B: LIR Enviro-Screen Report.....	15
Appendix C: LIR Historical Aerial Photographs.....	16
Appendix D: LIR Report Maps.....	17



## GLOSSARY OF TERMS

Abbreviation	Definition
ACM	Asbestos containing material
AEC	Area of Environmental Concern
AHD	Australian Heights Datum
BTEXN	Benzene, toluene, ethylbenzene, xylene, and naphthalene
CBD	Central Business District
CLM	Contaminated Lands Management
CoPC	Contaminant of Potential Concern
CSM	Conceptual Site Model
DP	Deposited Plan
EDD	Environmental due diligence
EDP	EDP Consultants Pty Ltd
EPA	Environmental Protection Authority
GME	Groundwater monitoring event
LATMP	Long term asbestos management plan
LGA	Local Government Area
LNAPL	Light non-aqueous phase liquid
NEPM	National Environmental Protection Measures
NSW	New South Wales
PAH	Polycyclic aromatic hydrocarbons
Pb	Lead
PFAS	Per- and poly-fluoroalkyl substances
PCAs	Potentially Contaminating Activity
PSI	Preliminary Site Investigation
QA/QC	Quality Assurance / Quality Control
SEPPs	State Environmental Management Plans
SWMS	Safe Work Method Statement5
TRH	Total Recoverable Hydrocarbons
UPSS	Underground petroleum storage system
UXO	Unexploded ordinance
WCC	Willoughby City Council

## EXECUTIVE SUMMARY

EDP Consultants Pty Ltd (EDP) was engaged by Willoughby City Council to undertake a Preliminary Site Investigation (PSI) at 316 Penshurst Street, North Willoughby NSW 2068 (the Site) to assess the potential risks resulting from current and/or historical site uses and support the rezoning of the site. EDP are of the understanding that WCC do not own the site, and the site is owned and operated by BP Australia Pty Ltd (BP).

In this PSI, EDP's objective was to establish the likelihood of contamination at the site as well as to determine whether a detailed site investigation is required to support and inform rezoning decisions by WCC from the current B2 – Local Centre to B2 and RE1 – Public Recreation. To achieve these objectives, EDP prepared this PSI which comprised a desktop study, site visit, review of previous investigations, development of a conceptual site model and a conclusion on contamination risk for the current and future land uses.

The site lies within the legal boundaries of Lot 1 in Deposited Plan (DP) 4704 and has an approximate area of 780 m<sup>2</sup>. The immediate surroundings are zoned B2 – Local Centre with retail commercial outlets to the north and east, and R3 - medium density residential to west and south. A review of the site history and database searches indicated that the site has existed as a fuel service station since 1964 to present.

EDP reviewed the findings of JBSG soil validation report for a portion of the site where former underground petroleum storage systems (UPSS) had been replaced. The validation report identified the presence of ACM in the fill material and suspected further asbestos within fill material in other parts of the site. A Long-Term Asbestos Management Plan (LTAMP) is being implemented to address the presence of ACM at the site. The review additionally indicated exceedances in TRH >C<sub>10</sub>-C<sub>16</sub> less naphthalene near the former UPSS (tanks). The soil validation report considered the exceedance to be *“limited and the potential impact not considered to pose unacceptable ecological risk”*. The soil validation report further concludes that the site is suitable for future ongoing commercial / industrial land-use as an operational service station.

EDP was not granted formal access to the site to conduct a site inspection. EDP would describe its attendance as a 'site visit' which made observations on the accessible forecourt and retail areas only (and not detailed inspection of UPSS systems, pits, traps, drainage, or oil/water separator systems etc). Investigation reporting data gaps also exist prior to and after 2020 when the JBSG validation report was prepared.

Due to the known and suspected contamination at the site, the existence of reporting data gaps, and limitations to EDP's site visit, the risk profile of the site is considered **MODERATE** for both the current land use, and potential future land use. It is recommended further investigation be undertaken on-site to characterise the contamination status of the site. In the event accessing the site cannot be easily attained to conduct intrusive investigations, EDP also recommends that three monitoring wells are installed by WCC in nearby public lands / reserves immediately up and down the hydraulic gradient and recommend groundwater monitoring be conducted on these off-site wells to determine if any off-site migration of contaminants of potential concern (CoPC) has occurred.

Based on EDP's findings, findings of previous investigations (JBSG, 2020) and uncertainties on the current contamination status, the land is contaminated and unsuitable in its current state for a future 'B2 and RE1 – Public Recreation' zoning. However, the land can be made suitable for a B2 and RE1 – Public Recreation zoning after further investigation and remediation.

## I. INTRODUCTION AND BACKGROUND

EDP Consultants Pty Ltd (EDP) was engaged by Willoughby City Council (WCC) to undertake a Preliminary Site Investigation (PSI) at 316 Penshurst Street, North Willoughby NSW 2068 (the site) to assess the potential risks resulting from current and/or historical site uses. The PSI was requested by Willoughby City Council for the site, as part of initial investigations to support proposed rezoning plans from the current 'B2 – Local Centre' to 'B2 and RE1 – Public Recreation' which includes new public open space.

It is understood that WCC does not own the subject site. As a result, EDP was not granted formal access to the site by the site occupier to conduct a site visit and the information gathered by EDP relies on information and data provided by WCC - and no data or information has been gathered from the occupier of the site. Due to the absence of formal authorisation for the works from the site occupier, EDP conducted a site visit to the publicly accessible forecourt and retail areas only.

The site is currently operated by BP Australia Pty Ltd (BP) as service station with retail store, canopy, refuelling facilities and concrete hardstand. The service station provides as a parking lot for private cars.

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

## 2. OBJECTIVES

The objective of this project is to provide a preliminary understanding of the contamination status of the site and determine 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 potentially contaminating activities;
- Identify potential contamination types;
- Discuss the current site condition;
- Provide preliminary assessment of site contamination;
- Assess the need for further investigations; and
- Inform future sampling strategies (if required).

## 3. SCOPE OF WORKS

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

- Desktop study including a review of historical information comprising;
  - Historical aerial photographs;
  - Recent imagery from Nearmap;
  - Current and historical land titles;
  - Geological and topographical maps;
  - Hydrogeological information;
  - Online public records; and
  - Areas of environmental interest.
- Site visit including preparation a Safe Work Method Statement (SWMS);
- Preparation of this PSI report detailing the findings of the investigation, including a preliminary CSM and recommendations for additional assessments for the site, if required.

## 4. CONSTRAINTS AND DATA GAPS

In preparation of this PSI, several constraints and data gaps were encountered which caused uncertainties when appraising the site. Conclusions and recommendations provided in this PSI have been provided with consideration of the following and any other information contained in this preliminary site investigation as follows:

- Reliance on both *Soil Validation Report* (JBS&G, 2020) and *Monitoring Well Install and Groundwater Monitoring Event* (JBS&G, 2020) have not been extended to EDP as part of this assessment. EDP therefore assumes no responsibility for the quality and accuracy of data obtained from third party sources.
- EDP was not granted formal access to the site by BP to conduct an inspection. EDP therefore conducted a site visit to make high level observations of the publicly accessible forecourt and retail shop areas only. EDP was unable to access or inspect pits, fill points, lids, drains, traps, wells, back of store etc or any area not in normal public view.
- No other documents on the operations of the service station were accessed for input into this PSI in exception of the *Soil Validation Report* (JBS&G, 2020) and *Monitoring Well Install and Groundwater Monitoring Event* (JBS&G, 2020, that were obtained from WCC. EDP understands that *Soil Validation Report* (JBS&G, 2020) was conducted in the specific area relating to the excavation and replacement of the underground petroleum storage system (UPSS). No recent report has been made available which investigates and provides comment on the suitability of the site as a whole.
- A data gap in the site condition exists prior to and since 2020 when the JBS&G UPSS validation report and GME were conducted. Any environmental investigations conducted on the site prior to 2020 and between 2020 to present were not available to EDP.

## 5. PREVIOUS ENVIRONMENTAL REPORTS

WCC provided EDP with a copy of the:

- *Soil Validation Report, BP Willoughby Service Station, 316 Penshurst Street, North Willoughby, NSW, Report Number 58147-132987* dated October 2020, prepared by JBS&G Australia Pty Ltd (JBS&G, 2020); and
- *Monitoring Well Install and Groundwater Monitoring Event – BP Willoughby Station, 316 Penshurst Street, North Willoughby NSW, Report Number 58147-133163* dated October 2020 prepared by JBS&G Australia Pty Ltd (JBS&G, 2020).

These reports have been considered in sections 5.1 and 5.2, below:

### 5.1 Soil Validation Report, BP Willoughby Service Station

The *Soil Validation Report, BP Willoughby Service Station, 316 Penshurst Street, North Willoughby, NSW, Report Number 58147-132987* dated October 2020, prepared by JBS&G Australia Pty Ltd (JBS&G, 2020) documented the excavation and off-site removal of the former underground storage tanks (UST) 'EX1', 'EX2', 'EX3', 'EX4', fuel lines, vent line, fill point and TPI, TP6 to TP8 which targeted residual historical tank farm sediment which remained in situ following previous upgrades under the BP underground tank maintenance program (UTMP), and subsequent validation of the excavation prior to the construction and installation of new USTs.

The report identified that:

- Petroleum constituents (Total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene and xylenes (BTEX), naphthalene and lead (Pb) in soil samples from the excavation walls and base, dispensers, canopy footing, vent lines were generally below concentrations adopted for ecological site assessment criteria. The three samples which failed the adopted NEPM 2013 ESL – Commercial and Industrial Fine Soil (170 mg/kg) criteria by registering exceedance for TRH >C<sub>10</sub>-C<sub>16</sub> less naphthalene were collected from the walls of the main tank farm, fuel line footprint, and a historical fuel tank location, beneath a concrete slab.
- Sandy clay soil samples were encountered at the former fill point contained moderate to strong hydrocarbon odour and grey staining. Samples at the fuel vent lines were observed to have slight hydrocarbon odour and grey staining.
- The potential ecological risks from exceedances identified at site locations underneath a concrete slab are not considered to pose unacceptable ecological risk.

- Asbestos fragments and other anthropogenic intrusions were identified in existing reworked clay filled material, and potentially, asbestos impacted fill likely remained in situ at other parts of the site.
- A separate Long-term Asbestos Management Plan (LTAMP) was prepared to address the asbestos find. The report on validation program on soil sampling and analysis deemed the site suitable for future ongoing commercial/industrial land-use as an operational service facility, within the limitations stated and the adopted criteria NEPM 2013 ESL – Commercial and Industrial Fine Soil.

## 5.2 Monitoring Well Install and Groundwater Monitoring Event – BP Willoughby Station

The *Monitoring Well Install and Groundwater Monitoring Event – BP Willoughby Station, 316 Penshurst Street, North Willoughby NSW*, Report Number 58147-133163 dated October 2020 prepared by JBS&G Australia Pty Ltd (JBS&G, 2020) comprised part of the investigations to support the installation of the new UPSS.

The report identified that;

- No light non-aqueous phase liquids (LNAPL), odours or sheens were observed in groundwater underlying the site;
- Groundwater analytical results indicate that concentrations of TRH and BTEX and Naphthalene were below the assessment criteria and/or the laboratory's limit of reporting for all constituents;
- Adopted criteria included:
  - Freshwater ecosystems, 95% species protection levels provided in ANZG (2018); and
  - Groundwater HSLs for vapour intrusion, CLAY 4 to <8 m depth – NEPC (2013), health screening level for commercial/industrial use (HSL D).
- Soil analytical results indicate that concentrations of TRH, BTEX and Naphthalene and Lead were below the adopted assessment criteria and/or the laboratory's limit of reporting for all constituents;
- The monitoring well network and subsequent groundwater monitoring event (GME) meets UPSS Regulation (2019), and confirms groundwater condition following UPSS and validation works;
- Quality Assurance / Quality Control (QA/QC) assessment of the analytical soil and groundwater data indicated that the dataset was suitable for the purposes of the assessment.
- The *Monitoring Well Install and Groundwater Monitoring Event (JBS&G, 2020)* stated that “the site is suitable for ongoing service station with the next GME undertaken within 6 months”. EDP have not been provided this document and cannot confirm if it was undertaken.

## 6. SITE INFORMATION

### 6.1 Site Identification

Site identification details for 316 Penshurst Street, North Willoughby NSW 2068 are summarised in **Table I** and the location of the site and investigation area is shown on **Figure I**, provided in **Appendix A**.

**Table I: Site Identification**

Site Identification	
Site Owner	Privately owned
Site Address:	316 Penshurst Street, North Willoughby NSW 2068
Legal Identification:	Lot DP4704
Local Government Area:	Willoughby City Council
Site Area:	777 m <sup>2</sup>
Current Zoning:	B2 – Local Centre
Current Land Use:	Service station
Locality Map	Figure I
Site Layout	Figure I

## 6.2 Site Description

Based on visual observations during the site visit by EDP consultants on 10 March 2023 alongside review of available aerial imagery, the key site features are as follows:

- Two permanent structures occupy the northern and southern sections of the site:
  - the structure located in the northern section of the site serves as the retail shop and
  - the structure in the southern section of the site is the canopy over fuel pumps.
- The site has concrete and asphaltic hardstand with the central section of the site serving as a parking space for vehicles.
- Vegetation, shrubs and large trees are located on the eastern section of the site. This dense vegetation separates the site from Sydney Street that intersects with Penshurst Street.

The layout of the site is shown on **Figure 1** as provided in **Appendix A** and photographs taken during the site visit are provided in **Appendix D**.

## 6.3 Surrounding Land Use

The site was located within a commercial area of the suburb of North Willoughby. The site was bound to the:

- **North:** by the intersect of Penshurst Street and Sydney Street with commercial structures within B2 - Local Centre zone with an R2 - low-density residential development area beyond.
- **East:** by Penshurst Street within B2 - Local Centre zone with R2 - low density residential area beyond.
- **South:** by commercial buildings within local centre zone with R3 - medium density residential area beyond.
- **West:** by Sydney Street with a R3 - medium density residential area beyond.

# 7. ENVIRONMENTAL SETTING

## 7.1 Topography and Drainage

A review of the Enviroscreen report from Land Insight accessed 14 February 2023, indicated that the site is located at an elevation of approximately 102 m Australian Height Datum (AHD), sloping towards the north. Surface water run off (either as overland flow or run-off into the stormwater network) is expected to flow generally north and outflow at Scotts Creek, 550 m north of the site. Scotts Creek is the nearest surface water body to the site and is a tributary to Fig Tree Cove located 2 km east of the site.

## 7.2 Soil Landscape

A review of the soil landscape information from the Enviroscreen report accessed 14 February 2023, indicated that the Blacktown (Residual) soil landscape existed at the site described as follows:

- 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) hard setting mottles texture contrast soils, red and brown podzolic soils on lower slopes and in drainage lines; and
- Limitations – localised seasonal waterlogging, localised water erosion hazard, moderately reactive highly plastic subsoil, localised surface movement potential.

## 7.3 Geology

The local geology on site consists of Ashfield Shale formation of black to light grey shale and laminite.

A review of the Enviroscreen report from Land Insight accessed 14 February 2023, indicated that the geology consists of Hawksbury sandstone formation of medium-to-coarse grained quartz sandstone with minor shale and laminate lenses.

Additional detail provided in Enviroscreen report in **Appendix B**.

Review of the Soil Validation Report (JBS&G, 2020) suggests fill material at site is approximately up to 1.35 m thickness consisting mostly of reworked silty clay, gravel and sand underlain by shale and laminite.

### 7.3.1 Salinity

Areas susceptible to salinity are usually at low locations in the landscape, such as floodplains, in the valley floors, or at a foot of a ridge. The Office of Environment and Heritage NSW Soil and Land Information System contains data points pinpointing evidence of soil salinity at areas which have previously been sampled. Salinity hazard has been rated very high to moderate in the Western Sydney Hydrogeological Landscapes, however, based on the Enviroscreen report, salinity is not considered to be an issue for the site.

Additional detail provided in Enviroscreen report in **Appendix B**.

## 7.4 Acid Sulfate Soils

A review of Atlas of Australia Acid Sulfate Soils included in the Enviroscreen report from Land Insight accessed 14 February 2023 for the site, indicated that there was a low probability of occurrence of acid sulfate soils (ASS) occurring beneath the site. Spatial Portal NSW have ASS mapping and the Council include ASS assessment and mapping. However, given the absence of ASS in the Atlas of Australia, the elevation of the site and soil type, no further research on the ASS has been undertaken for the purposes of this PSI.

Based on the elevation and soil types on the site, there is a low risk of the occurrence of acid sulfate soils. Additional details are provided in Enviroscreen report in **Appendix B**. Refer to **Figure 3** for the Acid Sulfate Soil Map for the site location provided in **Appendix A**.

## 7.5 Hydrogeology

### 7.5.1 Aquifers and Groundwater

Groundwater migration is north to northeast with a reported velocity estimated between 0.0057 and 0.006 m/year (BP, 2017 as cited by JBS&G, 2020) with the slow migration attributed to a predominant bedrock soil profile (JBS&G, 2020).

A search of the New South Wales Department of Primary Industries (DPI) Office of Water Groundwater Works database online (<http://allwaterdata.water.nsw.gov.au/water.stm>) indicated the aquifer/s beneath the site and within the surround area as porous, extensive and of low to moderate productivity. The hydrogeological unit at the site and within the surrounding 500 m buffer area is described as Late Permian/Triassic sediments (porous media, consolidated). Groundwater flow is inferred to be north to northeast.

Additional detail provided in Enviroscreen report in **Appendix B**.

### 7.5.2 Groundwater Bores

A review of the New South Wales Department of Primary Industries (DPI) Office of Water Groundwater Works database online (<http://allwaterdata.water.nsw.gov.au/water.stm>), identified forty-eight registered groundwater bores within a 2,000 m radius of the site, used for exploration or research (monitoring), irrigation, recreation, and an unknown use water supply.

The closest groundwater bore for extractive purposes is located approximately 327 m southeast of the site (Bore ID# GW026513) and used for farm irrigation activities, with a final depth of 64 m and an installation date of 1 December 1966.

Additional detail provided in LIR Report in **Appendix B**.



## 7.6 Proximity to Local Sensitive Environments

No sensitive receptors for this site based on the review of the Enviroscreen report from Land Insight accessed 14 February 2023. A search of the Bureau of Meteorology Groundwater Dependant Ecosystem Atlas was undertaken and a place search for 'Willoughby' does appear in the atlas for a groundwater dependant ecosystem within 5 km.

## 7.7 NSW EPA Contaminated Lands Database

A search of the online NSW EPA Sites Notified as Contaminated Records of Notices, accessed 15 March 2023, indicated there were no recorded notices for the site, or land within 500 m of the site under Section 58 of the CLM Act 1997 (<https://app.epa.nsw.gov.au/prpoeoapp/>).

An additional review of the Enviroscreen report from Land Insight accessed 02 March 2023 indicated that 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. Due to the distance from the subject site and location down hydraulic gradient, this has not been considered further.

Additional details are provided in Land Insight's Enviroscreen report (February 2023) in **Appendix B**. did identify the site in the record.

## 7.8 NSW EPA Notices, Approvals and Licences

A search of the the NSW EPA public register under the POEO Act 1997 online (<https://app.epa.nsw.gov.au/prpoeoapp/>), found no NSW EPA notices, approvals or licences for the site.

The search accessed on 14 February 2023, indicated that the notices, approvals and licences within a 1000 m buffer of the site include:

- George Weston Foods Limited (licence #145) – surrendered licence for hazardous, industrial or group A waste generation or storage at 51 Alleyne St, Chatswood, NSW 2067, 663 m north of site;
- Intec Ltd (licence #10431) – surrendered license for hazardous, industrial or group A waste generation or storage at 21 Smith Street, Chatswood NSW 2067 870 m north to site;
- State Transit Authority of NSW (licence #7023) – delicensed for hazardous, industrial or group A waste generation or storage at Cnr Ann & Stan Streets, Willoughby NSW, 881 m northwest to the site.

However, based on review of these licences, it is determined that these processes have not occurred onsite, and it is unlikely these activities will impact the site because of the distance.

Additional detail provided in LIR Report in **Appendix B**.

## 7.9 Regulated Sites

A review of defence, military sites, and unexploded ordinance (UXO) areas did not identify the site as being regulated by other jurisdictional bodies. The search identified the following areas within the 2,000 m dataset buffer:

- Willoughby – Post WWII and on the re-raising of the CMF in 1948, 7th Field Regiment, RAA was reformed at Warrane Road, Willoughby. A depot/storage facility for field armaments was located approximately 757 m southeast of the site.
- North Shore - 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 664 m northeast to site and became redundant in 1970.
- Willoughby – Fire station built in 1915, located 784 m southeast to site. Potential historical use of PFAS.

However, based on the location and distance from the subject site, these regulated sites will not have an adverse environmental impact on the site. Additional detail provided in LIR Report in **Appendix B**

## 7.10 Council Planning Certificate

No Section 10.7 planning certificate under the Environmental Planning Assessment ACT 1979 and Section 10.7 (2) Certificate for the site was supplied by the Willoughby City Council.



## 7.1.1 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:

- Erosion Risk – Vulnerable land (very highly erodible) to water erosion risk and existing erosion/sedimentation located within the property and surrounding buffer area, moderate water erosion vulnerability onsite and moderate wind erosion risk exists within the 500 m buffer area;
- Flood Hazard – probable maximum flood area located within the surrounding 500 m buffer area.

Additional detail provided in Enviroscreen report in **Appendix B**.

## 8. TECHNICAL FRAMEWORK

The assessment was undertaken in general accordance with the following guidelines:

- 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; and
- National Environment Protection (Assessment of Site Contamination) Measure, Amendment, 2013 (NEPM 2013).

## 9. 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 interpretation of current and historical aerial photographs to ascertain any noteworthy changes to land use or site condition over time.

### 9.1 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
1930	The site is occupied by <u>several small buildings</u> which are to the west section of the triangular shaped site, sharing the border with an unnamed street. The east portion close to Peshurst street appears vacant.	The surrounding area appears as predominantly residential within the 500 m buffer area. A large building (AI 5), potentially an industrial/ commercial facility is located approximately 400 m west to the site. However, due to its distance has not been considered further.
1943	The small structures along the east section of the site have diminished in size and quantity.	The surrounding area is relatively unchanged from the 1930 aerial photograph in exception of new building 50 m east of the site.
1951	<u>Two large buildings (one partially adjoining the site) and two smaller appear on the site.</u> The small structures along the eastern boundary of the site are no longer present.	The surrounding area use remains residential.
1956	The site appears relatively unchanged from the 1951 aerial photograph.	Visible residential developments 400 m to the southeast of the site.

Year	Description of Site	Surrounding Land
1961	The site appears relatively unchanged from the 1956 aerial photograph.	A large building and a couple of residential blocks visible 400 m to the southeast of the site.
1965	<u>A new building, understood to be a service station (JBSG, 2020) facility) which almost completely occupies the whole site is visible.</u>	Redevelopment of AI 5 into a bigger, modern, and more complex facility commences.
1975	The site appears relatively unchanged from the 1965 aerial photograph.	Redevelopment of AI 5 A subdivided portion of AI 1 visibly undergoing redevelopment. There is a new structure, and the old structure is apparent to have been demolished.
1978	The site appears relatively unchanged from the 1965 aerial photograph.	Redevelopment (potentially a residential complex) of subdivided portion of AI 1 complete. Redevelopment of the site immediately north of AI 4 commences.
1991	Building at the site partially demolished or demolished and replaced with a smaller building.	Redevelopment of the site immediately north of AI 4 continues.
1994	The site appears relatively unchanged from the 1991 aerial photograph.	Site immediately north of AI 4 now a vacant lot, potential used a car park.
2002	Aerial photographs show redeveloped site with two new buildings (characteristic of a service station) at the north (retail shop) and south (canopy) sections of the site.	The surrounding area is relatively unchanged from the 1994 aerial photograph.
2004	The site appears relatively unchanged from the 2002 aerial photograph.	The surrounding area is relatively unchanged from the 1994 aerial photograph.
2007	The site appears relatively unchanged from the 2002 aerial photograph.	The surrounding area is relatively unchanged from the 1994 aerial photograph. However, it is visible that cars are no more being parked at the vacant site close to AI 4.
2011	The site appears relatively unchanged from the 2002 aerial photograph.	The surrounding area is relatively unchanged from the 2007 aerial photograph.
2014	The site appears relatively unchanged from the 2002 aerial photograph.	The surrounding area is relatively unchanged from the 2007 aerial photograph.
2017	The site appears relatively unchanged from the 2002 aerial photograph.	The surrounding area is relatively unchanged from the 2007 aerial photograph.
2020	Redeveloped service station with two new structures at the north (retail shop) and south (canopy) sections of the site, replacing the old ones.	The surrounding area is relatively unchanged from the 2007 aerial photograph.
2023	The site continues to exist as a fuel service station.	Buildings/structures on AI 4 with the vacant lot razed down. Aerial photographs depict an area undergoing earth works and subsequent development. AI 2 and AI 3 still exist, as the only areas of interest, relatively untouched.

### 9.1.1 Key land-use changes on-site

The 1930 aerial photograph indicates that the site was occupied with residential properties. These residential properties were demolished, and a commercial/industrial facility was constructed before 1951. Based on the aerial photographs and interpretation provided by JBSG, 2020 the site was developed as a service station in 1964. The service station was refurbished and reconfigured twice, once in 1991 and again 2002. As a result, the main

potentially contaminating activity identified is associated with the use and operation of the site as a service station - therefore underground storage tanks, possible above ground storage tanks, bowzers, oil-water separators, fuel supply pipelines etc. are the primary potential sources. Hydrocarbons associated with fuel products including petrol, diesel, lead and oil are the main contaminants of concern.

## 9.2 Site Visit

A site visit was undertaken on 10 March 2023 by EDP to make general observations of site conditions, current activities and evidence of recent or historical contamination. Specific areas of visit include all surface areas of the site such as the refuelling forecourt, fuel fill points, retail building (outer and interior) and the washroom.

No peeling paint, odorous or stained soil or unexplained disturbance of the site were observed. The details of site visit are summarised as follows:

- The retail building sits to the north section of site and the fuel bowzers are located in the southern portion of the site.
- Four metallic fill point covers were visible at the north west corner of the site which were connected by inground fuel lines to the UPSSs. EDP's observations of the tank caps and their orientation suggest there 4 tanks in the 'tank farm' located north of the canopy and refuelling area.
- The UPSS vent riser was located next to the eastern site exit (Sydney St) and was connected to the tanks by inground vent line.
- The buildings are constructed on ground bearing slabs, and no basements were observed.
- Three aboveground onsite stormwater detention tanks behind the sales building, close to the intersection of Penshurst Street and Sydney Street.
- Two grease traps located west, towards the exit road for traffic to Sydney Street.

## 10. PRELIMINARY CONCEPTUAL SITE MODEL

This preliminary conceptual site model (pCSM) was developed in general accordance with the ASC NEPM (NEPM, 2013 – B2). The preliminary conceptual site model (pCSM) was developed based on the information obtained during the preliminary site investigation process, to allow assessment of potential sources of impact, contaminants of potential concern, transport mechanism and sensitive receptors. Per ASC NEPM, definitions of the key elements of the complete exposure pathways are as follows.

- Contaminants – any substance, that is potentially hazardous to human health and/or the environment and is present in the environment at concentrations above background levels.
- Source – the location from which a contaminant(s) has entered or may enter a physical system. A source may be primary (i.e. a tank or fuel line) or secondary (fuel contamination in soil and groundwater).
- Environmental Receptor – humans, groundwater, surface water and living organisms potentially exposed to and adversely affected by contaminants because they are present at the source(s) or along contamination migration pathways.
- Migration Pathway – the course through which contaminants in the environment may move away from the source(s) to potential environmental receptors.
- Exposure Route – the process by which a contaminant or physical agent in the environment comes into direct contact with the body, tissues, or exchange boundaries of an environmental receptor or organism. Examples include (but are not limited to) ingestion, inhalation, dermal absorption, root intake and plant uptake, and gill intake.

Aside from known CoPC identified from the previous JBS&G assessments, no intrusive investigations or sampling was conducted as part of this preliminary site investigation.

## 10.1 Potential sources of on-site contamination

Several indicators can be used to determine whether soil contamination has occurred at a site, and therefore provide a rationale for proposing further assessment and sampling program for the site. The indicators considered for this PSI include:

- Current and legacy activities which have the potential to cause environmental contamination;
- The presence of underground and above ground facilities;
- Unexplained soil/ground disturbance or lack of vegetation;
- Odorous soil (although this was limited to the peripheral landscaping areas);
- Discoloured or oily or stained soil (although this was limited to the peripheral landscaping areas);
- Presence of accumulations of solid or liquid waste (limited to the presence of skip bins – or the identification of stockpiles on-site – which were not observed).

Based on the observation from the site visit and review of current and legacy site information, the following issues may indicate the presence of contaminants of potential concern (CoPC).

- **Fuel Service station:** There is the potential for petroleum hydrocarbons contamination in soils and groundwater due to potential leakage of fuel from UPSS infrastructure and potential fuel spills during discharge of fuel into the underground tank. The site is however mostly surfaced in concrete and bitumen which all appear in fair condition. The UPSS and infrastructure at the site is used for bulk storage or transfer of petroleum products and is a potential source of contamination, for total recoverable hydrocarbons (TRH), polycyclic aromatic hydrocarbons (PAHs), and heavy metals.
- **Legacy activities:** The nature of the new buildings visible on the aerial photograph of 1965, indicates the potential for a small industrial/commercial facility which almost completely occupies the whole site is visible. Depending on the nature of the industrial or commercial activity, there is the potential for the historical uses to be sources of contamination to the site. JBS&G, 2020a also identified asbestos contamination in fill, suggesting uncontrolled filling and import activities have taken place at the site.

## 10.2 Contaminants of potential concern (CoPC)

The CoPC from leakage of fuel from underground storage tank and potential for fuel spills from fuelling cars and during discharge of fuel into the underground tank include PAHs, TPHs, heavy metals, BTEX, OPP/OCP and PFAS.

The *Soil Validation Report* (JBS&G, 2020) indicated that ACM were confirmed in the reworked clay fill material and potentially, asbestos impacted fill likely remained in situ at other parts of the site as suggested in JBSG, 2020. If the refill material is disturbed or removed, asbestos may contaminate the air and pose an inhalation risk to human health.

## 10.3 Potential migration pathways

No off-site migration of contamination (wastes, or contaminated stormwater) was observed in the form of contaminated surface run-off leaving the site. EDP's observations cannot comment on any subsurface migration or surface migration which has or could occur outside our site visit. However, if there was any event of fuel spillage during discharge or fuelling of cars, then there is the potential for off-site migration to have occurred after any immediate rainfall event. The concrete and asphaltic hardstand at the site serves as a break in the pathway between potential oil spills and the underlying soil. Oil spills therefore may potentially vaporize and pose inhalation risk, onsite and off-site.

If there is a leakage in the underground fuel storage tank system, there is the potential for contaminant migration to underlying soil and subsequent off-site migration of groundwater. If the refill material is disturbed or removed, known or suspected asbestos could be released from broken fragment and pose an inhalation risk to human health, particularly for workers on-site.

## 10.4 Sources to Sensitive Receptor Linkages

### 10.4.1 Human Receptors and Pathways:

- **Retail workers on-site** - The only plausible pathway mechanism for exposure to identified CoPC is through vapour inhalation of any volatiles in soil or groundwater emanating through the current site slab. Retail workers at the site may also be exposed to airborne asbestos fibre if there was any disturbance of the concrete slab.
- **Maintenance and construction workers** - Maintenance workers who carry out intrusive work at site may be exposed to CoPC by direct dermal contact and potential inhalation of volatile CoPC. The inhalation mechanism would most likely be through inhalation of accumulated vapours in pits, service trenches and around bowsters. There is a limited potential for accidental ingestion of contaminated soil. Maintenance and construction workers at the site may also be exposed to airborne asbestos fibres if there was any disturbance of the concrete slab
- **Neighbours and the public** - Neighbouring residents, workers and the public who visit the site may be exposed to identified CoPC through vapour inhalation from accidental spills, in soil or groundwater emanating through the concrete hardstand. Neighbours may potentially be exposed to airborne asbestos during construction works.

### 10.4.2 Ecological Receptors and Pathways

- **On-site soil** - Fuel leakage from the UPSS and may migrate to the underlying site soil.
- **On-site and off-site groundwater** - Fuel leakage from the UPSS and may migrate to the underlying site soil and potentially leach into underlying groundwater.
- **On-site soil invertebrates and microorganisms** - Invertebrates and microorganisms have direct and indirect exposure to contaminants in soil and groundwater. Although it is noted that a large percentage of the site is covered with hardstanding, which will reduce the ecological risks.
- **Off-site surface water bodies** – Stormwater (which is likely to outflow to a surface water body) and site run-off which is not captured by on-site drains may dissolve CoPC and eventually discharge into an off-site surface water body. The closest potential surface water receptor is Scotts Creek to the north.

## 11. DISCUSSION & CONCLUSION

Willoughby City Council have commissioned EDP to conduct a PSI at 316 Penshurst Street, North Willoughby. The PSI is required to inform future rezoning of the site which is currently zoned as B2 – Local Centre under Willoughby Local Environmental Plan 2012 and exists as a fuel service station. EDP conducted a site visit and reviewed JBSG Soil Validation and JBSG Groundwater Monitoring Event reports prepared in 2020. Both reports stated the site as suitable for future ongoing commercial / industrial land-use as an operational service facility, within the limitations provided in both reports.

However, based on the access, inspections, site history data gaps (primarily restriction on accessing dangerous goods archive for the site) and reporting constraints as outlined in Section 4, the current contamination status of the site as a whole cannot be confirmed. There is a potential for unidentified historical contaminants or the emergence of new contamination since 2020 to be posing a risk to human health and the environment.

In considerations of the above, and the conceptual site model which identifies human health and ecological source/pathway/receptor linkages for CoPC, EDP considers the site presents a **MODERATE** contamination risk. A detailed site investigation (DSI) is required to properly quantify and qualify the risks.

Based on EDP's findings, findings of previous investigations (JBSG, 2020) and uncertainties on the current contamination status, EDP consider the land is contaminated and unsuitable in its current state for a future 'B2 and RE1 – Public Recreation' zoning. However, EDP consider the land can be made suitable for a B2 and RE1 – Public Recreation zoning after further investigation and remediation.

## 12. RECOMMENDATIONS

The following recommendations are provided:

- WCC to request BP provide access to all environmental investigation reports conducted at the site to close the current data gaps on contamination status of the site as whole. The information request is to include but not limited to environmental reports, tank integrity test and loss reports, reports on any incident or spills and permission to conduct a dangerous good search.
- Based on the data and information returned to WCC, the need and scope of a DSI could be determined.

If requested information is not provided by BP, and/or BP are not granting access to conduct investigations, WCC should consider installing a minimum of three groundwater monitoring events in immediate up and down gradient locations of the site to assess upgradient contamination condition, and if contamination is potentially migrating downgradient from the site.

## 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**

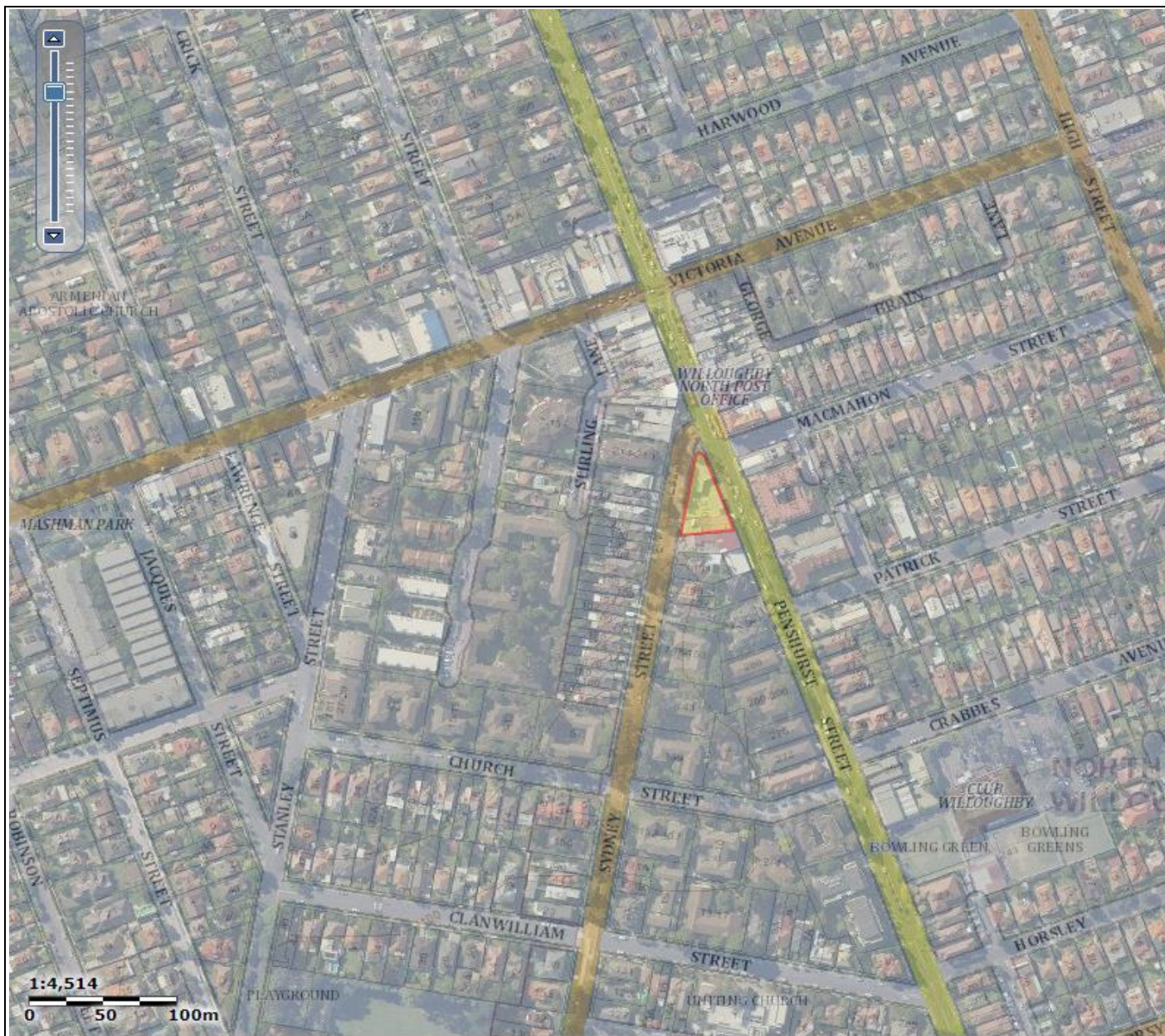
EDP notes that where information has been provided by other parties in order for the works to be undertaken, EDP cannot guarantee the accuracy or completeness of this information the client therefore waives any claim against the company and agrees to indemnify EDP for any loss, claim or liability arising 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





316 Penshurst Street, North  
Willoughby, NSW 2068

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






316 Penshurst Street, North  
Willoughby, NSW 2068

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: 316 Penshurst Street, North Willoughby, NSW 2068

EDP Reference: S-05152.PSI.001



Photo 1: Rainwater tanks, northern side of retain building, facing south

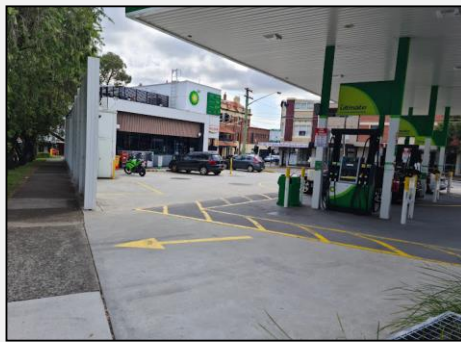


Photo 2: Service station forecourt, western exit, facing east

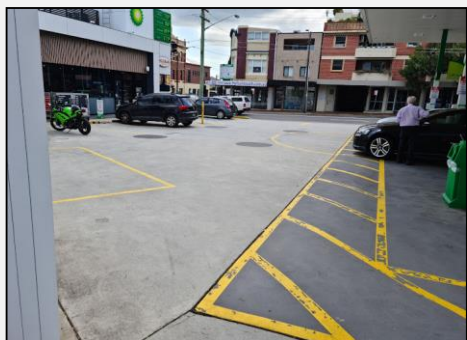


Photo 3: Service station forecourt and UPSS location, western exit, facing east



Photo 4: Service station forecourt and UPSS location, eastern exit, facing west



Photo 5: Service station forecourt and bowzers, eastern exit, facing south

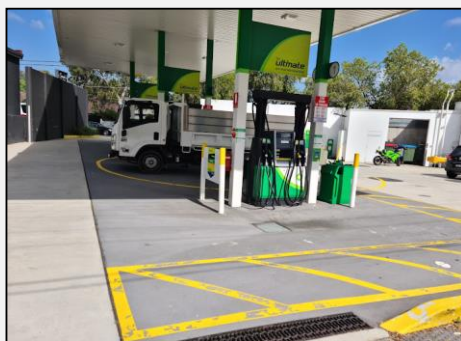


Photo 6: Service station forecourt and bowzers, eastern exit, facing west

End of Photographic Log

## Appendix B: LIR Enviro-Screen Report



# Enviro-Screen Report

316 Penshurst Street  
North Willoughby, NSW

14 February 2023

Report n°:  
LI-3210 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

# Index

1.1 SENSITIVE RECEPTORS Map 1.1 (200m Buffer)	0
1.2a PLANNING CONTROLS Map 1.2a (500m Buffer)	0
Zoning	0
1.2b PLANNING OVERLAYS Map 1.2b (500m Buffer)	1
Environmental Planning Instruments	1
Other Planning Information	1
1.3 HERITAGE Map 1.3 (200m Buffer)	1
State and Local Heritage Registers	1
Australian Heritage Database Register	1
1.4a SOIL AND LAND USE INFORMATION Map 1.4a (500m Buffer)	2
Soil Landscape	2
Salinity	2
Radon	3
1.4b ACID SULFATE SOIL Map 1.4b (500m Buffer)	3
State and Local Acid Sulfate Soil Registers	3
National Acid Sulfate Soil Register	3
1.5 GEOLOGY AND TOPOGRAPHY Map 1.5 (500m Buffer)	4
Geology	4
Naturally Occurring Asbestos Potential (NOA)	4
Topography	4
2.1 HYDROGEOLOGY AND GROUNDWATER BORES Map 2.1 (2000m Buffer)	5
Groundwater Bores	5
Groundwater Bores Driller Lithology Details	7
2.2 HYDROGEOLOGY AND OTHER BOREHOLES Map 2.2 (500m Buffer)	10
Groundwater Dependent Ecosystems (GDE)	11
Other Known Borehole Investigations (Coal Seam Gas (CSG), Petroleum Wells and Other Boreholes)	11
3.1 CONTAMINATED LAND PUBLIC REGISTER Map 3.1 (1000m Buffer)	12
Contaminated Sites	12
3.2 LICENCES, APPROVALS & ASSESSMENTS Map 3.2 (500m Buffer)	13
Licences	13
Audits	13
Clean Up, Penalty Notices and Orders	13
3.3a SITES REGULATED BY OTHER JURISDICTIONAL BODY Map 3.3a (2000m Buffer)	14
Contaminated Legacy Areas	14
Defence, Military Sites and UXO Areas	14
Former Gasworks Sites	14
PFAS Sites	14
3.3b OTHER POTENTIAL POLLUTION SOURCES Map 3.3b (500m Buffer)	15
Derelict Mines and Quarries	15
Historical Landfills	15
National Pollutant Inventory (NPI)	15
4.1 POTENTIALLY CONTAMINATING ACTIVITIES Map 4.1 (200m Buffer)	16
Liquid Fuel Facilities	16
Waste Management Facilities & Recycling Centres	16
4.2 HISTORICAL BUSINESS DIRECTORIES (not mapped)	17



5.1 Fire Hazard Map 5.1 (500m Buffer)..... 34

    Bushfire Prone Areas ..... 34

    Bushfire History ..... 34

5.2 Flood and Erosion Hazards Map 5.2 (500m Buffer)..... 34

    Erosion Hazard..... 34

    Flood Hazard ..... 35

ATTACHMENTS

Attachment A - Report Maps

Attachment B - Historical Imagery

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
-	-	-	-

### 1.2a PLANNING CONTROLS

Map 1.2a (500m Buffer)

#### Zoning

Zoning	Type	Details	Distance (m)	Direction
B2	Local Centre	Willoughby Local Environmental Plan 2012	0.0	Onsite
SP2	Infrastructure		0.0	East
R3	Medium Density Residential		20.1	West
R2	Low Density Residential		66.2	East
RE2	Private Recreation		210.8	South-east
RE1	Public Recreation		371.0	South
B1	Neighbourhood Centre		420.8	South-east

## 1.2b PLANNING OVERLAYS

## Map 1.2b (500m Buffer)

### Environmental Planning Instruments

Name	Type	Details	Distance (m)	Direction
Active Street Frontages	Active Street Frontages Map	Willoughby Local Environmental Plan 2012	0.0	Onsite
Acid Sulfate Soils	Acid Sulfate Soils Map		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
Lot Size	Lot Size Map		66.2	East
Land Reservation Acquisition	Land Reservation Acquisition Map		67.3	North-west
Local Provisions	Dual Occupancy Restriction Map		186.5	North

### 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
I223	Hotel Willoughby (including original interiors)	Heritage Register	Item - General. Significance is Local.	18.8	North-east
I128	House (including original interiors)	Heritage Register	Item - General. Significance is Local.	24.0	South
C5	Harwood Avenue	Heritage Register	Conservation Area - General. Significance is Local.	186.5	North

### 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	<p>Landscape—gently undulating rises on Wianamatta Group shales. Local relief to 30 m, slopes usually &gt;5%. Broad rounded crests and ridges with gently inclined slopes. Cleared Eucalypt woodland and tall open-forest (dry sclerophyll forest).</p> <p>Soils—shallow to moderately deep (&gt;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.</p> <p>Limitations—localised seasonal waterlogging, localised water erosion hazard, moderately reactive highly plastic subsoil, localised surface movement potential.</p>	0.0	Onsite
ERgy	Gymea	Erosional	<p>Landscape—undulating to rolling rises and low hills on Hawkesbury Sandstone. Local relief 20–80 m, slopes 10–25%. Rock outcrop &lt;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.</p> <p>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 (&lt;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 (&lt;100 cm) siliceous sands (Uc1.2) and leached sands (Uc2.21) along drainage lines.</p> <p>Limitations—steep slopes, water erosion hazard, rock outcrop, localised rockfall hazard, localised noncohesive soils, shallow highly permeable soil, very low soil fertility.</p>	413.4	North
ERgn	Glenorie	Erosional	<p>Landscape—undulating to rolling low hills on Wianamatta Group shales. Local relief 50–80 m, slopes 5–20%. Narrow ridges, hillcrests and valleys. Extensively cleared tall open-forest (wet sclerophyll forests).</p> <p>Soils—shallow to moderately deep (&lt;100 cm) Red Podzolic Soils (Dr2.11) on crests; moderately deep (70–150 cm) Red and Brown Podzolic Soils (Dr2.11, Dr2.21, Db1.11, Db1.21) on upper slopes; deep (&gt;200 cm) Yellow Podzolic Soils (Dy5.11) and Gleyed Podzolic Soils (Dg4.11) along drainage lines.</p> <p>Limitations—water erosion hazard, localised steep slopes, localised mass movement hazard, localised surface movement potential, localised impermeable highly plastic soil, moderately reactive.</p>	484.7	North-west

### 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	Inland Acid Sulfate Soils	0.0	Onsite
	Severe limitations	Inland Acid Sulfate Soils	414.7	North
	Moderate limitations	Inland Acid Sulfate Soils	485.0	North-west

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

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>	Twia	Ashfield Shale	Middle Triassic	Wianamatta Group	Shale	Black to light grey shale and laminite.	0.0	Onsite
	Tuth	Hawkesbury Sandstone	Middle Triassic	Ungrouped Triassic units	Sandstone	Medium- to coarse-grained quartz sandstone with minor shale and laminite lenses.	310.4	North

### Naturally Occurring Asbestos Potential (NOA)

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

### Topography

<b>Topography</b> (Onsite)	102 mAHD
-------------------------------	----------





## 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>	Not identified	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
3	GW026513	Irrigated agriculture	1/12/1966	64.0	64.0	6	Fresh	0.95	326.6	South-east
46	GW114502	Monitoring	28/10/2010	8.0	8.0	2.5	<Null>	<Null>	465.2	South-east
48	GW114504	Monitoring	28/10/2010	8.0	8.0	2.5	<Null>	<Null>	497.0	South-east
47	GW114503	Monitoring	28/10/2010	8.0	8.0	2.5	<Null>	<Null>	501.1	South-east
10	GW111233	Monitoring	11/08/2010	4.3	4.3	1.8	<Null>	<Null>	897.5	South-east
7	GW111232	Monitoring	16/11/2010	4.5	4.5	2.4	<Null>	<Null>	899.1	South-east
13	GW111234	Monitoring	11/08/2010	4.5	4.5	2.4	<Null>	<Null>	925.0	South-east
6	GW108481	Unknown	11/12/2007	216.0	216.0	<Null>	245.00 mg/L	0.05	1050.4	East

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
29	GW112963	Monitoring	15/03/2012	9.0	9.0	<Null>	<Null>	<Null>	1207.1	South-west
31	GW112965	Monitoring	15/03/2012	9.0	9.0	<Null>	<Null>	<Null>	1217.8	South-west
8	GW111333	Monitoring	24/01/2011	9.0	9.0	<Null>	<Null>	<Null>	1227.8	South-west
9	GW111332	Monitoring	24/01/2011	3.2	3.2	<Null>	<Null>	<Null>	1228.4	South-west
30	GW112964	Monitoring	15/03/2012	2.0	2.0	<Null>	<Null>	<Null>	1228.9	South-west
5	GW107757	Recreation	29/07/2005	162.6	162.6	25.6	1360.00 mg/L	0.3	1387.3	South-west
2	GW029731	Recreation	1/04/1967	21.6	21.6	<Null>	<Null>	<Null>	1421.0	South-west
17	GW114838	Monitoring	30/07/2011	9.7	9.7	3.9	<Null>	<Null>	1541.2	West
16	GW114837	Monitoring	30/07/2011	5.0	5.0	2.6	<Null>	<Null>	1571.2	West
15	GW114836	Monitoring	30/07/2011	15.0	15.0	8.8	<Null>	<Null>	1604.6	North-west
22	GW113508	Monitoring	1/09/2004	7.5	7.5	<Null>	<Null>	<Null>	1622.6	North-west
23	GW113509	Monitoring	1/09/2004	3.0	3.0	<Null>	<Null>	<Null>	1623.0	North-west
26	GW113512	Monitoring	31/08/2004	8.0	8.0	<Null>	<Null>	<Null>	1626.3	North-west
27	GW113513	Monitoring	1/09/2004	2.8	2.8	<Null>	<Null>	<Null>	1627.4	North-west
25	GW113511	Monitoring	1/09/2004	8.0	8.0	<Null>	<Null>	<Null>	1628.0	West
20	GW113506	Monitoring	31/08/2004	3.1	3.1	<Null>	<Null>	<Null>	1634.2	North-west
19	GW113505	Monitoring	31/08/2004	8	8	<Null>	<Null>	<Null>	1634.7	North-west
24	GW113510	Monitoring	31/08/2004	7.8	7.8	<Null>	<Null>	<Null>	1635.5	North-west
21	GW113507	Monitoring	31/08/2004	7.6	7.6	<Null>	<Null>	<Null>	1653.1	North-west
28	GW113514	Monitoring	6/09/2004	8.6	8.6	<Null>	<Null>	<Null>	1659.0	North-west
12	GW111007	Monitoring	19/04/2010	7.5	7.5	3.8	<Null>	<Null>	1714.4	North
14	GW111006	Monitoring	19/04/2010	7.5	7.5	3.8	<Null>	<Null>	1724.7	North
11	GW111008	Monitoring	19/04/2010	7.5	7.5	3.8	<Null>	<Null>	1726.5	North
33	GW112743	Monitoring	23/03/2009	11	11	<Null>	<Null>	<Null>	1807.9	South-west
32	GW112742	Monitoring	24/03/2009	11	11	<Null>	<Null>	<Null>	1825.6	South-west
35	GW112745	Monitoring	23/03/2009	12	12	<Null>	<Null>	<Null>	1825.6	South-west
37	GW112747	Monitoring	25/03/2009	12	12	<Null>	<Null>	<Null>	1836.9	South-west
34	GW112744	Monitoring	24/03/2013	11	11	<Null>	<Null>	<Null>	1838.7	South-west
39	GW112749	Monitoring	8/04/2009	6.5	6.5	<Null>	<Null>	<Null>	1839.7	South-west
41	GW112751	Monitoring	16/03/2009	6	6	<Null>	<Null>	<Null>	1854.6	South-west
36	GW112746	Monitoring	23/03/2013	12	12	<Null>	<Null>	<Null>	1858.2	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
43	GW112753	Monitoring	27/08/2013	11	11	<Null>	<Null>	<Null>	1867.5	South-west
40	GW112750	Monitoring	9/04/2009	6	6	<Null>	<Null>	<Null>	1875.1	South-west
44	GW112754	Monitoring	18/03/2009	11	11	<Null>	<Null>	<Null>	1877.4	South-west
1	GW112756	Monitoring	23/03/2013	<Null>	<Null>	<Null>	<Null>	<Null>	1877.7	South-west
38	GW112748	Monitoring	25/03/2009	12	12	<Null>	<Null>	<Null>	1878.5	South-west
45	GW112755	Monitoring	23/03/2009	11	11	<Null>	<Null>	<Null>	1896.7	South-west
18	GW111773	Monitoring	16/03/2012	6	6	<Null>	<Null>	<Null>	1901.7	South-west
42	GW112752	Monitoring	16/03/2009	10.5	10.5	<Null>	<Null>	<Null>	1909.6	South-west
4	GW103127	Recreation	31/07/2000	138	138	54	Fresh	3	1987.0	North

Note: The use of the symbol "<Null>" 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
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		326.6	South-east
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		465.2	South-east
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		497.0	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		501.1	South-east
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		897.5	South-east
GW111232	0m-0.2m Concrete 0.2m-0.3m Fill,sandy gravel 0.3m-0.5m Fill clayey sand		899.1	South-east

Groundwater Bore ID	From Depth – To Depth (m)	Lithology	Distance (m)	Direction
	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			
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		925.0	South-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, bedded 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		1050.4	East
GW112963	#N/A		1207.1	South-west
GW112965	#N/A		1217.8	South-west
GW111333	0m-0.17m Concrete 0.17m-2.8m Fill, silty sandy clay, orange brown 2.8m-3m Silty clay, light grey mott. red. brown 3m-9m Shale, grey weathered		1227.8	South-west
GW111332	0m-0.18m Concrete 0.18m-2.8m Fill, silty sandy clay, orange brown 2.8m-3m Silty clay, light grey mottled red/brown 3m-3.2m Shale grey weathered		1228.4	South-west
GW112964	#N/A		1228.9	South-west
GW107757	0m-1.4m Fill 1.4m-4.3m Clay: brown, red, white 4.3m-5.1m Shale; brown, weathered 5.1m-5.5m Clay brown 5.5m-16.8m Shale grey 16.8m-18.5m Sandstone grey, shale grey 18.5m-28.7m Sandstone grey 28.7m-29m Sandstone grey, fractured 29m-42.4m Sandstone l/grey 42.4m-42.8m Siltstone d/grey 42.8m-51.1m Sandstone l/grey 51.1m-65.7m Sandstone l/grey, quartz 65.7m-66.7m Shale, grey, silty 66.7m-74.6m Sandstone l/grey 74.6m-76.1m Sandstone l/grey 76.1m-76.3m Shale l/grey, soft 76.3m-88m Sandstone l/grey 88m-88.6m Shale, silty, d/grey 88.6m-162.6m Sandstone l/grey, grey		1387.3	South-west
GW029731	0m-3.45m Boulders large 0m-3.45m Clay red sandy 0m-3.45m Gravel 3.45m-6.7m Clay red yellow puggy sandy 3.45m-6.7m Ironstone gravel 6.7m-17.98m Shale grey black hard 17.98m-21.64m Clay bands 17.98m-21.64m Sandstone grey very fractured medium-coarse		1421.0	South-west

Groundwater Bore ID	From Depth – To Depth (m)	Lithology	Distance (m)	Direction
GW114838	0m-0.2m Sand Gravel 0.2m-1.6m Compacted Ballast,Sand Gravel 1.6m-2.8m Clay Red Yellow 2.8m-3.9m Clay Red Grey 3.9m-6m Clay Red/White,Some Wet Rocks 6m-7m Rock And Clay Red Weathered 7m-7.5m Rock White Weathered 7.5m-8m Shale Orange Wheathered 8m-9.7m Shale Muddy Weathered		1541.2	West
GW114837	0m-0.2m Gravel Compacted 0.2m-1.4m Non Destructive Excavations,Gravel 1.4m-2.5m Clay Yellow 2.5m-3.8m Clay Red Grey 3.8m-5m Clay Red, Weathered Rock		1571.2	West
GW114836	0m-0.6m Compacted Gravel / Ballast 0.6m-2m Compacted Gravel / Ballast 2m-2.2m Clay Light Red Brown 2.2m-3m Clay White Red 3m-4.5m Clay Grey Very Hard 4.5m-6m Clay Grey 6m-9m Shale Grey Very Hard Clay 9m-15m Shale Very Weathered Grey Shale		1604.6	North-west
GW113508	#N/A		1622.6	North-west
GW113509	#N/A		1623.0	North-west
GW113512	#N/A		1626.3	North-west
GW113513	#N/A		1627.4	North-west
GW113511	#N/A		1628.0	West
GW113506	#N/A		1634.2	North-west
GW113505	#N/A		1634.7	North-west
GW113510	#N/A		1635.5	North-west
GW113507	#N/A		1653.1	North-west
GW113514	#N/A		1659.0	North-west
GW111007	0m-0.2m Concrete slab:0.2m 0.2m-0.6m Fill,silty sand,fine to med.grained,yellow 0.6m-0.7m Concrete slab:0.1m 0.7m-1.6m Fill,silty sand,clay,ironstone,gravel 1.6m-3m Shale,grei with clay bands,grei and orange 3m-4.4m Sandstone fine to med. grained,grei and orange 4.4m-5.4m Sandstone with shale bands 5.4m-7.5m Sandstone fine to medium grained.orange with clay bands		1714.4	North
GW111006	0m-0.2m Concrete 0.2m-0.4m Fill,silty sandy clay,trace of ironstone 0.4m-0.8m Silty clay 0.8m-1.8m Shale,/ quartz 1.8m-3.5m Sandstone,fine to medium grained red. 3.5m-6.2m Sandstone yellow 6.2m-7.5m Sandstone,fine to med.grained,grei		1724.7	North
GW111008	0m-0.2m Concrete slab:0.15m 0.2m-1.8m Fill,as above,trace of ironstone and igneous gravel 1.8m-4.2m Sandstone fine to medium grained,red with grei clay bands. 4.2m-6.4m Sandstone,fine to medium grained,light yellow 6.4m-7.5m Sandstone fine to medium grained,dark brown with clay bands.		1726.5	North
GW112743	#N/A		1807.9	South-west
GW112742	#N/A		1825.6	South-west
GW112745	#N/A		1825.6	South-west
GW112747	#N/A		1836.9	South-west

Groundwater Bore ID	From Depth – To Depth (m)	Lithology	Distance (m)	Direction
GW112744	#N/A		1838.7	South-west
GW112749	#N/A		1839.7	South-west
GW112751	#N/A		1854.6	South-west
GW112746	#N/A		1858.2	South-west
GW112753	#N/A		1867.5	South-west
GW112750	#N/A		1875.1	South-west
GW112754	#N/A		1877.4	South-west
GW112756	#N/A		1877.7	South-west
GW112748	#N/A		1878.5	South-west
GW112755	#N/A		1896.7	South-west
GW111773	0m-0.2m Concrete 0.2m-0.8m Fill, Clay Yellow/ Brown, Some Brick 0.8m-2.4m Clay Yellow Brown, Dry, Loose, L/Plas. 2.4m-4.3m Clay Brown/Grey/Red, Stiff, L/Plast. Ironstone 4.3m-6m Clay Grey/Red, Dry, Hard, L/Plasticity		1901.7	South-west
GW112752	#N/A		1909.6	South-west
GW103127	0m-0.5m Topsoil 0.5m-1.5m Sandy clay 1.5m-5.2m Sandstone yellow 5.2m-39.7m Sandstone grey 39.7m-40.1m Sandstone grey w.b. 40.1m-70.4m Sandstone grey 70.4m-74m Sandstone grey 74m-130.5m Sandstone grey 130.5m-132.2m Sandstone grey w.b. 132.2m-138m Sandstone grey		1987.0	North

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
Not identified	-	-	-	-	-	-	-

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	Caltex Service Station	157 Penhurst STREET WILLOUGHBY	Service Station	Regulation under CLM Act not required	460.2	South-east
EPA Notified Contaminated Sites	Willoughby Bus Depot	Corner Ann Street and Stan STREET WILLOUGHBY EAST	Other Industry	Regulation under CLM Act not required	788.5	South-east
EPA Notified Contaminated Sites	Woolworths Chatswood	364-366 Eastern Valley WAY CHATSWOOD	Service Station	Regulation under CLM Act not required	872.9	North-east

*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

Table 3.1.1 Contaminated Land Public Register		
<b>TAS</b>	EPA (Environment Protection Authority)	Regulated Sites and Premises Lutana and Parts of Hobarts Eastern Shore
<b>VIC</b>	EPA (Environment Protection Authority)	Priority Sites Register Pollution Abatement Notice
<b>WA</b>	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
145	Surrendered	George Weston Foods Limited	Tip Top Bakeries	51 Alleyne Street, Chatswood, NSW, 2067	Hazardous, Industrial or Group A Waste Generation or Storage	662.9	North
10431	Surrendered	Intec Ltd	Intec Hydromet Systems	21 Smith Street, CHATSWOOD, NSW, 2067	Hazardous, Industrial or Group A Waste Generation or Storage	869.5	North
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	875.7	East

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.	757.0	East

\*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.	663.7	North-east

#### 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	784.1	South-east



### 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
BP	Petrol Stations	316 Penshurst St, North Willoughby NSW 2068	Current	0.0	Onsite

#### 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
2010	Petrol Stations & Garages	Bp Australia Pty Ltd	316 Penhurst St WILLOUGHBY 2068 NSW	Address	0.0	Onsite
1970	MIXED BUSINESSES	Penshurst "314" Mixed Store,	314 Penshurst St., Willoughby	Address	5.5	South
2010	Couriers	Pack & Send	4/283 Penshurst St NORTH WILLOUGHBY 2068 NSW	Address	13.7	North-east
1930	Motor Service Stations	Nowell & Pinson	308 Penshurst Street, Willoughby,NSW	Address	15.8	South
1950	Engineers - Electrical	Dunn F&Coleman S	308 Penshurst Street, Willoughby,NSW	Address	15.8	South
1950	Engineers - General	Dunn F & Coleman S	308 Penshurst Street, Willoughby,NSW	Address	15.8	South
1950	Motor Body Painters & Sprayers	Comet Panel Works	308 Penshurst, Willoughby,NSW	Address	15.8	South
1950	Motor Garages	Johnson F H	308 Penshurst, Willoughby,NSW	Address	15.8	South
1950	Motor Panel Beaters	Comet Panel Works	308 Penshurst Street, Willoughby,NSW	Address	15.8	South
1965	Batteries	METROPOLITAN CLYDE DEALERS - WILLOUGHBY: T. Hillerman & Co	308,PenshurstSt,NS W	Address	15.8	South
1940	Electrical Contractors	Norcliffe A E	310 Penshurst Street, Willoughby,NSW	Address	16.6	South
1970	ELECTRIC INSTALLATION APPLIANCES	Twin-City Electric Co. Pty. Ltd.,	312 Penshurst St., Willoughby	Address	18.9	South
1970	ENGINEERS—ELECTRICAL	Twin-City Electric Co. Pty. Ltd.,	312 Penshurst St., Willoughby	Address	18.9	South
1970	RADIO &/OR TELEVISION SALES & SERVICEMEN WILLOUGHBY	Twin-City Electric Co. Pty. Ltd.,	312 Penshurst St., NSW	Address	18.9	South
1950	Drainers	Greenow & Teasdel	304-306 Penshurst Street, Willoughby,NSW	Address	30.9	South
1950	Joinery Merchants	Wangman Fredk&Sons	304 Penshurst Street, Willoughby,NSW	Address	30.9	South
1965	Shop & Office Fitters	Bassett (Aust) Pty Ltd	302,Penshurst,NSW	Address	32.0	South
1965	Tiles—Flooring & Wall	N.S.W. Plastic Tile Co Pty Ltd	302,Penshurst,NSW	Address	32.0	South
1970	BATHROOM EQUIPMENT MFRS. &/OR DIST.	N.S.W. Plastic Tile Co. Pty. Ltd.,	302 Penshurst St., Willoughby	Address	32.0	South
1980	Buildings - Prefabricated & or portable - Home	Centa-Kit	302 Penshurst St., Willoughby,NSW	Address	32.0	South
1930	Dyers & Cleaners	Poullars' Limited (branches)	313 Penshurst Street, Willoughby,NSW	Address	38.4	East
2010	Mattresses Retail M/facrs & W/salers	Foam Booth The	313 Penshurst St WILLOUGHBY 2068 NSW	Address	38.4	East
2015	Cake Decorating Supplies	Cake Decorating Solutions	311 Penshurst St Willoughby NSW 2068	Address	40.3	East

YEAR	Activity	Name	Address	Positional accuracy	Distance (m)	Direction
1940	Hot Water Systems	Joseph Auto-Hot Pty Ltd	303 Penshurst Street, Willoughby, NSW	Address	41.5	East
1940	Motor Garages	Champion Bros	303 Penshurst Street, Willoughby, NSW	Address	41.5	East
1950	Motor Garages	George Marshall Service Station	303 Penshurst Street, Willoughby, NSW	Address	41.5	East
1950	Motor Garages	Marshall George Service Station	303 Penshurst, Willoughby, NSW	Address	41.5	East
1950	Motor Service Stations	George Marshall Service Station	303 Penshurst, Willoughby, NSW	Address	41.5	East
1965	Motor Body Builders & Repairers	Hillermans	303, Penshurst, NSW	Address	41.5	East
1965	Motor Garages	Hillerman's Service Station	303, Penshurst, NSW	Address	41.5	East
1965	Motor Panel Beaters	HILLERMANS	303, Penshurst St, NSW	Address	41.5	East
1965	Motor Service Stations	George Marshall Service Station	303, Penshurst, NSW	Address	41.5	East
1965	Motor Service Stations	HILLERMANS SERVICE STATION	303, Penshurst, NSW	Address	41.5	East
1965	Towing Stations	HILLERMANS	303, Penshurst, NSW	Address	41.5	East
1970	MOTOR BODY REPAIRS/CONVERTERS	Hillermans Pty. Ltd.,	303 Penshurst St., Willoughby	Address	41.5	East
1970	Motor Garages	Hillermans Service Station	303 Penshurst Street, Willoughby, NSW	Address	41.5	East
1970	MOTOR GARAGES/ENGINEERS WILLOUGHBY	Hillermans Pty. Ltd.,	303 Penshurst St., NSW	Address	41.5	East
1970	MOTOR PAINTERS	Hillermans Pty. Ltd.,	303 Penshurst St., Willoughby	Address	41.5	East
1970	MOTOR PANEL BEATERS	Hillermans Pty. Ltd,	303 Penshurst St., Willoughby	Address	41.5	East
1970	Motor Panel Beaters	Hillermans	303 Penshurst Street, Willoughby, NSW	Address	41.5	East
1970	Motor Service Stations	George Marshall Service Station	303 Penshurst Street, Willoughby, NSW	Address	41.5	East
1970	MOTOR STEERING SPECIALISTS	Hillermans Pty. Ltd.,	303 Penshurst St., Willoughby	Address	41.5	East
1980	Motor Replacement Parts	Specialised Parts Service (NSW) Pty Ltd	303 Penshurst St., Willoughby, NSW	Address	41.5	East
1980	Motor Service Stations & Garages	Hillermans Service Station	303 Penshurst St., Willoughby, NSW	Address	41.5	East
1980	Panel Beaters &/or Painters	Hillermans	303 Penshurst St., Willoughby, NSW	Address	41.5	East
2005	Chocolate & Cocoa	Chocolate Genie (Willoughby) Pty Ltd	303 Penthurst St, WILLOUGHBY, NSW, 2068	Address	41.5	East
2010	Funeral Directors	Liberty Funerals	222 Sydney St CHATSWOOD 2057 NSW	Address	41.7	North-west
2010	Funeral Directors	Chatswood & Roseville Funerals Services	222 Sydney St WILLOUGHBY 2068 NSW	Address	41.7	North-west
2010	Funeral Directors	Northern Suburbs Funeral Services	222 Sydney St WILLOUGHBY 2068 NSW	Address	41.7	North-west
1970	CHEMICAL IMPORTERS &/OR DISTRIBUTORS	Turton, Gordon Pty. Ltd.,	222 Sydney St., Willoughby	Address	42.0	North-west

YEAR	Activity	Name	Address	Positional accuracy	Distance (m)	Direction
1970	Dry Cleaners' & Dyers' Supplies	Turton Gordon Pty Ltd	222 Sydney Street, Willoughby, NSW	Address	42.0	North-west
1970	DRY CLEANING MACHINERY & SUPPLIES—MFRS. &/OR DIST.	Turton, Gordon Pty. Ltd.,	222 Sydney St., Willoughby	Address	42.0	North-west
1980	Dry Cleaners & Dyers Supplies	Turton Gordon Pty Ltd	222 Sydney St., Willoughby, NSW	Address	42.0	North-west
1980	Dry Cleaning Machinery	Turton Gordon Pty Ltd	222 Sydney St., Willoughby, NSW	Address	42.0	North-west
2015	Carpet Furniture & Upholstery Cleaning	Offlowe Pty Ltd T/A Big Jim Carpets	311 Penshurst St Chatswood NSW 2067	Address	42.8	East
2015	Chocolate & Cocoa Specialists	Chocolate Genie (Willoughby) Pty Ltd	8/ 303 Penthurst St Willoughby NSW 2068	Address	42.8	East
2010	Chocolate & Cocoa Specialists	Chocolate Genie (Willoughby) Pty Ltd	8/ 303 Penthurst St WILLOUGHBY 2068 NSW	Address	43.2	East
1965	Blue Prints	Willoughby Plan Printing	299, Penshurst, NSW	Address	44.1	East
1965	Chemical Suppliers	Bontemo Chemical Co	299, Penshurst, NSW	Address	44.1	East
1965	Chemical Suppliers	Chemical Resources Pty Ltd	299, Penshurst, NSW	Address	44.1	East
1965	Timber Merchants	Wangman L M F Pty Ltd	299, Penshurst, NSW	Address	44.1	East
1965	Veterinary Supplies &/or Instruments	Southsphere Chemicals Pty Ltd	299, Penshurst, NSW	Address	44.1	East
1970	SAWMILLERS	Wangmann, L. M. F. Pty. Ltd,	299 Penshurst St., Chatswood	Address	44.1	East
1970	TIMBER MERCHANTS	Wangmann, L. M. F. Pty. Ltd.,	299 Penshurst St., Willoughby	Address	44.1	East
1980	Building Supplies	North Shore Timber & Hardware	299 Penshurst St., Willoughby, NSW	Address	44.1	East
1980	Hardware - Retail	North Shore Timber & Hardware	299 Penshurst St., Willoughby, NSW	Address	44.1	East
1980	Timber Merchants	North Shore Timber & Hardware	299 Penshurst St., Willoughby, NSW	Address	44.1	East
1980	Timber Merchants	Timber Shop	299 Penshurst St., Willoughby, NSW	Address	44.1	East
1980	Timber Merchants	Wangmann L M F Pty Ltd	299 Penshurst St., Willoughby, NSW	Address	44.1	East
1990	Asbestos Products	Belils Australia Pty Ltd	311 Penshurst, Willoughby, NSW	Address	44.3	East
1990	Insulation Materials - W'salers &/or Mfrs	Bellis Australia Pty Ltd	311 Penshurst, Willoughby, NSW	Address	44.3	East
2005	Carpet & Furniture Cleaning & Protection	Offlowe Pty Ltd T/A Big Jim Carpets	311 Penshurst St, CHATSWOOD, NSW, 2067	Address	44.3	East
2010	Carpet Furniture & Upholstery Cleaning	Offlowe Pty Ltd T/A Big Jim Carpets	311 Penshurst St CHATSWOOD 2067 NSW	Address	44.3	East
1970	NEWSPAPERS/PERIODICALS	World Wool Guide,	220 Sydney St., Willoughby	Address	45.1	North-west
1980	Concrete Contractors	Hadid A	220 Sydney St., Willoughby, NSW	Address	45.1	North-west



YEAR	Activity	Name	Address	Positional accuracy	Distance (m)	Direction
1970	FILM LABORATORIES/PROCESSORS	Gothic Film Productions Pty. Ltd.,	305 Penshurst St.,Willoughby	Address	45.1	East
1970	FILM LABORATORIES/PROCESSORS	K.G. Film Services Pty. Ltd.,	305 Penshurst St.,Willoughby	Address	45.1	East
1970	FILM PRODUCERS	Gothic Film Productions Pty. Ltd.,	305 Penshurst St.,Willoughby	Address	45.1	East
1970	FILM PRODUCERS	K.G. Film Service Pty. Ltd.,	305 Penshurst St.,Willoughby	Address	45.1	East
1970	PHOTOGRAPHIC DEVELOPING, PRINTING/COLOURING SERVICES	Gothic Film Productions Pty. Ltd.,	305 Penshurst St.,Willoughby	Address	45.1	East
1970	PHOTOGRAPHIC DEVELOPING, PRINTING/COLOURING SERVICES	K.G. Film Service Pty. Ltd.,	305 Penshurst St.,Willoughby	Address	45.1	East
1980	Audio Visual Equipment & Productions	Eclipse Creative Lighting Electronics	305 Penshurst St.,Willoughby,NSW	Address	45.1	East
1980	Display & Exhibition Equipment & Supplies	All Art Show & Exhibition Lighting Hire Services	305 Penshurst St.,Willoughby,NSW	Address	45.1	East
1980	Display & Exhibition Equipment & Supplies	Eclipse Creative Lighting Electronics	305 Penshurst St.,Willoughby,NSW	Address	45.1	East
1980	Electronic Engineers	Eclipse Creative Lighting Electronics	305 Penshurst St.,Willoughby,NSW	Address	45.1	East
1980	Electronic Engineers	Illusion	305 Penshurst St.,Willoughby,NSW	Address	45.1	East
1980	Laser Equipment	Eclipse Lighting	305 Penshurst St.,Willoughby,NSW	Address	45.1	East
1980	Laser Equipment	LaserCo	305 Penshurst St.,Willoughby,NSW	Address	45.1	East
1980	Lighting	All Art Show & Exhibition Lighting Hire Services	305 Penshurst St.,Willoughby,NSW	Address	45.1	East
1980	Lighting	Eclipse Creative Lighting Electronics	305 Penshurst St.,Willoughby,NSW	Address	45.1	East
1980	Lighting	Eclipse Lighting	305 Penshurst St.,Willoughby,NSW	Address	45.1	East
1980	Lighting	Light Years Ahead	305 Penshurst St.,Willoughby,NSW	Address	45.1	East
1980	Photographic Supplies Mfrs &/or W'salers	Eastman Photographics	305 Penshurst St.,Willoughby,NSW	Address	45.1	East
2005	Dental Supplies & Equipment	Alphabond Dental Pty Ltd	202 Sydney St,WILLOUGHBY,NSW,2068	Address	48.5	West
1970	Machinery-Dry Cleaning	Turton Gordon Pty Ltd	272 Sydney Street,Willoughby,NSW	Address	48.7	North-west
2015	Funeral Directors	Liberty Funerals	222 Sydney St Chatswood NSW 2057	Address	49.1	North-west
2015	Funeral Directors	Chatswood & Roseville Funerals Services	222 Sydney St Willoughby NSW 2068	Address	49.1	North-west
2015	Funeral Directors	Northern Suburbs Funeral Services	222 Sydney St Willoughby NSW 2068	Address	49.1	North-west

YEAR	Activity	Name	Address	Positional accuracy	Distance (m)	Direction
2015	Funeral Directors	Liberty Funerals	222 Sydney St Chatswood NSW 2067	Address	49.5	North-west
1940	Stores - General	Willoughby Stores	332 Penshurst Street, Willoughby, N SW	Address	49.6	North
1980	Instruments - Process Control	Manu Electronics	224 Sydney St., Willoughby, NSW	Address	50.5	North-west
1970	PRODUCE MERCHANTS—GRAIN & SEED —RETAIL	Bowtell, H. P.,	38 McMahon St., Willoughby	Address	52.5	East
1970	ELECTRONICS— INDUSTRIAL CONTROL EQUIPMENT MFRS.	Manu Electronics,	224A Sydney St., Willoughby	Address	54.8	North-west
1990	BOAT & YACHT EQUIPMENT	ELECTRIC BOAT PARTS PTY LTD	319 Penshurst Street, North Willoughby New South Wales 2068, Australia	Address	55.6	North-east
1950	Hardware - Retail	Marsden J H	317 Penshurst Street, Willoughby, N SW	Address	57.0	North-east
1965	Dry Cleaners & Dyers	Fore-Most Dry Cleaners	321, Penshurst, NSW	Address	57.0	North-east
1965	Hardware—Retail	Marsden's Hardware	317, Penshurst, NSW	Address	57.0	North-east
1970	DRY CLEANERS, PRESSERS/ DYERS	Fore-Most Dry Cleaners,	321 Penshurst St., Willoughby	Address	57.0	North-east
1970	HARDWARE DEALERS/IRONMONG ERS WILLOUGHBY	Marsden, J. H.,	317 Penshurst St., NSW	Address	57.0	North-east
1970	PAINT, VARNISH, OILS/COLOUR MERCHANTS	Marsden, J. H.,	317-319 Penshurst St., Willoughby	Address	57.0	North-east
1970	TOOL DEALERS— RETAIL	Marsden, J. H.,	317 Penshurst St., Willoughby	Address	57.0	North-east
1990	Auto Electrical Services	Marine Electrical Specialist	319 Penshurst Street, Willoughby, N SW	Address	57.0	North-east
1990	Boat & Yacht Equipment	Electric Boat Parts Pty Ltd	319 Penshurst Street, Willoughby, N SW	Address	57.0	North-east
1990	Boat & Yacht Equipment	Electric Boat Parts Pty. Ltd.	319 Penshurst Street, Willoughby, N SW	Address	57.0	North-east
2005	Computer Equipment-- Installation & Networking; Computer Equipment--Repairs, Service & Upgrades	Just Printers	319b Penshurst St, WILLOUGHBY, NS W, 2068	Address	57.0	North-east
2005	Computer Equipment-- Installation & Networking	Piranha Computers	36 McMahon St, WILLOUGHBY, NS W, 2068	Address	58.4	East
2015	Office & Business Supplies	Willoughby North Office Supplies	323 Penshurst St Willoughby North NSW 2068	Address	61.5	North-east

YEAR	Activity	Name	Address	Positional accuracy	Distance (m)	Direction
2005	Office Supplies	Willoughby North Office Supplies	323 Penshurst St,WILLOUGHBY NORTH,NSW,2068	Address	61.5	North
2005	Pest Control	Planet Pest Control	89/ 323 Penhurst St,WILLOUGHBY,NSW,2068	Address	61.5	North
2010	Office & Business Supplies	Willoughby North Office Supplies	323 Penshurst St NORTH WILLOUGHBY 2068 NSW	Address	62.0	North-east
1930	Fuel Merchants	Ray Wm	34 McMahon Street,Willoughby,NSW	Address	63.2	North-east
1970	Earth Moving Equipment	Specialised Parts Service Pty Ltd	34 McMahon Street,Willoughby,NSW	Address	63.2	North-east
1970	Filtering Materials & Supplies	Specialised Parts Service Pty Ltd	34 McMahon Street,Willoughby,NSW	Address	63.2	North-east
1965	Butchers	Hygrade Meats	325,Penshurst,NSW	Address	66.7	North
1965	Motor Tyre Retreads & Repairs	NATIONAL TYRE SERVICE PTY LTD	283,Penshurst,NSW	Address	69.7	South-east
1965	Motor Tyres	X-Press Tyre Services Pty Ltd	283,Penshurst,NSW	Address	69.7	South-east
1970	BATTERY SALES & SERVICE	Dunlop Tyre Service (Willoughby) Pty. Ltd.,	283 Penshurst St.,Willoughby	Address	69.7	South-east
1970	TYRE DEALERS, RETREADERS & VULCANIZERS	Dunlop Tyre Service (Willoughby) Pty. Ltd.,	283 Penshurst St.,Willoughby	Address	69.7	South-east
1970	TYRE/TUBE DEALERS	Dunlop Tyre Service (Willoughby) Pty. Ltd.,	283 Penshurst St.,Willoughby	Address	69.7	South-east
1980	Tyres - Recapping, Retreading & Repairing	Dunlop Tyres (A Division of Dunlop Australia Ltd (Inc. in VIC)	283 Penshurst St. (Tyre Centre),Willoughby, NSW	Address	69.7	South-east
1980	Tyre's - W'sale	Dunlop Tyres	283 Penshurst St.,Willoughby,NSW	Address	69.7	South-east
1980	Tyre's Retail	Dunlop Tyres (A Division of Dunlop Australia Ltd (Inc. in VIC)	283 Penshurst St. (Tyre Centre),Willoughby, NSW	Address	69.7	South-east
2005	Courier Services	Pack & Send, Chatswood	4/ 283 Penhurst St,CHATSWOOD,NSW,2057	Address	69.7	South-east
2010	Couriers	Pack & Send	4/ 283 Penshurst St CHATSWOOD 2067 NSW	Address	69.7	South-east
2010	Sewage & Waste Treatment Services	Airvac Rsm Pty Ltd	283 Penshurst St WILLOUGHBY 2068 NSW	Address	69.7	South-east
2005	Shower Screens	Elegant Shower Screens	The Gables Shop 5 31 Patrick St,WILLOUGHBY,NSW,2068	Street	70.2	South-east
2005	Shower Screens	Elegant Showerscreens, Willoughby	The Gables, Shop 5, 31 Patrick St,WILLOUGHBY,NSW,2068	Street	70.2	South-east



YEAR	Activity	Name	Address	Positional accuracy	Distance (m)	Direction
2005	Shower Screens; Wardrobes--Built-In	Elegant Wardrobes, Willoughby	31 Patrick St,WILLOUGHBY,NSW,2068	Address	70.2	South-east
2005	Wardrobes--Built-In	Elegant Wardrobes, Willoughby	The Gables, Shop 5, 31 Patrick St,WILLOUGHBY,NSW,2068	Street	70.2	South-east
2005	Wardrobes--Built-In	Elegant Showerscreens, Willoughby	'The Gables', Shop 5, 31 Patrick St,WILLOUGHBY,NSW,2068	Address	70.2	South-east
2015	Air Freight Services	Pack & Send Chatswood	4/ 283 Penshurst St Willoughby NSW 2068	Address	71.3	South-east
2015	Bakeries	The Cheesecake Shop	283 Penshurst St Willoughby NSW 2068	Address	71.3	South-east
2010	Shower Screens Supply & Installation	Complete Wardrobes & Shower Screens	Shop 5 31 Patrick St WILLOUGHBY 2068 NSW	Address	71.4	South-east
2010	Shower Screens Supply & Installation	Classic Frameless Showerscreens	Shp 5 31 Patrick St WILLOUGHBY 2068 NSW	Address	71.4	South-east
2010	Shower Screens Supply & Installation	Elegant Shower Screens	The Gables Shop 5 31 Patrick St WILLOUGHBY 2068 NSW	Street	71.4	South-east
2015	Wedding - Stationery	Pure Invites	Shp2/ 283 Penshurst St Willoughby NSW 2068	Address	71.4	South-east
2010	Bakeries	Cheesecake Shop The	283 Penshurst St WILLOUGHBY 2068 NSW	Address	71.9	South-east
2010	Bakeries	The Cheesecake Shop	283 Penshurst St WILLOUGHBY 2068 NSW	Address	71.9	South-east
1980	Kitchen Renovations, Equipment & Fittings	North Shore Home Demonstration Centre Pty Ltd	338 Penshurst St.,Willoughby,NSW	Address	72.2	North-west
1940	Chemists - Pharmaceutical	O'Connell K J	331 Penshurst Street,Willoughby,NSW	Address	79.3	North
1950	Chemists - Pharmaceutical	O'Connell K J	331 Penshurst Street,Willoughby,NSW	Address	79.3	North
1965	Chemists—Pharmaceutical	O'Connell K J	331,Penshurst,NSW	Address	79.3	North
1970	CHEMISTS—PHARMACEUTICAL	O'Connell, K. J.,	331 Penshurst St.,Willoughby	Address	79.3	North
1980	Chemists - Pharmaceutical	O'Connell K J	331 Penshurst St.,Willoughby,NSW	Address	79.3	North
1940	Grocers - Retail	Broadhead&Barcham Pty Ltd	333 Penshurst Street,Willoughby,NSW	Address	82.4	North
2005	Dry Cleaners	Country Club Dry Cleaners	333 Penshurst St,WILLOUGHBY NORTH,NSW,2068	Address	82.4	North
2010	Dry Cleaning Services	Country Club Dry Cleaners	333 Penshurst St NORTH WILLOUGHBY 2068 NSW	Address	82.4	North

YEAR	Activity	Name	Address	Positional accuracy	Distance (m)	Direction
1930	Motor Engineers and Repairers	Sexty WE	296 Penshurst Street,Willoughby,N SW	Address	85.0	South
1950	Builders & Contrators	Maddocks T	182 Sydney,Willoughby, NSW	Address	86.0	South-west
1940	Grocers - Retail	Graham C C	342 Penshurst Street,Willoughby,N SW	Address	87.5	North-west
1965	Grocers—Retail	Tenkate P&J	342,Penshurst,NSW	Address	87.5	North-west
1980	Food Products	Goodin Trading Pty Ltd	342 Penshurst St.,Willoughby,NSW	Address	87.5	North-west
2005	Fishing Bait; Fishing Tackle	Chatswood Bait & Tackle	342 Penshurst St,CHATSWOOD,NS W,2067	Address	87.5	North-west
2010	Batteries - Automotive & Marine	Battery Now	342 Penhurst St CHATSWOOD 2067 NSW	Address	87.5	North-west
2010	Solar Energy Equipment & Machinery	Solar Now	342 Penhurst St CHATSWOOD 2067 NSW	Address	87.5	North-west
1970	Dry Cleaners and Dyers	Pollard R J	41 Macmahon Street,Willoughby,N SW	Address	90.1	North-east
1980	Dry Cleaners & Dyers	Pollard R J	41 MacMahon St.,Willoughby,NSW	Address	90.1	North-east
2005	Laundries	Chatswood Laundrette	344 Penshurst St,WILLOUGHBY,NS W,2068	Address	90.6	North-west
2010	Laundries - Commercial/Industrial	Chatswood Laundrette	344 Penshurst St NORTH WILLOUGHBY 2068 NSW	Address	90.6	North-west
1940	Fruiterers & Greengrocers	Maniscalco V	335 Penshurst Street,Willoughby,N SW	Address	92.4	North
1965	Fruiterers & Greengrocers	Awenevole G	335,Penshurst,NSW	Address	92.4	North
2010	Printers - General	A B M Printing	Shop 1B/ 335 Penshurst St WILLOUGHBY 2068 NSW	Address	92.4	North
2015	Cartridges - Printing Inks & Toners	Cartridge World	346 Penhurst St Chatswood NSW 2067	Address	94.6	North-west
2010	Cartridges - Printing Inks & Toners	Cartridge World	346 Penhurst St CHATSWOOD 2067 NSW	Address	95.9	North-west
2005	Computer Equipment--Home & Small Business	Computer Affair	337 Penshurst St,WILLOUGHBY NORTH,NSW,2068	Address	96.8	North
2005	Electronic Engineers	Wave Band Electronics	Unit 92 337 Penshurst St,WILLOUGHBY,NS W,2068	Address	96.8	North
1970	ADVERTISING DISPLAY SPEC.	Central Sign Service,	339 Penshurst St.,Willoughby	Address	102.3	North
1970	SCREEN PROCESS PRINTERS	Central Sign Service,	339 Penshurst St.,Willoughby	Address	102.3	North
1970	SHOWCARD/POSTER ARTISTS	Central Sign Service,	339 Penshurst St.,Willoughby	Address	102.3	North

YEAR	Activity	Name	Address	Positional accuracy	Distance (m)	Direction
1970	SIGN MANUFACTURERS	Central Sign Service,	339 Penshurst St.,Willoughby	Address	102.3	North
1940	Fruiterers & Greengrocers	Virgona J	350 Penshurst Street,Willoughby,N SW	Address	104.7	North-west
2005	Aquariums & Supplies	Aquarium North Shore	350a Penshurst St,WILLOUGHBY NORTH,NSW,2068	Address	104.7	North-west
2015	Aquariums & Live Fish Sales & Supplies	Fish Rock Aquarium	350 Penshurst St Willoughby North NSW 2068	Address	104.9	North-west
1940	Plumbers & Gasfitters	Stephenson F V&Sons	3 Kooringa Road,Chatswood,NS W	Address	107.7	West
2015	Chemists - Retail Pharmacies	Goodman's Pharmacy	352 Penshurst St Willoughby NSW 2068	Address	109.2	North-west
1930	Motor Car Body Builders	Doerner & Armstrong	279 Penshurst Street,Willoughby,N SW	Address	110.7	South-east
1940	Coach & Carriage Builders & Dealers	Armstrong R H	279 Penshurst Street,Willoughby,N SW	Address	110.7	South-east
1950	Coach & Carriage Builders	Armstrong RH	279 Penshurst,Willoughby,NSW	Address	110.7	South-east
1965	Motor Cars & Trucks—Used	Gothic Motors	279,Penshurst,NSW	Address	110.7	South-east
1970	MOTOR CAR/TRUCK DEALERS—NEW/USED	Gothic Motors,	279 Penshurst St.,Willoughby	Address	110.7	South-east
1980	Cosmetic Mfrs. &/or W'salers	Dynasty Fashions Pty Ltd	279 Penshurst St.,Willoughby,NSW	Address	110.7	South-east
1980	Cosmetic Mfrs. &/or W'salers	Johnson Laboratories Pty Ltd	279 Penshurst St.,Willoughby,NSW	Address	110.7	South-east
1965	Antique Dealers	Connoisseurs Corner Pty Ltd	104c,VictoriaAv,NSW	Address	111.6	North-west
1970	Advertising-General	Cross L E (Advertising) Pty Ltd	104 Victoria Avenue,Chatswood, NSW	Address	111.6	North-west
1970	Controllers-Automatic	Tempress Controls Pty Ltd	104 Victoria Avenue,Chatswood, NSW	Address	111.6	North-west
1970	Electrical Switches & Control Equipment	Tempress Controls Pty Ltd	104 Victoria Avenue,Chatswood, NSW	Address	111.6	North-west
1970	ENGINEERS—CONSULTING	Higgins, J. M.,	104 Victoria Ave.,Chatswood	Address	111.6	North-west
1970	Meters & Equipment	Tempress Controls Pty Ltd	104 Victoria Avenue,Chatswood, NSW	Address	111.6	North-west
1980	Lighting	Ital Lights	104b Victoria Avenue,Chatswood, NSW	Address	111.6	North-west
2005	Sewing Machines--Domestic	Chatswood Sewing Machine Service	104b Victoria Ave,CHATSWOOD,N SW,2067	Address	111.6	North-west
2005	Sewing Machines--Domestic; Sewing Machines--Service &	Chatswood Sewing Centre	104 Victoria Ave,CHATSWOOD,N SW,2067	Address	111.6	North-west

YEAR	Activity	Name	Address	Positional accuracy	Distance (m)	Direction
	Repairs; Embroidery Supplies & Equipment					
2005	Structural Engineers	MJ Civil Engineering	Suites 1&2 Level 1, 104 Victoria Ave, CHATSWOOD, NSW, 2057	Street	111.6	North-west
2010	Furniture - Exterior/Outdoor	Bbq Factory	341 Penshurst St CHATSWOOD 2067 NSW	Address	112.1	North
2005	Furniture--Outdoor; Barbecues & Barbecue Equipment	BBQ Factory, Chatswood	341 Penshurst St, CHATSWOOD, NSW, 2067	Address	113.5	North
1940	Chemists - Pharmaceutical	Goodman S	352 Penshurst Street, Willoughby, NSW	Address	114.0	North-west
1950	Chemists - Pharmaceutical	Goodman S	352 Penshurst Street, Willoughby, NSW	Address	114.0	North-west
1965	Chemists—Pharmaceutical	Goodman's Pharmacy	352, Penshurst, NSW	Address	114.0	North-west
1965	Chemists—Pharmaceutical	Ryan J A	352, Penshurst, NSW	Address	114.0	North-west
1970	CHEMISTS—PHARMACEUTICAL	Goodman, S.,	352 Penshurst St., Willoughby	Address	114.0	North-west
1970	MOTOR ACCESSORIES/DEALERS	Chatswood Auto Spares & Accessories,	352 Penshurst St, Chatswood	Address	114.0	North-west
1970	MOTOR SPARE PARTS DEALERS—RETAIL	Chatswood Auto Spares & Accessories,	352 Penshurst St., Chatswood	Address	114.0	North-west
1980	Chemists - Pharmaceutical	Goodman's Pharmacy	352 Penshurst St., Willoughby, NSW	Address	114.0	North-west
1980	Chemists - Pharmaceutical	Ryan John A	352 Penshurst St., Willoughby, NSW	Address	114.0	North-west
1980	Motor Accessories - Retail	Chatswood Auto Spares & Accessories	352a Penshurst St., Chatswood, NSW	Address	114.0	North-west
1980	Motor Accessories - Retail	Covey Craig Auto Industries Pty Ltd	352a Penshurst St., Chatswood, NSW	Address	114.0	North-west
1980	Motor Replacement Parts	Chatswood Auto Spares & Accessories	352a Penshurst St., Chatswood, NSW	Address	114.0	North-west
1980	Motor Replacement Parts	Covey Craig Auto Industries Pty Ltd	352a Penshurst St., Chatswood, NSW	Address	114.0	North-west
2005	Motor Replacement Parts	Autobarn-Chatswood	352a Penshurst St, CHATSWOOD, NSW, 2067	Address	114.0	North-west
2005	Motor Replacement Parts; Radios & Stereos--Automotive	Autobarn Chatswood	352a Penshurst St, CHATSWOOD, NSW, 2067	Address	114.0	North-west
2010	Car Accessories - Retail	Real Spare Parts Stores	352A Penshurst St CHATSWOOD 2067 NSW	Address	114.0	North-west
2010	Car Accessories - Retail	Autobarn-Chatswood	352A Penshurst St CHATSWOOD 2067 NSW	Address	114.0	North-west
1940	Veterinary Surgeons & Hospitals	Sinclair J Stuart	145 Sydney Street, Willoughby, NSW	Address	116.2	South
2005	Engineers--General	A.I.S. Engineering	24 Macmahon St, WILLOUGHBY, NSW, 2068	Address	120.2	East

YEAR	Activity	Name	Address	Positional accuracy	Distance (m)	Direction
1940	Plumbers & Gasfitters	Richards Austin	137 Victoria Avenue, Chatswood, NSW	Address	126.2	North
1965	Hardware—Retail	Willoughby North Hardware	139, Victoria Av, NSW	Address	126.2	North
1965	Builders & Contractors	Jeffrey R	25, Patrick, NSW	Address	126.3	East
2015	Wedding - Car Hire	North Shore Wedding Cars	23 Patrick St Willoughby NSW 2068	Address	127.2	East
1940	Engineers - General	Chapman C	23 Patrick Street, Willoughby, NSW	Address	135.2	East
1950	Engineers - General	Chapman C	23 Patrick Street, Willoughby, NSW	Address	135.2	East
1965	Carriers—Heavy	Hill J J	23, Patrick, NSW	Address	135.2	East
1965	Carriers—Light	P.&R. Carriers Pty Ltd	23, Patrick, NSW	Address	135.2	East
2010	Wedding - Car Hire	North Shore Wedding Cars	23 Patrick St WILLOUGHBY 2068 NSW	Address	135.2	East
1950	Builders & Contrators	McKnight AA	94 Victoria Av, Chatswood, NSW	Address	136.4	North-east
1965	Motor Service Stations	Avenue Filling Station	98, Victoria Av, NSW	Address	139.6	North
1940	Builders & Contractors	Gurney E G	162 Sydney, Willoughby, NSW	Address	145.6	South-west
1950	Builders & Contrators	Gurney EG	162 Sydney, Willoughby, NSW	Address	145.6	South-west
2010	Dress Fabrics & Materials	Fox's	151 Victoria Ave CHATSWOOD 2067 NSW	Address	146.4	North-west
1950	Boot Repairers	Brown E	147 Victoria Avenue, Chatswood, NSW	Address	146.7	North-west
1965	Boot Repairers	Brown E	147, Victoria Av, NSW	Address	146.7	North-west
1965	Butchers	MEDWAY H PTY LTD	149, Victoria Av, NSW	Address	146.7	North-west
1970	AIR CONDITIONING—SALES &/OR SERVICE	H.A.C. Services Pty. Ltd.,	147 Victoria Ave., Chatswood	Address	146.7	North-west
1965	Dry Cleaners & Dyers	COUNTRY CLUB DRY CLEANERS	143, Victoria Av, NSW	Address	148.8	North-west
1970	Dry Cleaners and Dyers	Country Club Dry Cleaners Pty Ltd	143 Victoria Avenue, Chatswood, NSW	Address	148.8	North-west
1970	DRY CLEANERS, PRESSERS/ DYERS	Country Club Dry Cleaners,	143 Victoria Ave, Chatswood	Address	148.8	North-west
1980	Dry Cleaners & Dyers	Spruce Goose	143 Victoria Avenue, Chatswood, NSW	Address	148.8	North-west
1990	Dry Cleaners	Country Club Dry Cleaners	143 Victoria Avenue, Chatswood, NSW	Address	148.8	North-west
2005	Blinds	A Accent Australia	143 Victoria Ave, CHATSWOOD, NSW, 2067	Address	148.8	North-west

YEAR	Activity	Name	Address	Positional accuracy	Distance (m)	Direction
2005	Blinds	Accent, Chatswood	143 Victoria Ave, CHATSWOOD, NSW, 2067	Address	148.8	North-west
1940	Builders & Contractors	Moore F	110 Victoria Avenue, Chatswood, NSW	Address	149.5	North-west
1950	Builders & Contractors	Moore F	110 Victoria Av, Chatswood, NSW	Address	149.5	North-west
1980	Hotel & Restaurant Cooking Equipment	Collectramatic Distributors Pty Ltd	135 Victoria Avenue, Chatswood, NSW	Address	152.7	North
2005	Building Contractors; Building Contractors-- Alterations, Extensions & Renovations	Peter McKay Home Improvements	Level 1-135 Victoria Ave, CHATSWOOD, NSW, 2057	Address	152.7	North
2005	Cleaning Contractors--Commercial & Industrial	Sunblest Cleaning Services	Suite 2, Level 1, 135 Victoria Ave, CHATSWOOD, NSW, 2067	Street	152.7	North
1980	Restaurant Equipment & Supplies	Accoutrement	145 Victoria Avenue, Chatswood, NSW	Address	155.6	North-west
2005	School Supplies	Janet's Art Supplies Pty Ltd	145 Victoria Ave, CHATSWOOD, NSW, 2067	Address	155.6	North-west
1940	Grocers - Retail	McComas W	141 Victoria Avenue, Chatswood, NSW	Address	155.9	North
1965	Laundries	Wash-O-Mat Pty Ltd	141, Victoria Av, NSW	Address	155.9	North
1970	LAUNDRIES &/OR LAUNDRETTES	Wash-O-Mat Pty. Ltd. Self-Service,	141 Victoria Ave., Chatswood	Address	155.9	North
1980	Antiques - Reproductions &/or Restorations	Jensen & Speers	141 Victoria Avenue, Chatswood, NSW	Address	155.9	North
1980	Laundries	Chatswood Laundrette	141 Victoria Avenue, Chatswood, NSW	Address	155.9	North
2015	Dress Fabrics & Materials	Fox's	151 Victoria Ave Chatswood NSW 2067	Address	156.9	North-west
2005	Radio Stations	FM . (NSB)	112 Victoria Ave, CHATSWOOD, NSW, 2067	Address	157.2	West
1980	Cleaning Contractors--Commercial & Industrial	Kennedy Cleaning Services Pty Ltd	133 Victoria Avenue, Chatswood, NSW	Address	158.3	North
1990	Taxi Truck Services	Zip Cars Pty Ltd	133 Victoria Avenue, Willoughby, NSW	Address	158.3	North
2005	Allergy Aid Products & Services	Allergy Services Pty Ltd	133 Victoria Ave, CHATSWOOD, NSW, 2067	Address	158.3	North
2005	Allergy Aid Products & Services	Allergy Assessment & Treatment Clinic	133 Victoria Ave, CHATSWOOD, NSW, 2067	Address	158.3	North
2005	Blinds	Material World, Chatswood	153-157 Victoria Ave, CHATSWOOD, NSW, 2057	Address	159.5	North-west



YEAR	Activity	Name	Address	Positional accuracy	Distance (m)	Direction
2005	Curtains & Curtain Fabrics--Retail	Material World, Chatswood	153-157 Victoria Ave,CHATSWOOD,N SW,2057	Address	159.5	North-west
2005	Lighting & Accessories--W'salers & Mfrs	Tian Li Lighting Australia Pty Ltd	153 Victoria Ave,CHATSWOOD,N SW,2067	Address	159.5	North-west
2010	Curtains - Custom & Ready-Made	Material World	153 Victoria Ave CHATSWOOD 2067 NSW	Address	159.5	North-west
2005	Electrical Contractors; Electrical Engineers; Inspection & Testing Services	Electrical Testing Co Pty Ltd	131 Victoria Ave,CHATSWOOD,N SW,2067	Address	160.1	North
2015	Curtains - Custom & Ready-Made	Material World	153-157 Victoria Ave Chatswood NSW 2067	Address	160.3	North-west
2015	Lighting Fixtures & Accessories - M/Factrs & W/Salers	Tian Li Lighting Australia Pty Ltd	153 Victoria Ave Chatswood NSW 2067	Address	160.3	North-west
2005	Carpet & Furniture Cleaning & Protection	Offlowe Pty Ltd T/A Big Jim Carpets, Chatswood	161 Victoria Ave,CHATSWOOD,N SW,2067	Address	162.1	North-west
2005	Computer Equipment Supplies	Cartridge World Chatswood	Shop 2, 161 Victoria Ave,CHATSWOOD,N SW,2057	Address	162.1	North-west
2005	Louvres & Shutters	Vogue Vinyl Shutters Pty Ltd	161 Victoria Ave,CHATSWOOD,N SW,2067	Address	162.1	North-west
2015	Carpet Furniture & Upholstery Cleaning	Ayaz Persian Oriental Carpets	127 Victoria Ave Chatswood NSW 2067	Address	165.0	North
2015	Car Accessories - Retail	Real Spare Parts Stores	352a Penshurst St Chatswood NSW 2067	Address	165.1	North
2015	Bicycles & Accessories - Retailers & Repairers	Cranks Bike Store	352A Penshurst St Chatswood NSW 2057	Address	165.2	North
1970	PRINTERS—LETTERPRESS	Para-Vogue Printing,	165 Victria Ave.,Chatswood	Address	168.7	North-west
2005	Bathroom Renovations	Capell Of Sydney, Chatswood	169 Victoria Ave,CHATSWOOD,N SW,2067	Address	169.0	North-west
2005	Bathroom Renovations; Kitchens, Renovations & Equipment	Capell Of Chatswood	169 Victoria Ave,CHATSWOOD,N SW,2067	Address	169.0	North-west
2005	Bathroom Renovations; Kitchens, Renovations & Equipment	Capell of Chatswood, Chatswood	169 Victoria Ave,CHATSWOOD,N SW,2067	Address	169.0	North-west
2005	Cabinet Makers; Kitchens, Renovations & Equipment	Capell Of Sydney, Chatswood	169 Victoria Ave,CHATSWOOD,N SW,2067	Address	169.0	North-west
1940	Laundries	Victoria Laundry	167 Victoria Avenue,Chatswood, NSW	Address	169.5	North-west
1950	Dry Cleaners and Dyers	Vicary R	167 Victoria Avenue,Chatswood, NSW	Address	169.5	North-west

YEAR	Activity	Name	Address	Positional accuracy	Distance (m)	Direction
1950	Dry Cleaners and Dyers	Vicks Dry Cleaners	167 Victoria Avenue, Chatswood, NSW	Address	169.5	North-west
1965	Printers — Lithographic	PARA-VOGUE PRINTING	165, Victoria Av, NSW	Address	169.5	North-west
1965	Printers—Letterpress	Paramount Printing Co	165, Victoria Av, NSW	Address	169.5	North-west
1965	Printers—Letterpress	PARA-VOGUE PRINTING	165, Victoria Av, NSW	Address	169.5	North-west
1965	Printers—Letterpress	Vogue Printing	165, Victoria Av, NSW	Address	169.5	North-west
1970	INDUSTRIAL CONSULTANTS	Internal Detection Service Co. Pty. Ltd.,	165 Victoria Ave., Chatswood	Address	169.5	North-west
1970	INDUSTRIAL CONSULTANTS	Robson, S. B. & Associates Pty. Ltd.,	165 Victoria Ave., Chatswood	Address	169.5	North-west
1970	Printers - Letterpress	Para-Vogue Printing	165 Victoria Avenue, Chatswood, NSW	Address	169.5	North-west
1970	Printers - Lithographic	Para-Vogue Printing	165 Victoria Avenue, Chatswood, NSW	Address	169.5	North-west
1970	Printers - Small Offset	Para-Vogue Printing	165 Victoria Avenue, Chatswood, NSW	Address	169.5	North-west
1970	PRINTERS—LITHOGRAPHIC (OFFSET)	Para-Vogue Printing,	165 Victoria Ave., Chatswood	Address	169.5	North-west
1980	Controllors-automatic	Tempress Controls Pty Ltd	165a Victoria Avenue, Chatswood, NSW	Address	169.5	North-west
1980	Electrical Switches & Control Equipment	Tempress Controls Pty Ltd	165a Victoria Avenue, Chatswood, NSW	Address	169.5	North-west
1980	Gauges - Pressure	Tempress Controls Pty Ltd	165a Victoria Avenue, Chatswood, NSW	Address	169.5	North-west
1980	Instruments - General	Tempress Controls Pty Ltd	165a Victoria Avenue, Chatswood, NSW	Address	169.5	North-west
1980	Irrigation &/or Reticulation Systems	Tempress Controls Pty Ltd	165a Victoria Avenue, Chatswood, NSW	Address	169.5	North-west
1980	Litho Plates	Independent Litho Plates Pty Ltd	Rear 165 Victoria Avenue, Chatswood, NSW	Address	169.5	North-west
1980	Printers - General	Para-Vogue Printing	165 Victoria Avenue, Chatswood, NSW	Address	169.5	North-west
1980	Printers - Lithographic	Para-Vogue Printing	165 Victoria Avenue, Chatswood, NSW	Address	169.5	North-west
1980	Printers Supplies & Services	Independent Litho Plates Pty Ltd	Rear 165 Victoria Avenue, Chatswood, NSW	Address	169.5	North-west
1980	Thermometers	Tempress Controls Pty Ltd	165a Victoria Avenue, Chatswood, NSW	Address	169.5	North-west
2010	Video & DVD Production & Duplication Service	Take Five Video	171 Victoria Ave CHATSWOOD 2067 NSW	Address	169.6	North-west



YEAR	Activity	Name	Address	Positional accuracy	Distance (m)	Direction
2005	Window Cleaning	Starlight Window Cleaning	16 Macmahon St, WILLOUGHBY, NSW, 2068	Address	169.8	East
1980	Irrigation &/or Reticulation Systems	Tempress Controls Pty Ltd	165a Victoria Avenue, Chatswood, NSW	Address	172.1	North-west
1940	Painters Decorators & Glaziers	Werner R	272 Penshurst Street, Willoughby, NSW	Address	177.5	South
1940	Radio Repairs & Service	Ferguson's Radio	12 McMahon Street, Willoughby, NSW	Address	197.8	East
1950	Timber Merchants	Wangmann Timber Co	Koorunga Road, Chatswood, NSW	Street		West
1970	CARRIERS & CARTAGE CONTRACTORS — MASTER	Pierce, J. L. Pty. Ltd.,	Koorunga Road, Chatswood	Street		West
1970	CARRIERS & CARTAGE CONTRACTORS	Trek Transport Pty. Ltd,	Koorunga Rd, Chatswood	Street		West
1970	CARRIERS & CARTAGE CONTRACTORS	Hennessy, J. G. Pty. Ltd.,	Koorunga Road, Chatswood	Street		West
1970	CARRIERS & CARTAGE CONTRACTORS	Pierce, J. L. Pty. Ltd.,	Koorunga Road, Chatswood	Street		West
1970	CLEARING CONTRACTORS	Hennessy, J. G. Pty. Ltd.,	la Koorunga Road, Chatswood	Street		West
1970	DREDGE OWNERS	Hennessy, J. G. Pty. Ltd.,	Koorunga Road, Chatswood	Street		West
1970	Dry Cleaners and Dyers	Ross Colin Dry Cleaners	Macmahon Street, Willoughby, NSW	Street		North-east
1970	EARTH-MOVING CONTRACTORS	Hennessy, J. G. Pty. Ltd.,	Koorunga Road, Chatswood	Street		West
1970	GRAVEL, SAND/SOIL SUPPLIES	Hennessy, J. G. Pty. Ltd.,	Koorunga Road, Chatswood	Street		West
1970	GRAVEL, SAND/SOIL SUPPLIES	Pierce, John L. Pty. Ltd.,	Koorunga Road, Chatswood	Street		West
1970	HAULAGE CONTRACTORS	Hennessy, J. G. Pty. Ltd.,	Koorunga Road, Chatswood	Street		West
1970	HAULAGE CONTRACTORS	Pierce, John L. Pty. Ltd.,	Koorunga Road, Chatswood	Street		West
1970	Pipes-Vitrified Clay	Mashman Bros Pty Ltd	Koorunga Road, Chatswood, NSW	Street		West
1970	POTTERY MFRS./DISTS.	MASHMAN BROTHERS PTY LIMITED	Koorunga Road, Chatswood	Street		West
1970	ROAD TRANSPORT SERVICES— INTERSTATE	Trek Transport Pty. Ltd.	Koorunga Road, Chatswood	Street		West
1970	ROAD TRANSPORT SERVICES—N.S.W.	Pierce, J. L. Pty. Ltd.	Koorunga Rd. Chatswood, NSW	Street		West
1970	Transport Services	Hennessy JG Pty Ltd	Koorunga Road, Chatswood, NSW	Street		West
1980	Dry Cleaners & Dyers	Colin Ross Dry Cleaners	MacMahon St., Willoughby, NSW	Street		North-east
1980	Dry Cleaners & Dyers	Ross Colin Dry Cleaners	MacMahon St., Willoughby, NSW	Street		North-east
1980	Motor Service Stations & Garages	BP Gothic Service Station	Cnr. Penshurst St. & Sydney	Street		North

YEAR	Activity	Name	Address	Positional accuracy	Distance (m)	Direction
			Road,Willoughby,NS W			
1980	Motor Service Stations & Garages	B P Aust Ltd	Cnr. Sydney Road & Penshurst St.,Willoughby,NSW	Street		North
1990	Dry Cleaners	Colin Ross Dry Cleaners	McMahon Street,Willoughby,N SW	Street		North-east
2005	Motor Replacement Parts	Chatswood Auto One	Cnr Patrick & Penshurst Sts,WILLOUGHBY,NS W,2068	Street		South-east
2005	Motor Replacement Parts	Auto One Parts And Accessories, Chatswood	Cnr Penshurst & Patrick St,CHATSWOOD,NS W,2067	Street		South-east
2005	Motor Service Stations & Garages	BP, Willoughby	Cnr Penshurst St & Sydney Rd,WILLOUGHBY,NS W,2068	Street		North
2010	Car Replacement Parts	Chatswood Auto One	Cnr Patrick & Penshurst Sts WILLOUGHBY 2068 NSW	Street		South-east
2010	Car Replacement Parts	Auto One Parts And Accessories	Cnr Penshurst & Patrick St CHATSWOOD 2067 NSW	Street		South-east
2010	Chemists - Retail Pharmacies	Goodman's Pharmacy	Cnr Victoria Ave & Penshurst St WILLOUGHBY 2068 NSW	Street		North
2015	Batteries - Automotive & Marine	Auto One Parts And Accessories	Cnr Penshurst & Patrick St Chatswood NSW 2067	Street		South-east
2015	Batteries - Automotive & Marine	Auto One Chatswood	Cnr Penshurst & Patrick Sts Willoughby NSW 2068	Street		South-east

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
Not identified			-	-

#### 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
Water Erosion Risk	Moderate to severe limitations	Moderate	0.0	Onsite
	Very severe limitations	Very High	414.7	North
Wind Erosion Risk	Very slight to negligible limitations	Very Low	0.0	Onsite
	Moderate to severe limitations	Moderate	414.7	North

Category	Type	Details	Distance (m)	Direction
	Slight but significant limitations	Low	485.0	North-west

## Flood Hazard

Category	Type	Details	Distance (m)	Direction
Probable Maximum Flood (PMF)	Flood Mapping Precinct	Scotts Creek Flood Study - March 2008	284.6	East

## 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)





The Commons  
388 George Street  
Sydney NSW 2000 Australia  
[info@landinsight.co](mailto:info@landinsight.co)  
[www.landinsight.co](http://www.landinsight.co)

## 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, lush green vegetation. The water's color is a striking contrast to the surrounding earthy tones of the rocks and foliage. The river flows from the top left towards the bottom right of the frame.

# Appendix B

HISTORIC IMAGERY

316 Penshurst Street  
North Willoughby, NSW



Historic Aerial Photograph - 1930



LI-3210 Aerial Photograph 1930 14.02.2023. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m



## Historic Aerial Photograph - 1943



L-3210 Aerial Photograph 1943 14.02.2023. Data source: Please refer to 'Digital Data Sources' in the Product Guide

 Subject area

0 200m

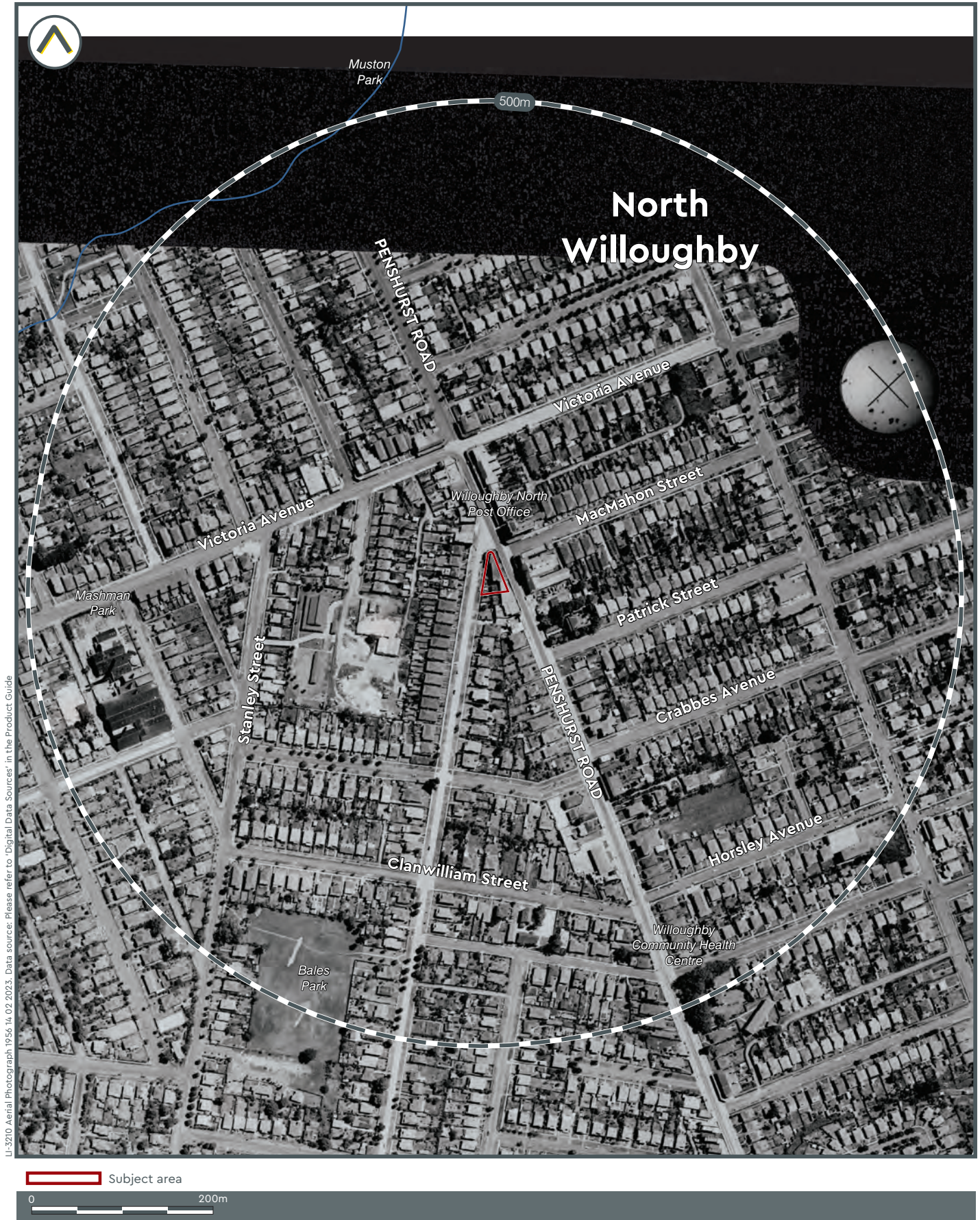


## Historic Aerial Photograph - 1951





## Historic Aerial Photograph - 1956





## Historic Aerial Photograph - 1961





## Historic Aerial Photograph - 1965





Historic Aerial Photograph - 1975



LI-3210 Aerial Photograph 1975 14.02.2023. Data source: Please refer to 'Digital Data Sources' in the Product Guide





Historic Aerial Photograph - 1978



LI-3210 Aerial Photograph 1975 14.02.2023. Data source: Please refer to 'Digital Data Sources' in the Product Guide





## Historic Aerial Photograph - 1986





## Historic Aerial Photograph - 1991





## Historic Aerial Photograph - 1994



LI-3210 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 - 2002





## Historic Aerial Photograph - 2004



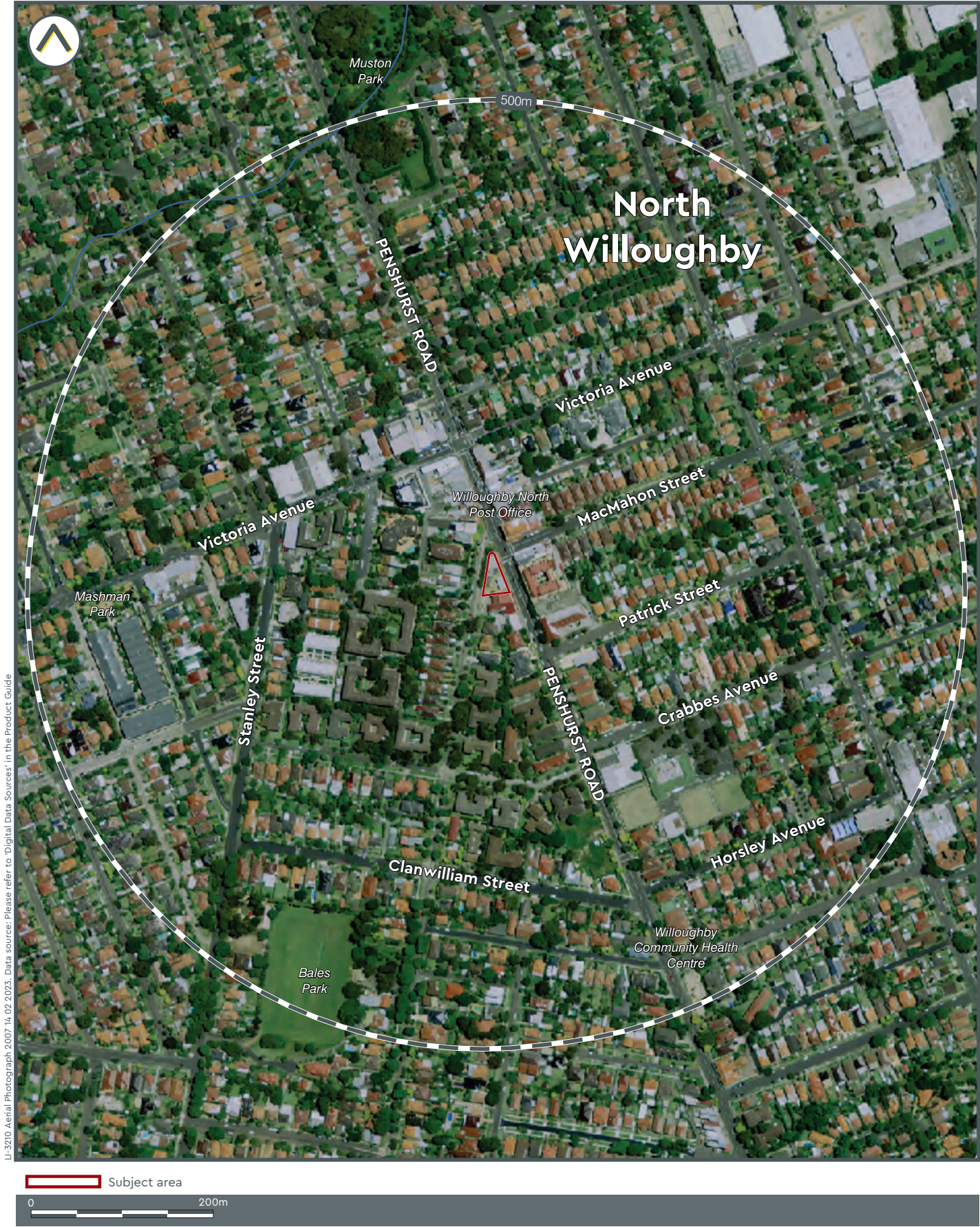
LI-3210 Aerial Photograph 2004 14.02.2023. Data source: Please refer to 'Digital Data Sources' in the Product Guide

 Subject area

0 200m

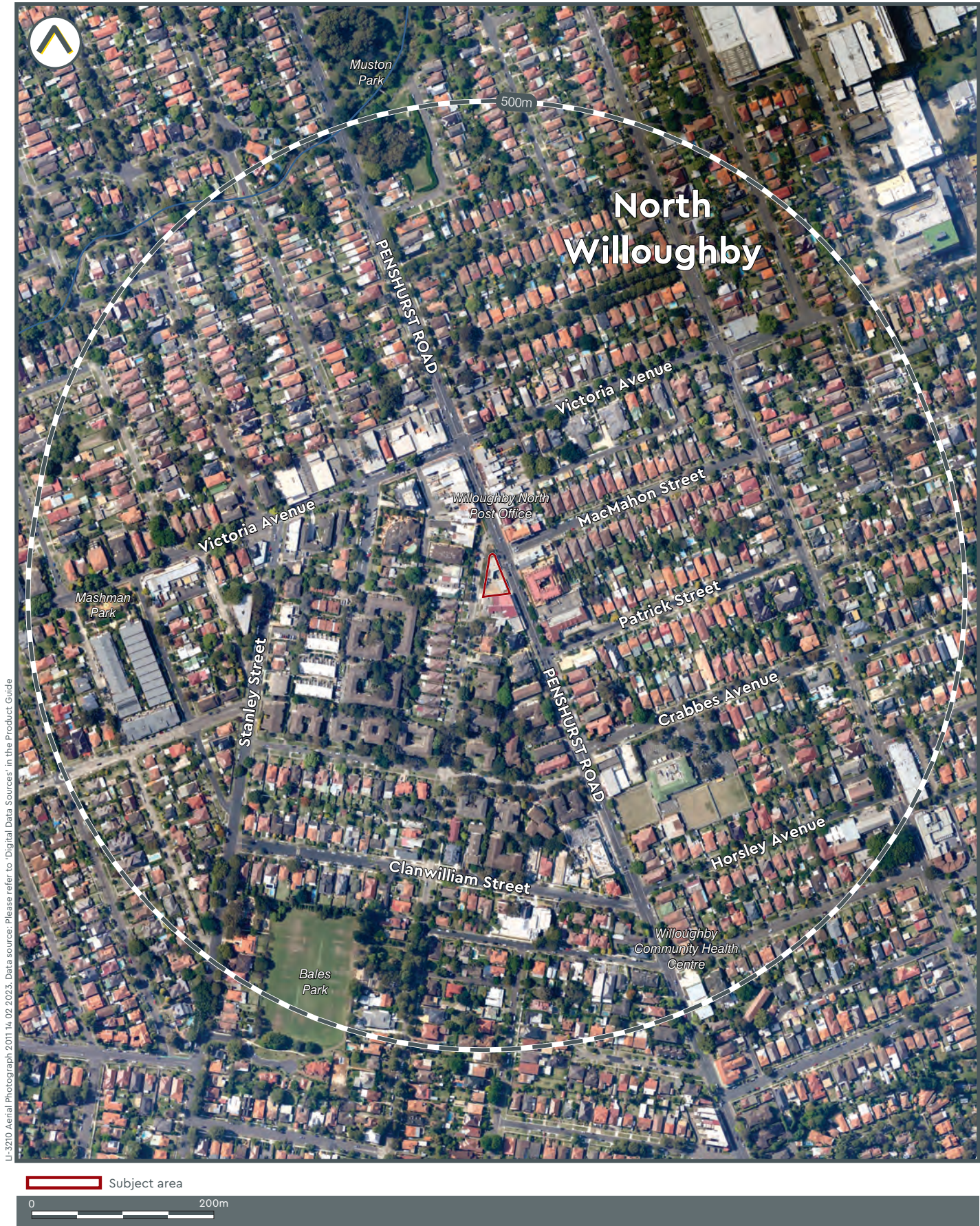


Historic Aerial Photograph - 2007



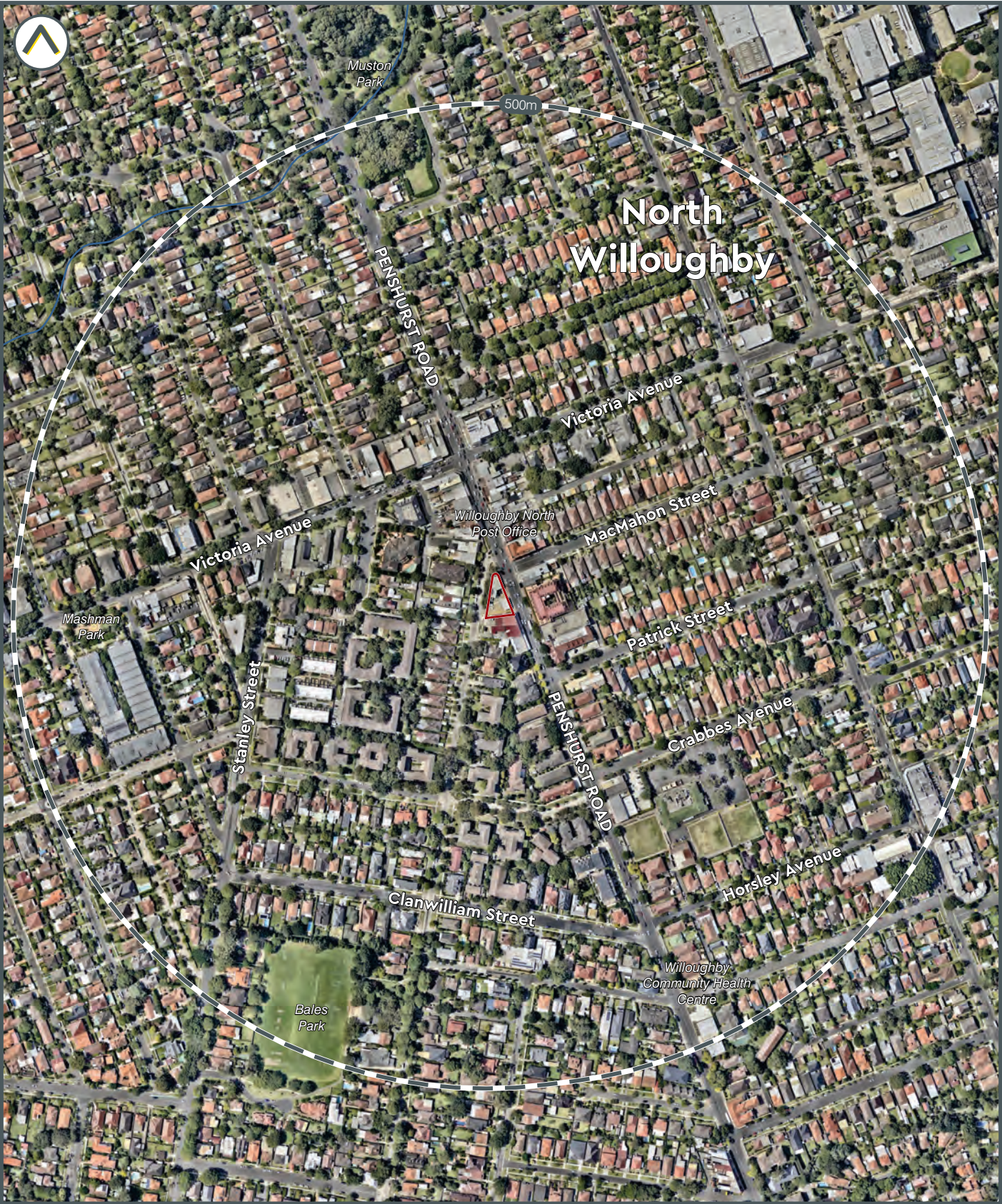


Historic Aerial Photograph - 2011





Historic Aerial Photograph - 2014



LI-3210 Aerial Photograph 2014, 14.02.2023. Data source: Please refer to 'Digital Data Sources' in the Product Guide



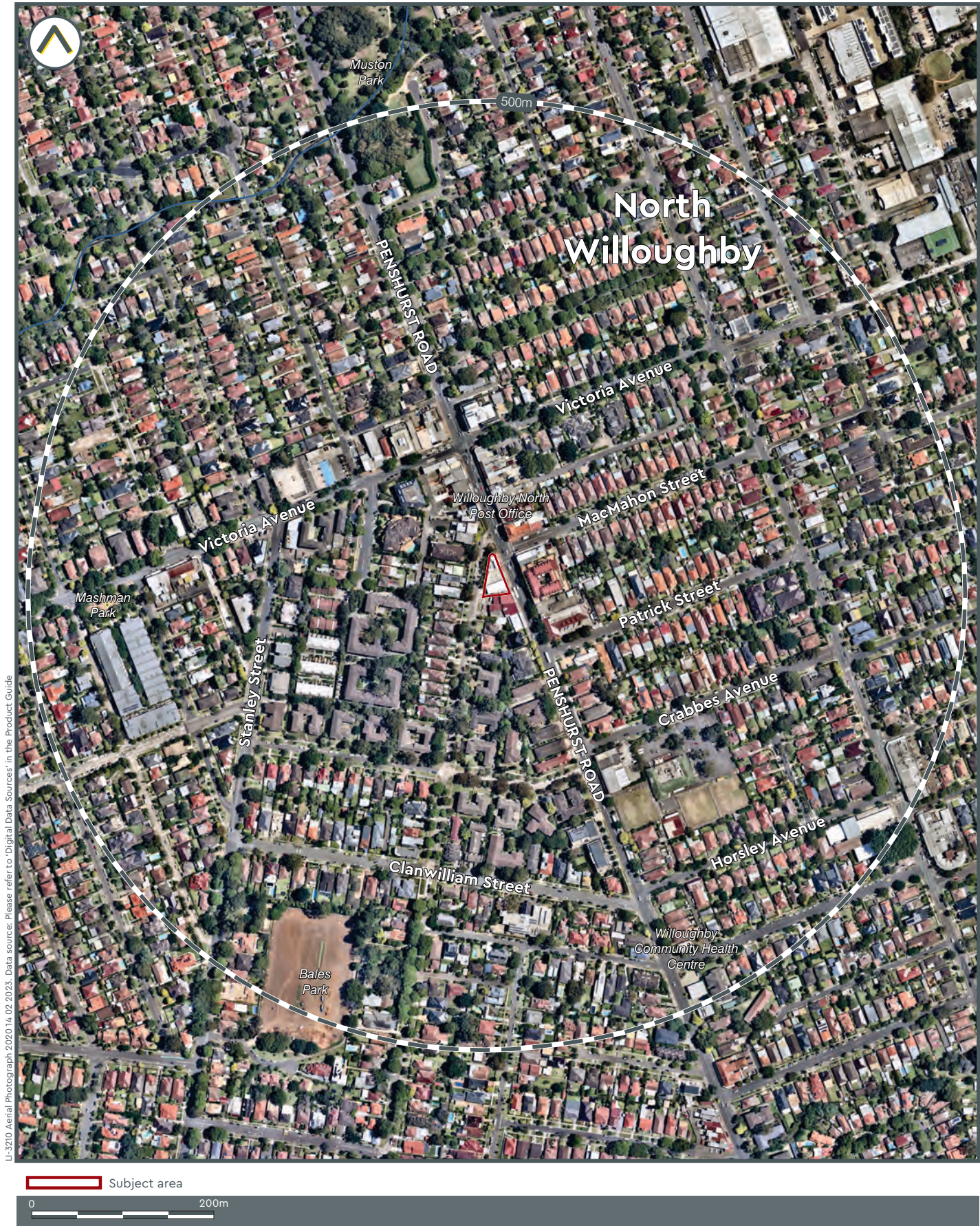


## Historic Aerial Photograph - 2017





Historic Aerial Photograph - 2020





Historic Aerial Photograph - 2023







## Appendix D: LIR Report Maps





# Appendix A

REPORT MAPS

316 Penshurst Street  
North Willoughby, NSW





**Subject Area and Sensitive Receptors**



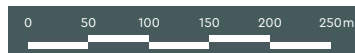
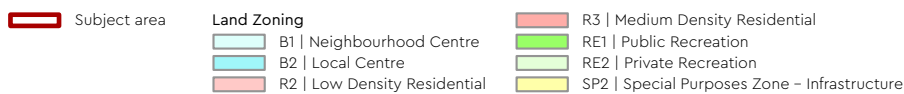
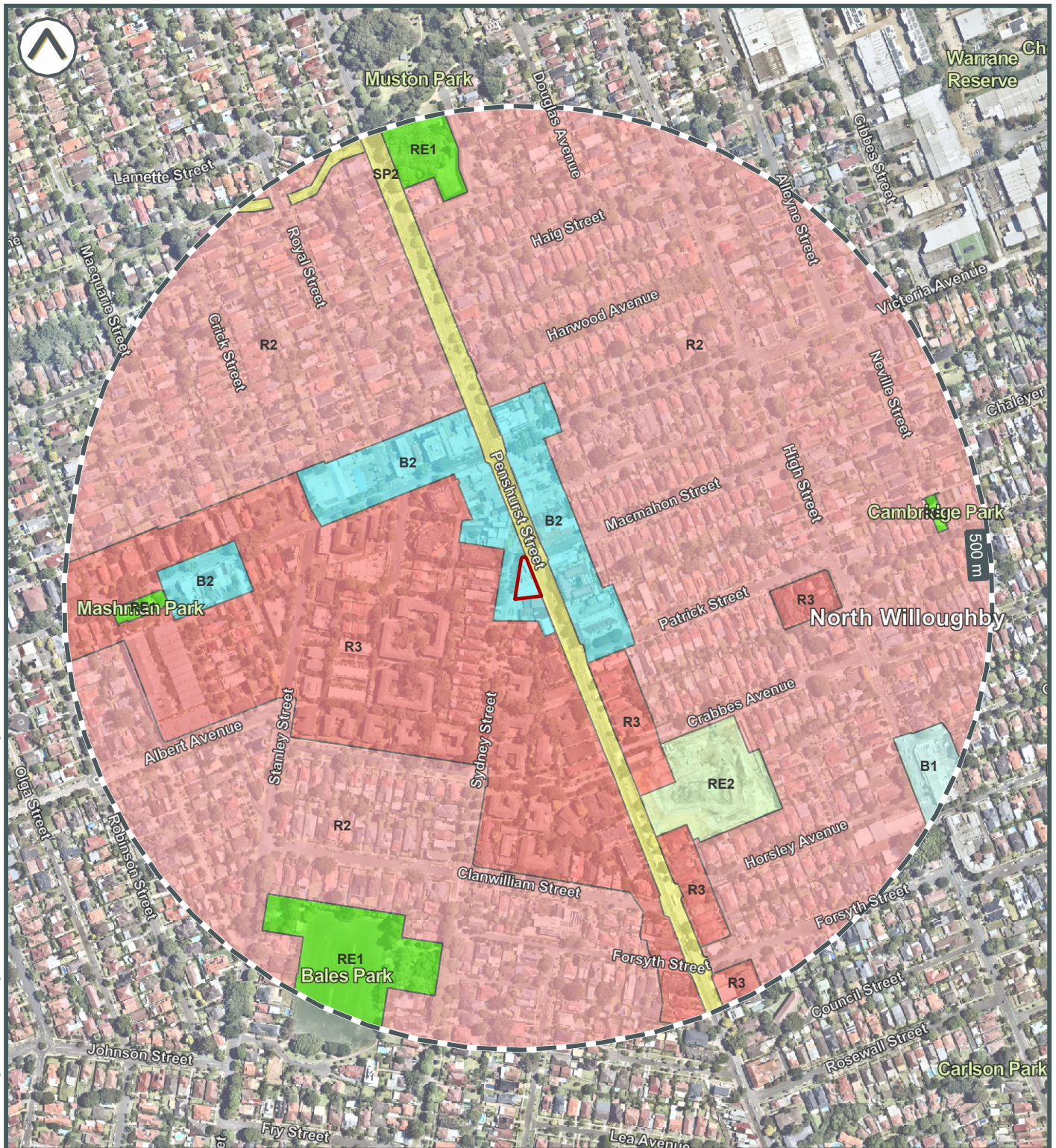
Subject area      Water main  
Sewer main







Zoning







Planning Overlays



©2023 Land Insight (LI) www.landinsight.co | R:\LI\3210 ESR North Willoughby\GIS\Working\GIS\Project\LI-XXXXX XXX A4P Layouts | Data source: Please refer to 'Digital Data Sources' in the Product Guide

- Subject area
- Acid Sulfate Soils

Active Street Frontages

Coal Seam Gas Exclusions

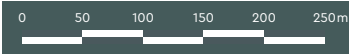
Height of Building

Land Reservation Acquisition

Local Provisions

Lot Size

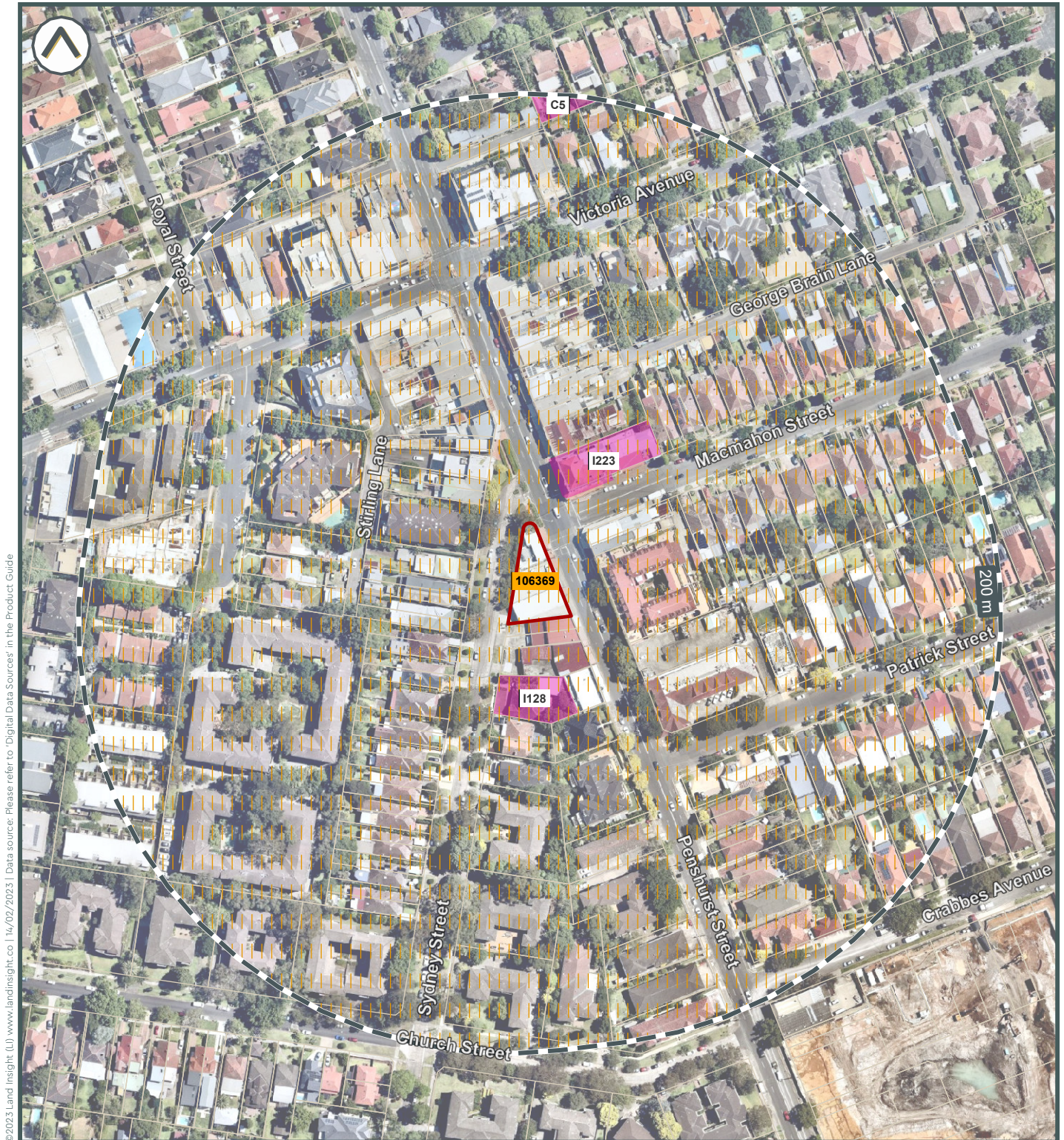
Maximum Floor Space Ratio (n:1)







Heritage



©2023 Land Insight (LI) www.landinsight.co | 14/02/2023 | Data source: Please refer to 'Digital Data Sources' in the Product Guide

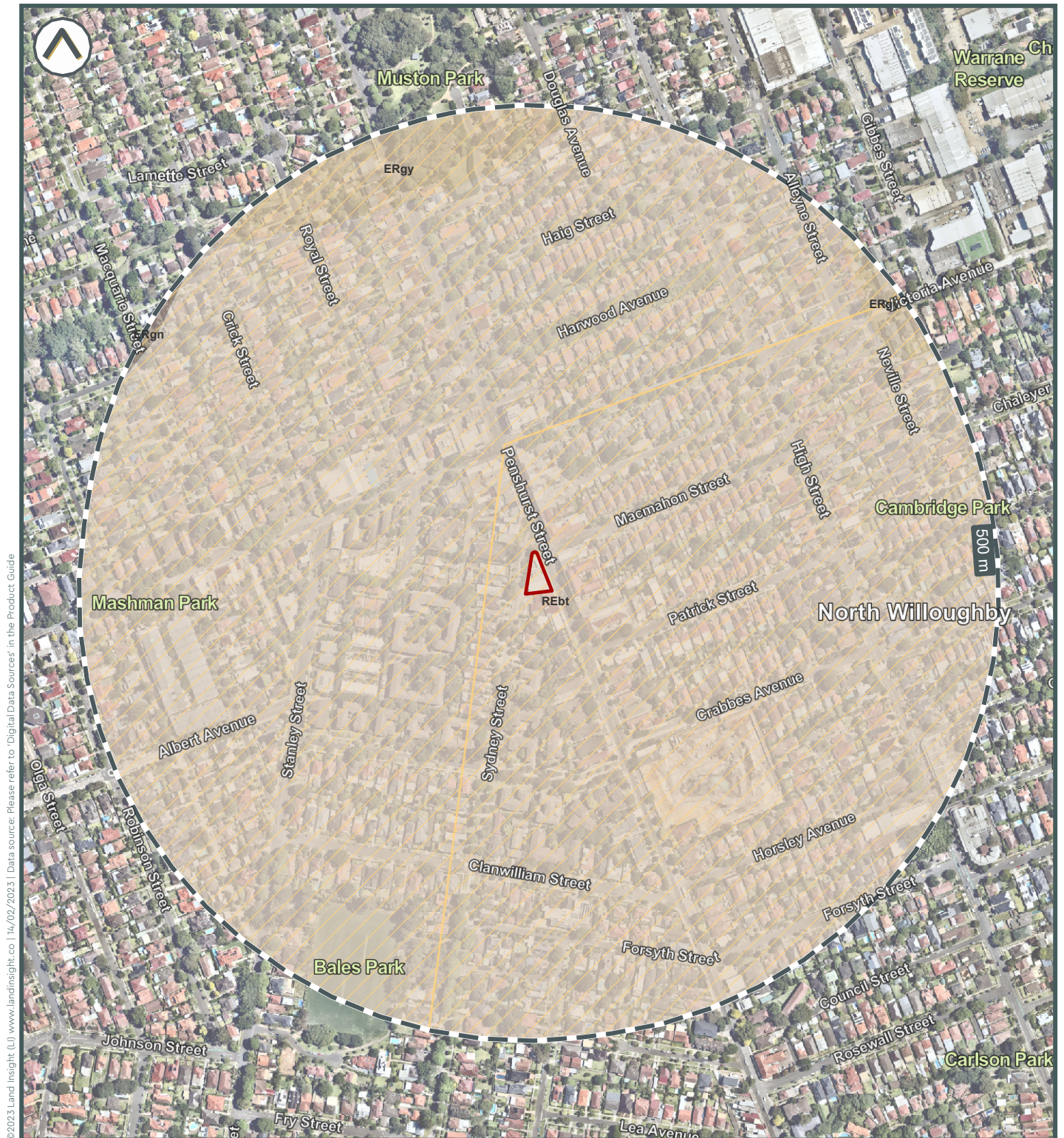
- Subject area
- National Heritage Database
- State and Local Heritage Registers
- National Heritage List
- Heritage Register








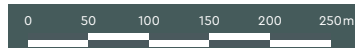
Soil Landscape and Salinity



©2023 Land Insight (LI) www.landinsight.co | 14/02/2023 | Data source: Please refer to 'Digital Data Sources' in the Product Guide

 Subject area  
Radon Level (Bq/m<sup>3</sup>)  
 5-19

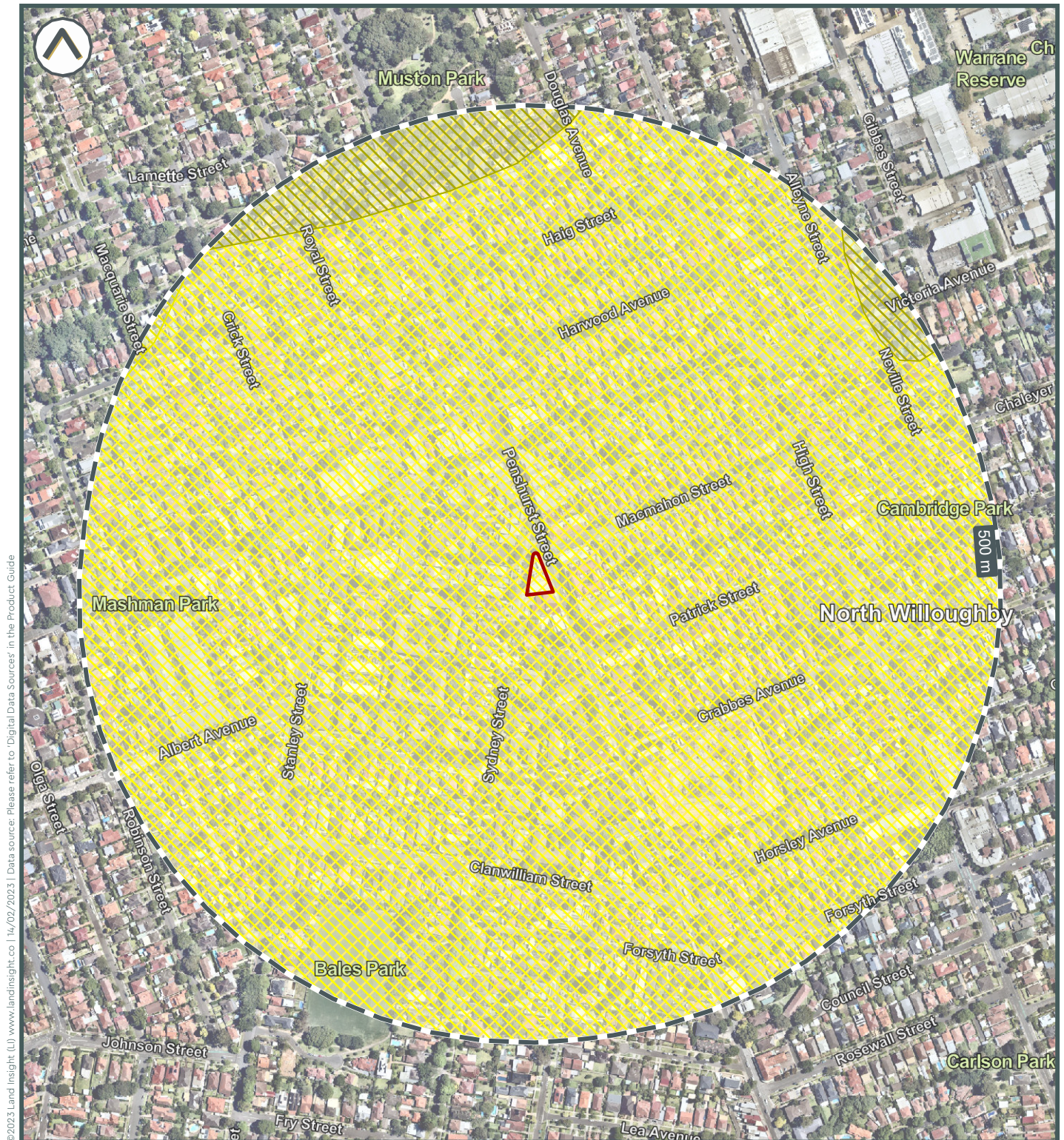
Soil Landscape  
 ERgn  
 ERgy  
 REbt







Acid Sulfate Soils



©2023 Land Insight (LI) www.landinsight.co | 14/02/2023 | Data source: Please refer to 'Digital Data Sources' in the Product Guide

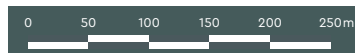
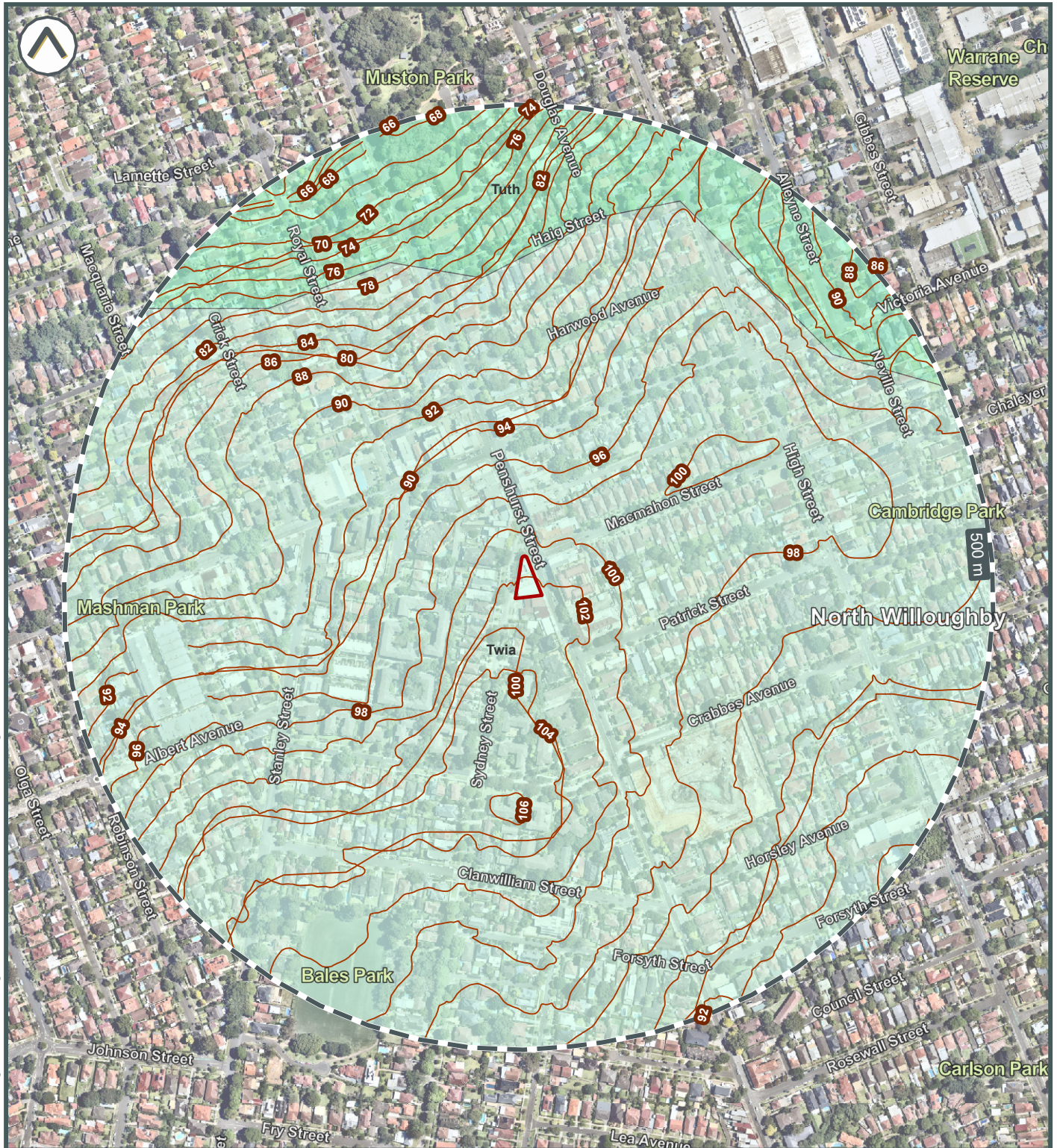
- |  |                            |                                |
|--|----------------------------|--------------------------------|
| Subject area                           | Coastal Acid Sulfate Soils | Moderate limitations           |
| Atlas of Australian Acid Sulfate Soils | Class 5         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







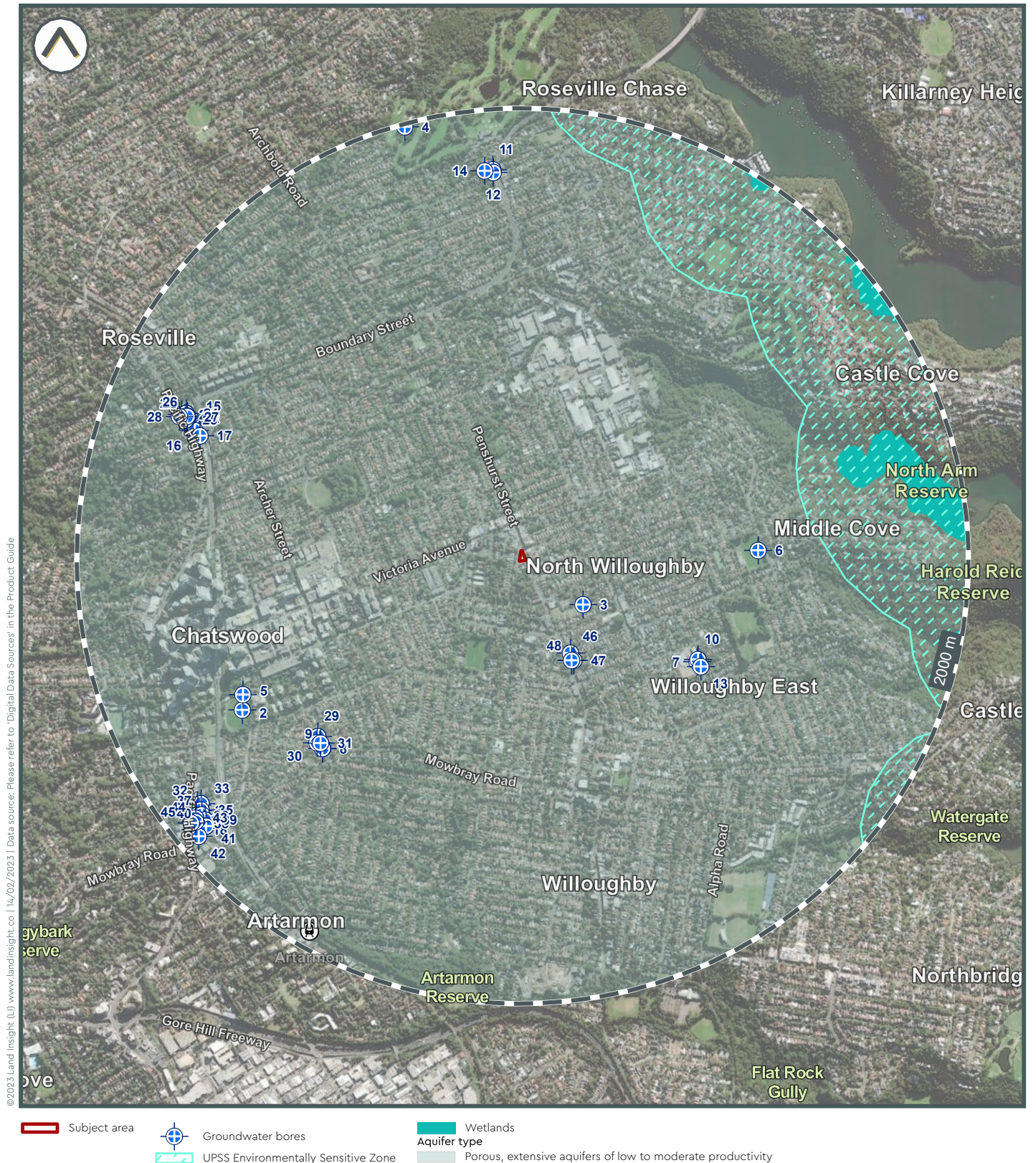
Geology and Topography







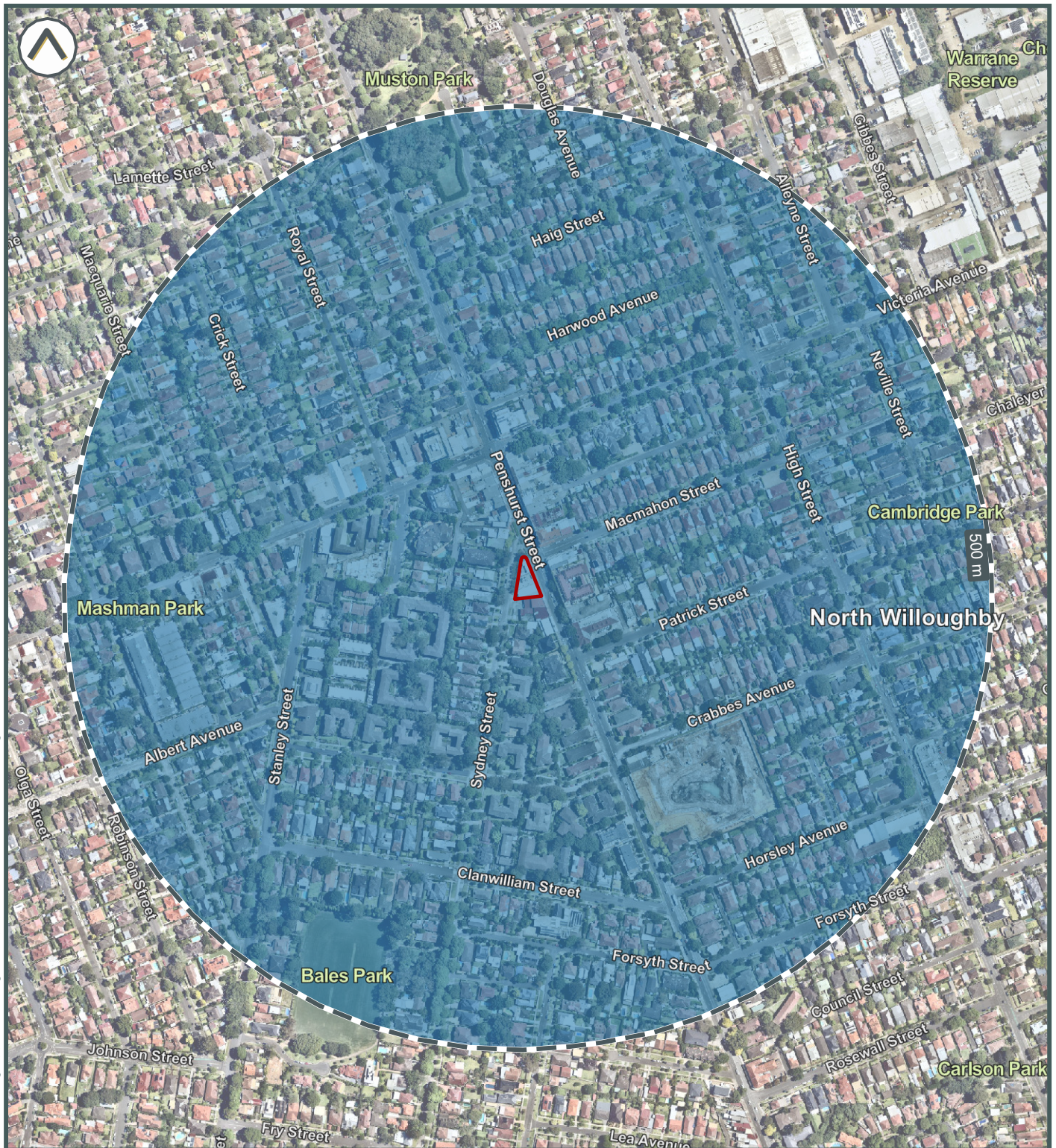
Hydrogeology and Groundwater Boreholes



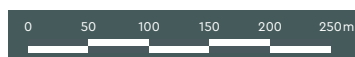




Hydrogeology and Other Boreholes



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







Contaminated Land Public Register

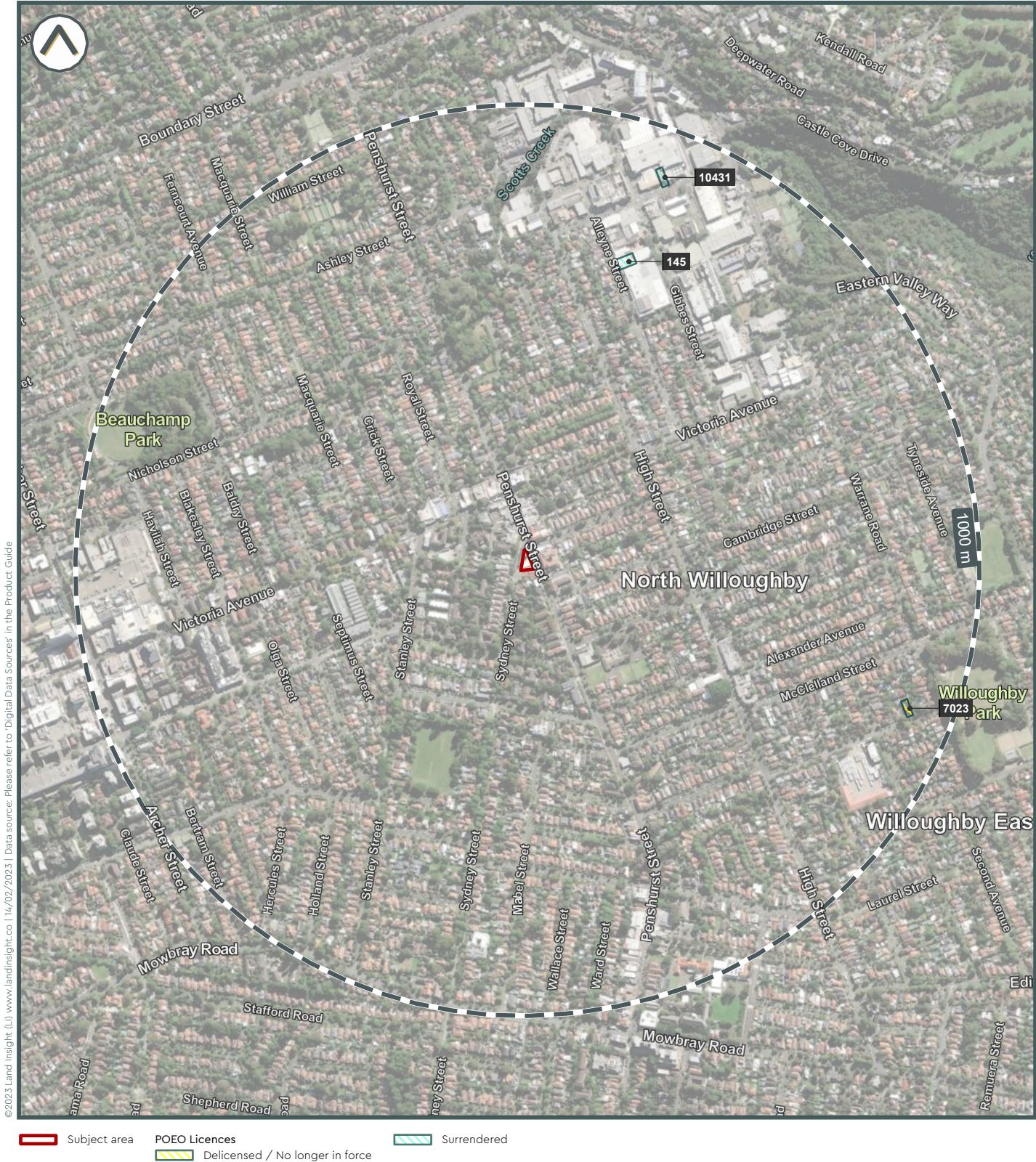


Subject area Contaminated Land Public Register (EPA)  
EPA Notified Contaminated Sites





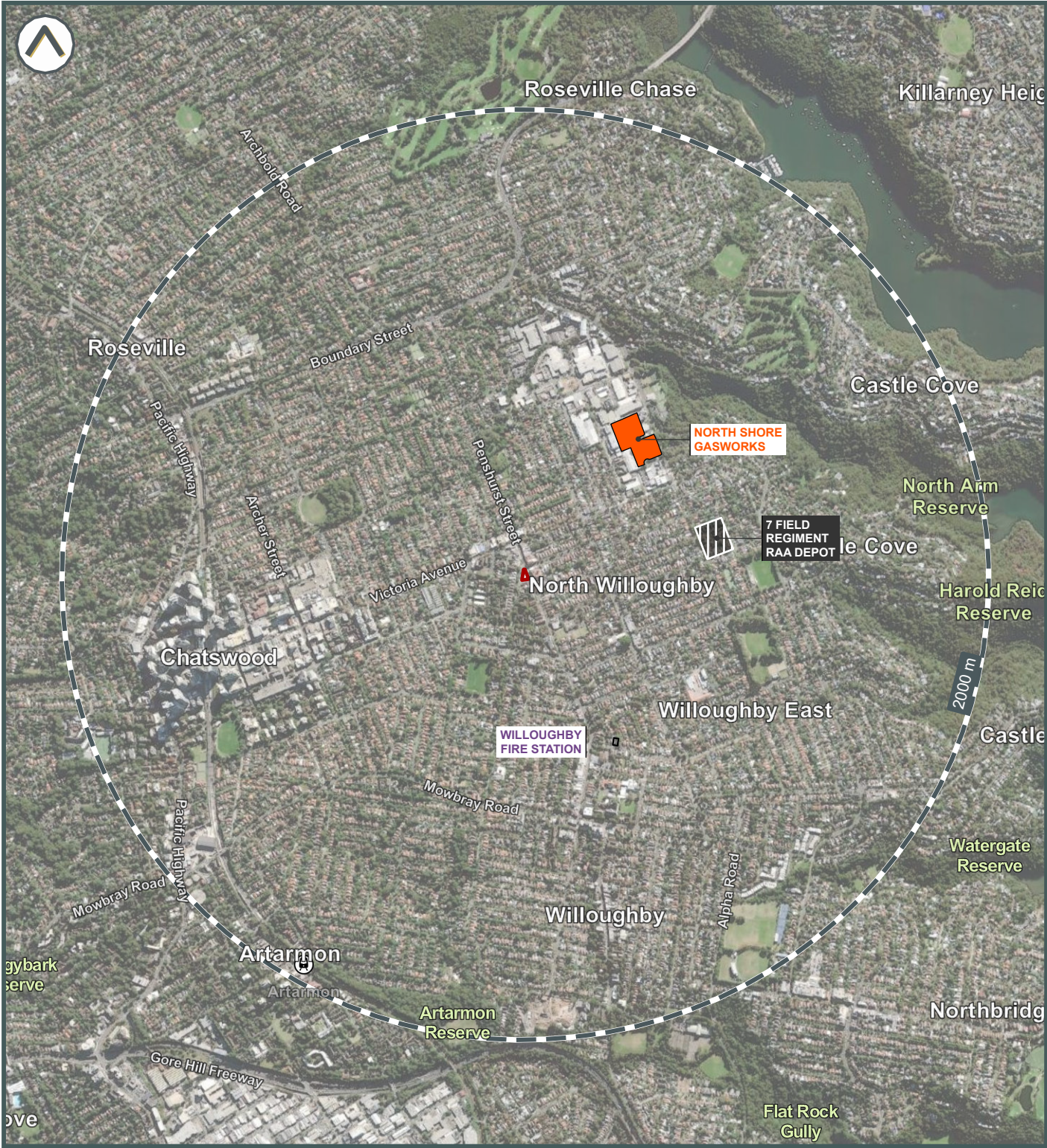
Licences, Approvals & Assessments







**Sites Regulated by Other Jurisdictional Body**



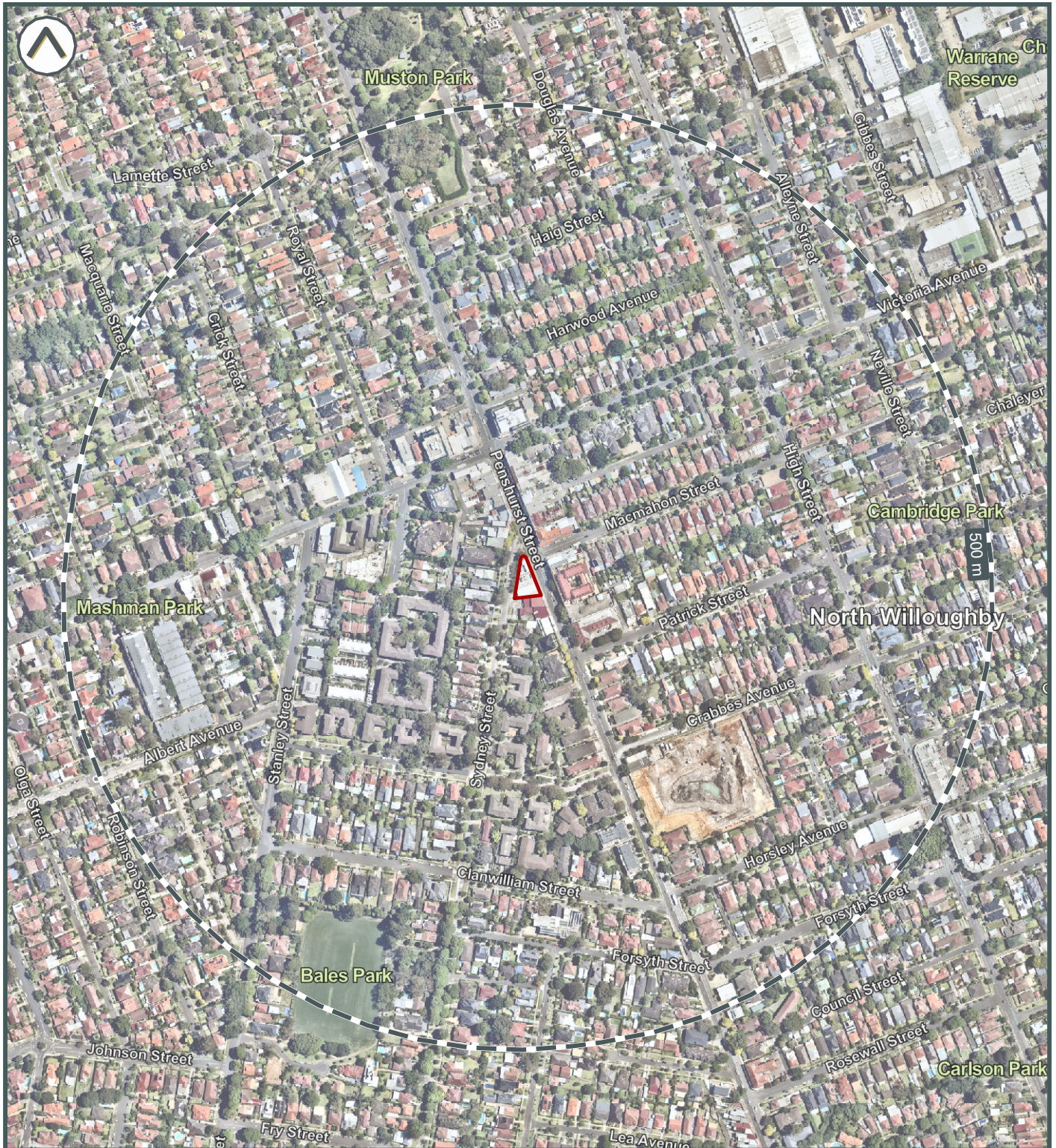
- Subject area
- PFAS sites
- Former Gasworks
- Defence Area / Military Sites








**Other Potential Pollution Sources**



 Subject area







**Potentially Contaminating Activities (PCAs)**



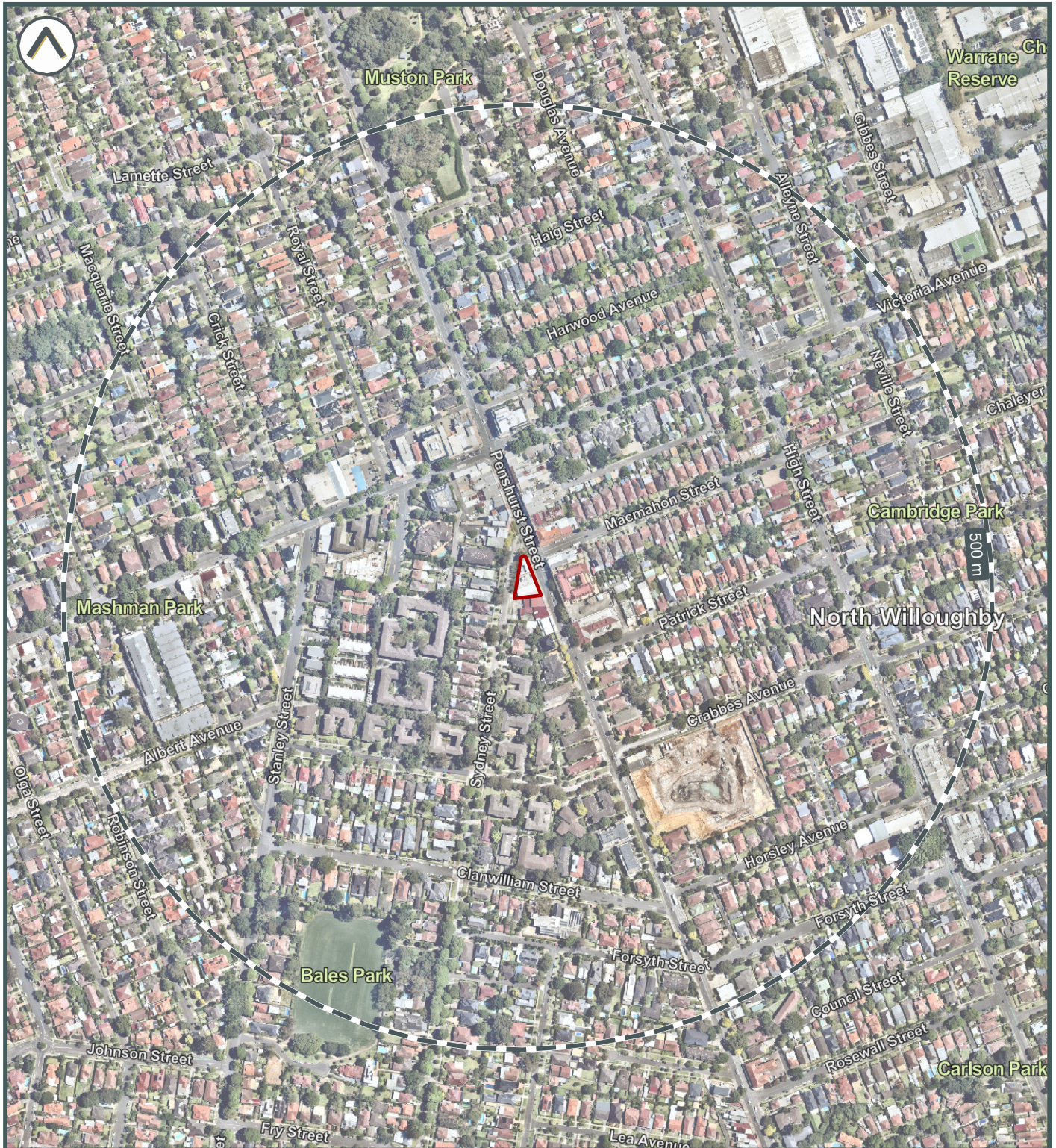
- Subject area
- Fuel Terminals & Depots
- Waste and Recycling Facilities
- Petrol Stations







Fire Hazards



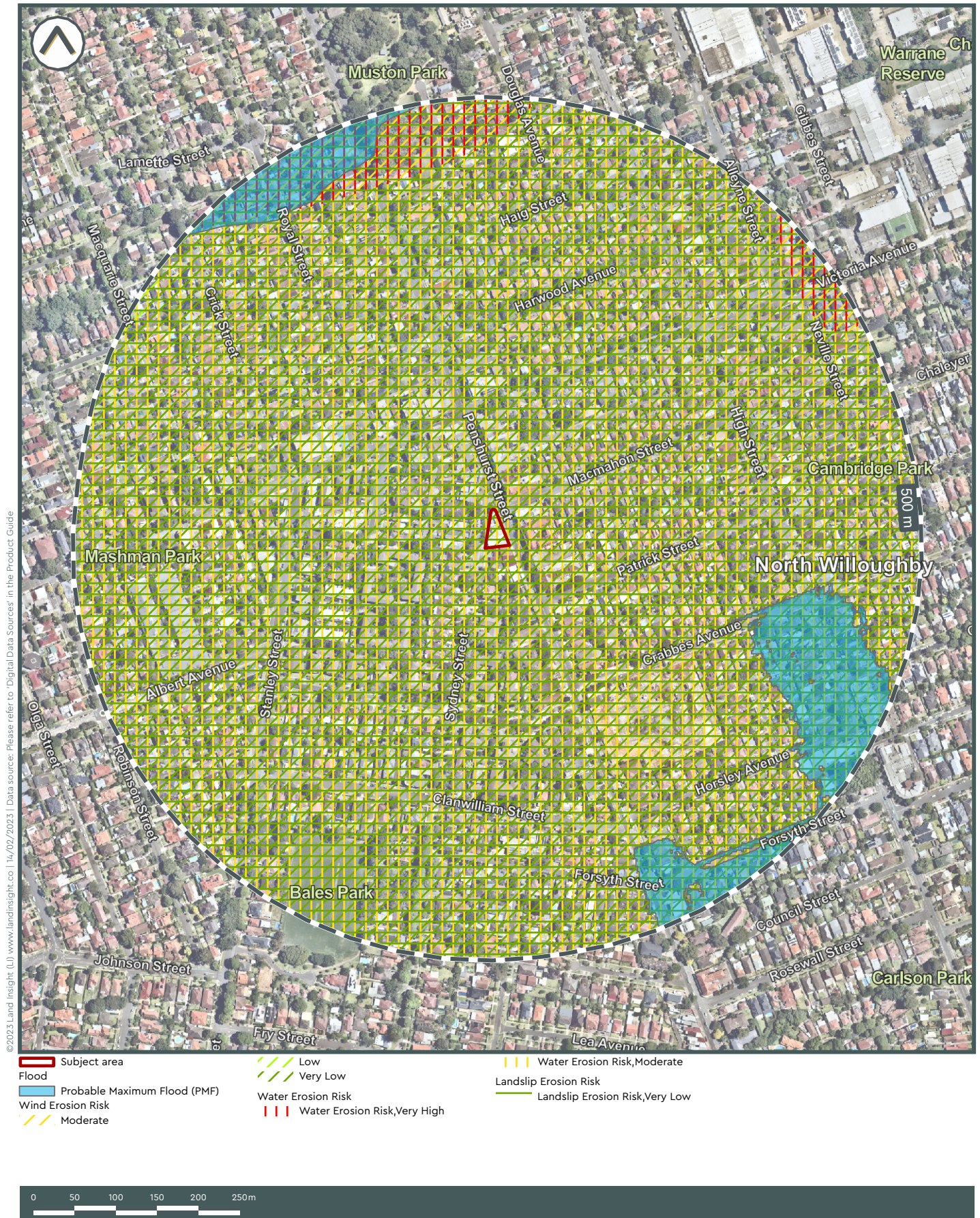
Subject area







**Flood and Erosion Hazards**











Level 4, 38 Oxley Street  
St Leonards, NSW 2065, Australia

email: [enquiries@edp-au.com](mailto:enquiries@edp-au.com)  
[www.edp-au.com](http://www.edp-au.com)

Office: +612 8484 5810

ABN: 13624867509