Phase 1 – Site History and Preliminary Site Assessment

2B3BMonaro Highway Upgrade Package 1C

50522017

Prepared for

Infrastructure Delivery Partners Group &
Transport Canberra and City Services

Report date: 14 November 2022

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Executive Summary

Cardno has undertaken a Phase 1 – Site History and Preliminary Site Assessment (PSA) for Package 1C of the Monaro Highway upgrade on behalf of Infrastructure Delivery Partners Group (IDPG).

The purpose of the PSA is to determine whether site contamination poses an actual or potential risk to human health and/or the environment, either on or off site, of sufficient magnitude to warrant remediation, or management for the current or proposed uses generally through a staged approach. This investigation includes the first phase of the staged assessment which is to establish a site history of potentially contaminating activities and to determine contaminants of concern and identify areas of potential contamination, including all sources of potential contamination.

The objectives of the PSA were to collect, review, assess and document whether potential contaminating activities potentially exist or impact on the Package 1C boundaries and whether further contamination assessment is needed.

The assessment identified Areas of Environmental Concern (AEC) and potential complete exposure pathways to receptors associated with the Monaro Highway and the Package 1C upgrade as detailed in the preliminary Conceptual Site Model (CSM), **Table 5-2**. Ten areas of environmental concern with potential complete exposure pathways, shown in **Figure 4, Appendix A**, were identified as follows:

- **AEC 1: Monaro Highway alignment** – **Low to medium (soil, groundwater, surface water, sediments**) – There was limited visual evidence of significant contamination observed during the site walk-over, however, some evidence of undulating land within or adjacent to heavy underbrush made further visual assessment not possible. History of spilling and vehicle accident is not known but should be considered as a potential activity along the existing highway. Asbestos pipe and conduits, asbestos pieces and farm tips have been noted as a potential hazard within the site.
- **AEC 2: Mugga Lane Resource Management Centre - Medium (groundwater, surface water, and sediments)** – This source of potential contamination is located upgradient of the site (>1km), however, there are sufficient migration pathways towards the site. The landfill may have leachate control measures and a monitoring programme that would mitigate against contamination releases, however, the details of leachate management and any releases at the landfill are not known. Potential contaminants are likely to be intermittently airborne, however, exposure at the site will be dependent on wind direction, speed and distance from landfill. Airborne contaminants may disperse to soil surfaces with run-off to surface water bodies or leaching to groundwater.
- **AEC 3: Hume Industrial Area – Medium to high (groundwater, surface water, sediments, soil)** – Given the concentration of heavy industrial activities located up-gradient of the site with drainage ways leading surface water into Dog Trap Creek and areas of Package 1C, there is a medium likelihood of contamination migration in groundwater, surface waters (including man-made stormwater drains) and sediments of water bodies.
- **AEC 4: Fly tipping in cleared area of forested PAD area between north and south bound lanes of Monaro Hwy, just north of Lanyon Drive) - Low (soil, groundwater, surface water)** – Illegal dumping of inert waste materials was observed on visible parts of the land near Dog Trap Creek within Package 1B. Whilst not within Package 1C the AEC is close enough that potential migration of contaminants could occur. Undulating ground surfaces in some areas also indicated the potential for ground disturbances or buried fill. The quantity and quality of materials at surface or buried is not known along with the potential of leach from these materials into the groundwater and nearby Dog Trap Creek.
- **AEC 5: Historical Building with Infrastructure (Possible Wastewater Treatment Plant) and their demolition - High (soil, groundwater, surface water)** – The quality of demolition and removal of historic building and infrastructure is not known. The building and infrastructure were located on the site (Historical aerial imagery from 1992, LotSearch Report LS029221, **Appendix B**) and residual materials may be present on surface or buried.
- **AEC 6: Helipad RFS South Pod and Emergency Services Agency Training Centre - High (groundwater, surface waters, sediments); Medium (soil)** - Given the activities including the use of fuels and fire training substances and the close proximity to the eastern boundary and the large paddock area of Package 1C, there is a high likelihood of migration of contaminants via run-off, leaching, and air dispersion to surface water and groundwater and soil migration.
- **AEC 7: Alexander Maconochie Centre - Low (soil, groundwater)** – The Alexander Maconochie Centre is located the inferred hydraulically down-gradient of Package 1C, however, the site does overlap with some areas. As such groundwater contaminants are more likely to migrate towards the east. Given the

potential of fuel and mild industrial activities, from the likely use of diesel generators, at the northern section of David Warren Road located on site, there is a low to medium likelihood of cross contamination.

- **AEC 8: Grazing and Nature Reserve Area – Low to medium (groundwater, surface water, and soil)** - Given the potential of fertiliser, pesticide and herbicide use on site and to the west inferred hydraulically up-gradient of the site, there is a medium likelihood of contamination.
- **AEC 9: Commonwealth, Department of Defence - Medium** – The Defence lands are located hydraulically down-gradient of the site and there is historical evidence of petroleum storage (located approximately 1.2 km northeast of the northern extent of Package 1C) and ground disturbances. The actual use of the lands by Defence or Commonwealth is not known. Given the history of land use by Defence in Australia, the potential for contamination on the Defence lands is considered to be medium to high. Migration of contamination to the site will vary depending on the nature of the contaminant.
- **AEC 10: Water Storage/Historical Dam - Low** – This area is located hydraulically down gradient of the site however, the flow direction of the sewer alignment is unknown, hence, this site has been considered as a precaution with a low likelihood of contamination located on site as a result of this dam.

For each of the AECs described above, current and future workers at the site may be exposed to contaminants, if any, during excavation and water management works. Flora and fauna located within the site may be exposed to site contaminants, if any, during and after works.

Recommendations

Further assessment, including soil, groundwater, surface water, and sediment investigation (sampling and analyses as needed), is recommended to determine if contamination is present, at what levels and if further management is required. Specifically:

- Undertake an intrusive targeted Phase 2 Detailed Site Assessment in accordance with the PSA findings presented and that is considerate of the design and proposed earthworks extents of the Stage 1C Monaro Highway upgrade. The requirement and extent to which offsite contaminant sources are investigated should be determined in consideration of the proximity to the works areas and in consideration of the design.
- Observations and data gathered during future assessments should be compared to applicable land use and waste classification guidelines and criteria in consideration to current and future users of the site, including construction workers and ecological receptors. The future assessment is to consider the suitability of the site, to determine the requirement for remedial works or contamination management, to determine preliminary waste classification of soils for off-site disposal, and to determine the environmental suitability of soils to be re-used on the site during proposed Highway constructions.
- Any future site environmental management plans should consider the findings of this assessment and future reports.

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Tables

1 Introduction

Cardno has been engaged by Infrastructure Delivery Partners Group (IDPG), on behalf of Transport Canberra and City Services (TCCS), to provide a prepare a Phase 1 – Site History and Preliminary Site Assessment (PSA) for Package 1C of the Monaro Highway upgrade (the site), which encompasses the intersection of Monaro Highway and Lanyon Drive, David Warren Road and pastoral areas. The site location for Package 1C is shown in **Figure 1**, **Appendix A.**

The Monaro Highway Upgrade (the Project) comprises of three packages as listed below and illustrated on **Figure 3** of **Appendix A**:

- Package 1B;
- Package 1C; and
- Heavy Vehicle Rest Areas (HVRA).

The site area resides beyond the Monaro Highway and its Designated Land Route Corridor and includes David Warren Road and its extension to Lanyon Drive and Sheppard Street. A detailed description of the Project is provided below in **Section 1.1**.

1.1 Project Description

The Monaro Highway is a major corridor and orbital link for freight, the community, workers and visitors to the Australian Capital Territory (ACT). Within this corridor the ACT Government is initially seeking to deliver a suite of road upgrades at, and near to, the intersection of Monaro Highway and Lanyon Drive, Hume with a new grade separated interchange at this intersection. These upgrade works also include connections with David Warren Road, Lanyon Drive and Sheppard Street and encompass the suite of road upgrades at this overall location.

- Package 1B includes road upgrades along the Monaro Highway from the Alexander Maconochie Centre entrance to approximately 1,000 m south of the Lanyon Drive intersection. It is located within the National Capital's Authority's Designated Land Route Corridor and under its planning jurisdiction.
- Package 1C includes the area beyond the Monaro Highway and its Designated Land Route Corridor and includes David Warren Road and its extension to Lanyon Drive and Sheppard Street, Hume. It also includes the formalisation of the Dog Trap Creek channel upstream of the northbound carriageway and downstream of the future southbound off-ramp. This package is generally under the Territory's planning justification. The northernmost 450m (approx.) of the Monaro Highway southbound carriageway (within the Designated Land) is also within Package 1C.
- HVRA includes northbound and southbound heavy vehicle paved laneway and rest areas adjacent to the highway with on and off access paved laneways.

The proposed works within Package 1C of the project, described by Jacobs (2021) *Package 1 – Preliminary Sketch Plan Construction Staging Report*, are provided below:

- Extension of David Warren Road south to connect to Lanyon Drive and Sheppard Street intersection to compensate for the removal of the intersection on Monaro Highway;
- Intersection of Lanyon Drive and Sheppard Street amended to four-way intersection;
- Widening of Lanyon Drive to provide additional turning lanes to relieve traffic congestion and improve safety for traffic entering and leaving Monaro Highway;
- Exit from Monaro Highway southbound carriageway to Lanyon Drive via new off ramp;
- Entry to Monaro Highway southbound carriageway from Lanyon Drive via the extended on ramp;
- Removal of general access from Monaro Highway northbound carriageway to David Warren Road/AMC. Access from Monaro Highway southbound carriageway modified to left in only;
- New line marking on northbound carriageway to enable left hand merge north of Lanyon Drive intersection.
- Southbound carriageway regrading in the vicinity of David Warren Road/AMC intersection to enable 100km/h posted speed.

> Existing southbound carriageway and Lanyon Drive intersection removed.

1.2 Purpose and objectives

In accordance with Contaminated Sites Environment Protection Policy Environment Protection Authority December 2017, the purpose of contaminated site assessment is to determine whether site contamination poses an actual or potential risk to human health and/or the environment, either on or off site, of sufficient magnitude to warrant remediation, or management for the current or proposed uses generally through a staged approach.

This investigation includes the first phase of the staged assessment (PSA) which is to establish a site history of potentially contaminating activities and to determine contaminants of concern and identify areas of potential contamination, including all sources of potential contamination.

The objectives of the PSA were to collect, review, assess and document whether potential contaminating activities potentially exist or impact on the Package 1C boundaries and whether further contamination assessment is needed.

1.3 Scope of work

The following scope of work was undertaken in order to achieve the above noted objectives:

> A desktop study of existing contamination information for the site and surrounds. This desktop study included a review of:
  - Local and regional geology, hydrogeology, topography, hydrology, acid sulfate soil risk maps and salinity risk maps;
  - Publicly available groundwater data available for the area;
  - Historic aerial photographs to provide an insight into previous site uses, practices and housekeeping;
  - Previous reports applicable to the site;
  - Current and historic land title information for select lots within / adjoining the site to identify previous site owners and possible historic site activities;
  - ACT Environment Protection Authority (EPA) public registers.
> A site walk-over of publicly accessible areas of the site to document the current conditions and identify potential contaminant sources. The site walk-over was not undertaken on private property or within buildings on private properties. Where available, interviews were undertaken with construction workers undertaking earthworks within Package 1B south of the Lanyon Drive and Monaro Highway intersection on the day of site walk-over.
> Completion of a PSA report in accordance with the Contaminated Sites Environment Protection Policy (ACT Govt., 2017) National Environment Protection (Assessment of Site Contamination) Measure (NEPC, 1999).

1.4 Works not undertaken

The following works were not undertaken:

> Interviews with land owners;
> Historical certificates of title were obtained for some of the areas of environmental concern (AEC), however, all historical certificates of titles for all properties abutting the Package 1C were not obtained;
> Review of some previous preliminary environmental assessments were not available and so were not reviewed.
> A review of dangerous substances records was not undertaken. Based on the history of the site as a road with variable surrounding land uses including agricultural and industrial/commercial infrastructure in the south, it is unlikely that these unsearched records will contain information relevant to the contamination status of the site.
> Adjoining land users in the southern section of Package 1C were comprised of numerous light to heavy industrial land uses. Title searches were not undertaken for these off-site lots as the industrial business park as a whole is considered to be an area of environmental concern (AEC).

1.5 Applicable guidelines and legislation

The scope of this PSA has been developed in accordance with the following guidelines and legislation:

- Environment Protection (Contaminated Sites) Environment Protection Policy 2017;
- National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended);
- Environment Protection Act 1997;
- Environment Protection Regulation 2005; and
- Planning and Development Act 2007.

1.6 Assessment timeframe

The key milestones during this assessment are summarised in **Table 1-1**.

Table 1-1 Site Investigation Timeline

Date	Activity / Milestone
November 2021	Cardno engaged by the Client.
11 February 2022	Commencement of site history information gathering
21 February 2022	Fieldwork commenced
TBC	Draft report issued
TBC	Final report issued.

2 Site identification

2.1 Site information

Details related to the site are included in **Table 2-1**, below whilst **Figure 1**, **Appendix A** shows the site locality in the context of the local area.

Table 2-1 Site Information

Details	Package 1C				
Site address	Package 1C includes the area beyond the Monaro Highway and its Designated Land Route Corridor as well as the David Warren Road and its extension to Lanyon Drive and Sheppard Street Hume. It also includes the formalisation of the Dog Trap Creek channel upstream of the northbound carriageway and downstream of the future southbound off-ramp. This package is generally under the Territory's planning justification. The northernmost 450m (approx.) of the Monaro Highway southbound carriageway (within the Designated Land) is also within Package 1C.				
Block and section	Block 10, Section 18 Block 14, Section 18 Block 16, Section 18 Block 17, Section 18 Block 20, Section 18 Block 8, Section 17				
Current land use	Carriageway, grasslands/broadacre				
Proposed land use	The proposed land use is unchanged and will remain a mixture of carriageway and grasslands/broadacre				
Government authority	ACT Government				
Current zoning – territory plan	TSZ1 – Transport and services NUZ1 – Non Urban – Broadacre				
Site area (approx.)	Total 16.4 ha (western section 5.22 ha, eastern section 11.18 ha)				
Site bounding box (GDA1994 MGA 55)	Point	Eastern Section		Western Section	
		X Coordinate	Y Coordinate	X Coordinate	Y Coordinate
	South	697266.347	6082110.383	696961.257	6082038.457
	East	697742.381	6082472.702	697081.158	6082590.004
	North	697060.07	6083553.706	697051.849	6082592.668
	West	697219.711	6082046.451	696753.428	6082075.76
Current Site owner	ACT Government: Roads ACT, JACS, EPSDD – Parks and Conservation Executive lease: 10400 Monaro Highway (Alexander Maconochie Centre)				

2.2 Surrounding land uses

The land uses surrounding the site are summarised below in **Table 2-2** and are also illustrated in **Figure 2** in **Appendix A**.

Table 2-2 Surrounding Land Use

Direction	Land Use or Activity
North	The existing Monaro Highway extends further north of the site, as well as farmland, the 'West Jerrabomberra Nature Reserve'. Commonwealth lands adjoin the site to the north east and Defence lands are located approximately 1 km further to the north east.
West	Farmland adjoins the site to the southwest and the 'Mugga Lane Resource Management centre' is located further west, approximately 1.8km southwest of the site.

Direction	Land Use or Activity
East	The Southcare rescue helipad and ACT Emergency Services Training Centre are located east of the southern portion of the site. The Alexander Maconochie Centre prison and corrective services buildings are located east of the northern portion of the site. Further east is land used for agricultural grazing with Jerrobomberra Creek located approximately 200m east of the site.
South	The land use south of the site is predominantly occupied by the existing road corridors of the Monaro Highway and Lanyon Drive and a commercial / industrial precinct that adjoins the Package 1C boundary.

2.3 Regional and Site Setting

Site setting information available from public datasets is summarised in **Table 2-3**.

Table 2-3 Site setting description

Item	Description
Regional soil landscapes (ACTmapi, 2016)	The soil landscapes, ACT Government *ACTmapi* website indicates that Package 1C of the Monaro Highway is underlain by the Williamsdale, transferral, landscape along David Warren Road, Sheppard Street, Monaro Highway and part of Lanyon Drive. The landscape is described as undulating rises, fans, valley flats and depressions on Silurian volcanics of the Canberra Lowlands. Landforms include slopes <10%, local relief of 5-50 m and elevation of 520-800 m. The landscape has patches of woodland and grassland and little to no rock outcrop. Soils are moderately deep (50-150 cm), moderately well-drained red and brown Chromosols and red and brown Kandosols, shallow (<50 cm) Leptic Tenosols and Rudosols and moderately to very deep (>100 cm), imperfectly to moderately well-drained brown and yellow Chromosols and brown Kandosols. Limitations of soils in the landscape include, localised shallow soils, widespread complex soils, localised poor moisture availability, localised non-cohesive soils, widespread foundation hazard, widespread complex terrain, localised dieback, widespread recharge zone, widespread discharge zone, localised salinity hazard, localised wind erosion hazard, widespread gully erosion hazard, widespread sheet erosion hazard, widespread streambank erosion hazard, widespread high run-on, localised poor drainage, localised permanently high water tables, widespread seasonal waterlogging and localised flood hazard. A small section around the intersection of Monaro Highway and Lanyon Drive is underlain by the Ginninderra Creek, alluvial, landscape. The landscape is described as gently undulating floodplain on Quaternary alluvium in the Canberra Lowlands. The slopes are generally <3% with local relief <10 m and elevation between 540-680 m. The landscape also has many imperfectly drained areas and extensively cleared riparian woodland. Soils are deep (>100 cm), poorly drained Stratic Rudosols on floodplains, with deep (>100 cm), imperfectly drained sodic brown Chromosols on margins. Limitations of the soils in the landscape include widespread non-cohesive soils, widespread foundation hazard, widespread complex terrain, localised wind erosion hazard, widespread gully erosion hazard, widespread high run-on, localised poor drainage, widespread permanent waterlogging, widespread seasonal waterlogging and widespread floor hazard.
Regional geology (MinView, 2020)	The NSW surface geology (ge612), *MinView Online Mapping* indicates the northern part of site on the Monaro Highway, David Warren Road and part of Lanyon Drive as it intersects with Sheppard Street is mapped as being underlain by the Mugga Mugga Porphyry Member (Sdodm) of the Deakin Volcanics. This is described as blue and mauve-grey porphyritic rhyodacite, volcaniclastic and epiclastic tuff (as a waterlaid deposit) and tuffaceous shale. The southern part of site at the Lanyon Drive intersection is underlain by Deakin Volcanics (Sdod_a). These are described as unnamed tuff, sandstone and shale. A small section of site on Lanyon Drive and north of the Lanyon Dr intersection is underlain by Alluvium (Q_a) of the Quaternary. This is described as unconsolidated grey to brown to beige humic micaceous silty clay, quartz-lithic silt, fine- to medium-grained quartz-rich to quartz-lithic sand, polymictic pebble to cobble gravel (as sporadic lenses) and sporadic palaeosol horizons.
Nearby water bodies	The ACT Government *ACTmapi* website indicates Dog Trap Creek passes through the site east of the intersection of the Monaro Highway and Lanyon Drive, flowing

Item	Description
(ACTmapi, 2020)	from west to east in Jerrabomberra Creek. Jerrabomberra Creek is located approximately 500 m east of the site and runs parallel to Monaro Highway flowing in a northerly direction, eventually discharging into Lake Burley Griffin.
Groundwater (Lotsearch source: ACT Government; Bureau of Meterology)	The Bureau of Meteorology and an ACT Government data source identified no registered boreholes onsite and two within 500 m. 80000770 was installed to 90 m below ground level (BGL) while 80000783 was installed to 60 mBGL. Both registered bores off-site are listed as being used for domestic purposes.
Sensitive ecological receptors – vegetation (Lotsearch source: Property Boundaries & Topographic Data – Environment, Planning and Sustainable Development Directorate)	Information relating to vegetation communities held by the ACT Government was searched for a 1,000 m buffer around the site with key results summarized below and full search results located within LS029221 in **Appendix B**. Areas within the site have been mapped as amenity planting native (APN), amenity planting exotic (APE), urban and developed areas and native grassland. In the surrounding area, native grassland is to the north and south of Lanyon Drive and urban and developed areas are south/south-west of the site. APE and APN are mapped along the Monaro Highway, west of the site. Exotic grassland is mapped to the north-east of the site.
Sensitive ecological receptors – groundwater (Lotsearch source: Property Boundaries & Topographic Data – Environment, Planning and Sustainable Development Directorate)	The groundwater dependent ecosystems atlas was searched for a 1,000 m buffer around the site with key results summarized below and full search results provided within LS029221 in **Appendix B**. A high potential groundwater dependent ecosystem (GDE) has been mapped along the course of Jerrabomberra Creek which runs parallel to the Monaro Highway and crosses Lanyon Drive approximately 150 m east of the site.
Acid sulphate soil risk (CSIRO, 2011)	The site is mapped as being an area of extremely low (1-5%) probability of occurrence of acid sulfate soils.

2.4 Site Visit Observations

A site walk-over was conducted in the publicly accessible areas of the site on 21 February 2022 by two Cardno experienced Environmental Professionals specialising in contaminated land assessment. Observations are summarised in **Table 2-4** below with reference to specific site features. Site photos with the related field comments demonstrating general site conditions observed during the walk-over are shown in **Appendix C**. **Appendix C** also includes **Figure 1** indicating the location at which each photo and comment were noted. Due to dense vegetation in many parts of the site, some areas could not be accessed for site observation.

It was observed during the site walkover that early works for Package 1B had commenced and were being carried out by the civil contractor Guideline ACT. This includes utility relocations, construction of access tracks and installation of temporary site offices and amenities.

Table 2-4 Observations summary table

Item	Observations
Weather Conditions (BOM, 2022)	Sunny with temperatures ranging between 10.5°C to 31°C. No rainfall was experienced during the site visit.
Site slope and drainage features	The site was relatively flat with an elevation ranging from 580 m Australian Height Datum (AHD) to 584 m AHD with the lowest elevations situated around Dog Trap Creek. The western section of the site contained a drainage channel that ran parallel to the Monaro Highway and connected to Dog Trap Creek where the creek and highway intersect. Dog Trap Creek flowed through the site from west to east and passed beneath two bridges constructed over the Monaro Highway. Dog Trap Creek extended beyond the site boundary and flowed into Jerrabomberra Creek in the east which continued to flow north, parallel with the site.
Site surface coverings	The majority of ground surfaces were covered with grass and with a sparse distribution of mature trees. Remaining areas were covered with asphalt roads including Lanyon Drive, Sheppard Road and David Warren Road. Exposed soil was noted at some areas which appeared to be associated with water erosion.
Site cut and fill	Both cut and filling was observed and appeared to be associated with the historical construction of the Monaro Highway, Lanyon Drive and Sheppard Road. Fill was prominently visible along Lanyon Drive and the northern carriageway of the Monaro Highway. Areas of cut were observed

Item	Observations
	at the intersection of Lanyon Drive and Sheppard Road, and also within the channel along the southbound carriageway of the Monaro Highway. Vegetation cover prevented visual observation of the presence of contamination or anthropogenic material within fill areas.
Surface soils	Surface soils were generally not visible, however, in discrete areas surface soils were visible and appeared to comprise of silty sand and gravel.
Buildings and structures	No permanent or temporary buildings are located within the site. Structures present include road, stormwater and drainage infrastructure (with culverts and buried pipes) and underground and aboveground utilities.
Potential hazardous building materials	No potentially hazardous building materials were observed during the site walkover.
Manufacturing, industrial or chemical processes and infrastructure	No manufacturing, industrial or chemical processes and infrastructure were noted on the site, however, a commercial estate containing storage facilities, manufacturing plants and a commercial petrol station were observed to the south of the site. Additionally, the 'Helipad RFS South Pod' and Alexander Maconochie Centre (correctional facility) were observed east of the northern portion of the site.
Fuel storage tanks (USTs/ASTs)	Evidence of above ground or underground storage tanks was not observed within the site boundary. It is noted that properties adjoining the site to the south are predominantly of commercial / industrial land use and bulk storage of fuels may occur as part of their operations. To the north-east of the site, the 'Helipad RFS South Pod' is likely to also store fuel onsite.
Dangerous goods	No dangerous goods were noted within the site boundary during the walkover, however, commercial and industrial properties adjacent to the site are assumed to store dangerous goods as part of their operations.
Solid waste deposition	No solid waste deposition was noted with the exception of litter observed within the roadside and drainage lines.
Liquid waste disposal features	No liquid waste disposal features were noted within the site. A suspected wastewater pump station was observed within a parcel of private land between the southbound carriageway of the Monaro Highway and the site boundary.
Evidence of previous site contamination investigations	Evidence of previous site contamination investigations were not observed within the site, however, groundwater monitoring wells and suspected historical test pits were observed within Package 1B.
Evidence of land contamination (staining or odours)	There was no evidence of land contamination on site, however, the a leachate / landfill odour was noted and assumed to be emanating from the Mugga Lane Resource Management Centre located west of the site.
Evidence of groundwater contamination	No evidence of groundwater contamination was noted during the site walkover.
Groundwater use	No evidence of groundwater use was noted on site, however, approximately thirty registered groundwater bores are located within a 2-3 km radius of the site. Four bores are identified for abstraction (identified by triangle symbol in Lotsearch report, **Appendix B)** with the purpose of the remaining bores unknown. Groundwater was noted within a test pit associated with Guideline Civil construction activities located within Site 1B (see **Appendix C** for photographs and location – Location ID 36) with water at a level of approximately 1.2 m below ground level. The water was highly turbid and evidence of visual and/or olfactory contamination was not observed.
Vegetation	Onsite vegetation includes grass, shrubs and mature trees. Trees were mostly observed within drainage lines and within the existing road corridor. Remaining unpaved areas were generally covered with grass including adjoining paddocks.
Site fencing	Fencing within the site was limited to boundary fences along private properties which mostly comprised of chain-mesh wire with barbed wire strands. A boom gate located north of the paddock next to the 'Helipad RFS South Pod' also restricted access to the paddock.

2.5 Inaccessible areas

Due to access limitations and site operations the areas in **Table 2-5** were not visually assessed during the walkover, these should be considered in relation to the further data gaps detailed in **Section 4.11**.

Table 2-5 Inaccessible areas during site walkover.

Area	Justification / Notes
Road verges and medians	Areas in the immediate vicinity of the road, with the exception of areas with driveway access, were not accessed at the time of the walkover due to safety concerns however these areas were generally easily visible from safely accessible areas.
Soils beneath paved and vegetated areas	Soils beneath pavement including asphalt and concrete and vegetated areas were unable to be visually assessed.
Adjoining properties	Private properties adjoining the site boundary were inaccessible during the inspection, including commercial industrial land users, and observations were noted from readily accessible areas within public land.
Onsite paddocks	Paddocks were unable to be safely accessed due to boundary fencing and being private properties.

3 Review of previous reports

Cardno have reviewed a copy of the following previous documentations of the site:

> Jacobs (2020) *Monaro Highway Upgrade Program Phase 2 Benefits and Constraints Mapping* (Ref. IA224400-RP-PM-051_Phase 2 Benefits and Constraints Mapping, Rev B, dated 21 February 2020); and

> Jacobs (2021) *Monaro Highway Upgrade Program Package 1 – Preliminary Sketch Plan Design Report* (Ref. IA224400-RP-GA-094, Rev E, dated 29 October 2021).

A summary of the findings is provided below in **Table 3-1**.

Table 3-1 Summary of Previous Investigations

Sections	Details
Jacobs (2020) Phase 2 Benefits and Constraints Mapping	
Key findings (Section 4.7)	▪ Total of 17 areas of environment interest (AEI) along the three alignment options. Cardno note that four of AEIs were near the Package 1C area of the project. ▪ Two AEI within the total proposed site boundary. Cardno note that these were outside the Package 1C boundary. ▪ Level of ground and groundwater disturbance for the three options was unknown and that there was currently insufficient data to establish if a significant risk of harm was present within the footprint of the proposed works, based on desktop studies to date.
Conclusions & recommendations	▪ Risks identified to the project included incidental illegal dumping of waste or possible imported fill. These were not considered a significant risk given the current land uses and land use zoning. – A change of land use could mean a change in exposure scenarios for workers. – Recommended that the risks are managed under a Construction Environment Management Plan (CEMP) or similar. ▪ Targeted shallow soil sampling in before construction and ground-engaging operations was recommended depending on final construction activity design, depth of excavations and associated surface water infrastructure details. ▪ Targeted contamination investigations were recommended if significant excavations are required within areas identified with high or moderate contamination risk. ▪ Soil sampling at eight AEIs and groundwater sampling at 3 AEIs. ▪ All material disposed from site would require Environment Protection Authority approval.
Jacobs (2021) Package 1 – PSP Design Report	
Key findings	▪ Preparation of a contamination plan will require soil and groundwater analytical data for areas with contamination sources connected by pathways where exposure will occur to workers, public and the environment. ▪ Location of critical areas of soil movements at the site is not known and therefore specific locations of investigation are not known yet. ▪ Current proposed sample locations are based on locations of culverts, wetland excavations, bridge embankments and small areas of proposed alignment cut.

4 Site history review

A Site history review was conducted for the Site and consisted of a desktop review of the following:

- Public Contaminated Land Search;
- EPA authorisations and agreements;
- National waste and liquid fuel facilities search;
- PFAS (perfluoroalkyl substances) assessment and management programs;
- Heritage records;
- Historical business directories;
- Historical maps;
- Historic aerial photographs; and
- Land title documents (selected).

4.1 Public contaminated sites register

A search of the ACT Register of Contaminated Sites within a 1,000 m buffer around the site was conducted with no record of contaminated sites identified.

4.2 EPA authorisations and agreements

A search of the EPA authorisations and agreements registered was conducted for a 1,000 m buffer around an arbitrary boundary (shown as pink line in LotSearch reports) beyond the site boundary in order to obtain site information on large scale land parcels neighbouring the site. The full search results are located within Lotsearch Report LS029221 in **Appendix B**, while items within approximately 500 m of the site are summarised in **Table 4-1**. Beyond approximately 500 m of the site, land uses identified included petroleum storage (to the northeast), commercial use of chemicals, waste petroleum, regulated waste, transport of controlled waste and production of road building materials activities.

Table 4-1 EPA authorisations and agreements summary – Package 1C

Activity / Agreement	Business / Individual Name	Grant Date	Status	Distance from site boundary (m)	Direction
Extraction of Material from waterways; Greater than 100m3 (Activity 1)	ACT Procurement Solutions	10/3/2011	Expired	0 m	On-site
Transport of Controlled Waste (Activity 8)	Cabiria Pty Ltd	12/2/2015	Ceased	460 m	South

4.3 National waste and liquid fuel facilities

A search of the National Waste Management Site Database and National Liquid Fuel Facilities was conducted for a 1,000 m buffer around the site. The full search results are located within Lotsearch Report LS029221 in **Appendix B**, while key items are summarised in **Table 4-2**. There were no records of National waste management sites within the buffer.

Table 4-2 National waste and liquid fuel facilities summary – Package 1C

Class	Operational status	Owner	Address	Distance (m)	Direction
Petrol Station	Operational	Caltex	96 Sheppard Street	1,000 m	South West

4.4 Per or Poly-Fluoralkyl Substances (PFAS)

A PFAS probability of occurrence desktop survey is provided in **Table 4-3** and has been undertaken on the basis of information provided in the PFAS National Environmental Management Plan (NEMP 2020). PFAS are known to be present in Aqueous Film Forming Firefighting Foams (AFFF) and Alcohol-Type Concentrate (ATC). The historic use of AFFF is reported as being used in Australia between the mid-1970's and as late as 2010 (Source: Fire & Rescue NSW, Information Sheet, Firefighting Foam and PFAS, reference D16/82523).

Table 4-3 PFAS Desktop Survey

Preliminary Screening Question	Response	Likelihood of Occurrence [1, 2, 3]
Is the past or present site activity listed in the NEMP 2020 as being an activity with risk of fire. If so, list activity.	Unknown, however, there would be a potential for accidents on Monaro Highway requiring use of fire extinguishing equipment and suppressants.	Low
Is the past or present off-site activity up-gradient or adjacent to the site listed in the NEMP 2020 as being an activity with risk of fire. If so list activity.	Petroleum fuel storage and industrial chemicals use and storage are reported on the neighbouring Hume industrial precinct and on Commonwealth Lands used by Defence; airport and aviation infrastructure are located at the Helipad Rural Fire Service South Pod (Emergency Services Training Facility, Southcare Helicopter Base, and ACT Rural Fire Service Heli-base Hume; waste disposal and landfilling are present up-gradient at the Mugga Lane Landfill.	Medium
Did fire training involving the use of suppressants occur on-site between 1970 and 2010 ?	Unknown, however, there would be a potential for accidents on Monaro Highway requiring use of fire extinguishing equipment and suppressants.	Low
Did fire training occur up-gradient of or adjacent to the site between 1970 and 2010 ?	Emergency services training facilities are located at the Helipad Rural Fire Service South Pod property. Several fire emergency trucks were parked at the facility during site walk-over visit on 21 February 2022. Direct information regarding fire training at the facility has not been discovered as part of this assessment, however, given the nature of the facility, it should be considered as a possibility.	Low to medium
Have "fuel" fires ever occurred on site between 1970 and 2010 ? (i.e. ignition of fuel storage tanks - solvent, petrol diesel, kerosene, other) ?	Unknown, however, there would be a potential for accidents on Monaro Highway requiring use of fire extinguishing equipment and suppressants.	Low
Have PFAS been used in manufacturing or stored on-site ?	Not likely.	Low
Could PFAS have been imported to the site in fill materials from a site with activity listed in NEMP 2020 and subject to exposure to PFAS from 1970 to 2010 ?	Yes. In some sections, the Monaro Highway is a raised highway embankment as compared to adjacent lands and includes embankment fill materials at bridge crossings.	Low
Could PFAS-contaminated groundwater or run-off have migrated beneath or on to the site ?	Yes. Potential sources of PFAS are within a 1 km radius of the site.	Low to médium.
Is the site or adjacent sites listed in the PFAS Investigation programs [4] ?	No. See Section 4.5 below.	Low
If the likelihood is medium or high in any of the above factors, does the site analytical suite need to be optimised to include preliminary sampling and testing for PFAS in soil and waters (incl. ASLP or TCLP) ?	Yes.	

Notes:

[1] Likelihood: Low – All necessary documentation has been reviewed and there is no recorded instance of potential PFAS use or exposure

[2] Medium - All necessary documentation has been reviewed and there is potential evidence of a recorded instance of potential PFAS use, exposure or site activity listed in the NEMP 2020 as being an activity with risk of fire.

[3] High - All necessary documentation has been reviewed and there is evidence of a recorded instance of potential PFAS use or exposure

[4] See Section 4.5 below.

4.5 PFAS investigation and management programs

A search of the following databases within a 1,000 m buffer of the site was conducted with no records identified from the following sources:

- Defence PFAS Investigation and Management Program Investigation Sites;
- Defence PFAS Investigation and Management Program Management Sites; and
- Airservices Australia National PFAS Management Program.

4.6 Heritage records

A review of federal and territory government heritage registers was conducted for an approximate 1,500 m buffer around the site. The full search results, including a map showing each heritage site location, indicated 38 heritage sites are located in Lotsearch Report LS029221 in **Appendix B**.

Results were provided by the ACT Government – Environment, Planning and Sustainable Development Directorate and some of the key heritage sites included:

- Item 231 - Woden Homestead and grasslands (600 m west); and
- Item 482 - Hill station (650 m south west).

4.7 Historical business directories

Included within Lotsearch Report LS029221 is a search of Universal Business Directory records and UBD Business Directories from 1950, 1961, 1970, 1982 and 1991. Searches were conducted to a 150 m buffer with 75 business activities identified. Full search results are included in Lotsearch Report LS029221 in **Appendix B**.

Relevant records have been summarised below in **Table 4-4** based upon cross-reference with street maps and contamination risk associated with the recorded business activity. There were no records within the buffer of dry cleaners, motor garages or service stations from 1950-1991.

Table 4-4 Business activity records summary – Package 1C

Business Activity	Premise	Year	Location Confidence	Distance to Road Corridor or Area	Direction
Joinery manufacturers &/or merchants	A.C.T. Advanced Joinery., 2 Arnott Pl Hume	1991	Premise Match	0 m	South
Aluminuim fabricators	Dee Bee Fabrictors., 3/2 Arnott Pl Hume	1991	Premise Match	0 m	South
Engineers – fabricating	Dee Bee Fabricators., Unit 3/2 Arnott Place Hume	1991	Premise Match	0 m	South
Welders	Felsdo Pty. Ltd., 6/2 Arnett Pl Hume	1991	Premise Match	0 m	South
Engineering – fabricating	Felsdo Pty. Ltd., 6/2 Arnett Pl Hume	1991	Premise Match	0 m	South
Engineers – general	Felsdo Pty. Ltd., 6/2 Arnett Pl Hume	1991	Premise Match	0 m	South

Business Activity	Premise	Year	Location Confidence	Distance to Road Corridor or Area	Direction
Stainless steel fabricators	Felsdo Pty. Ltd., 6/2 Arnett Pl Hume	1991	Premise Match	0 m	South
Steel fabricators	Felsdo Pty. Ltd., 6/2 Arnett Pl Hume	1991	Premise Match	0 m	South
Roof trusses mfrs. &/or dists.	A.C.T. Frames & Roof Trusses, 15 Sheppard St	1991	Premise Match	15 m	South East
Wall frames	A.C.T. Frames & Roof Trusses, 15 Sheppard St	1991	Premise Match	15 m	South East
Timber merchants &/or saw millers	Smith EM Building Supplies, 13 Sheppard St., Hume., Canberra. (A.C.T.)	1991 1982	Premise Match	15 m	South East

4.8 Historical maps

Historical maps from 1914, 1942 and 1987 were provided as part of Lotsearch Report LS029221 and are included in **Appendix B.** Evidence of Monaro Highway and Lanyon Drive are visible in 1942 and 1987. Sheppard Street and associated industrial/commercial development south of the site is also visible in 1987.

4.9 Historical aerial imagery

Eight historical aerial photographs dating back to 1944 were provided as part of Lotsearch Report LS029221 in **Appendix B**. A review of these photographs is included in **Table 4-5**.

Table 4-5 Aerial photos summary – Package 1C

Year	Site Observations	Surrounding Area Observations
1944 (B&W)	There is a road running in a south-east direction near the Lanyon Drive/Monaro Highway intersection. Dog Trap Creek is visible north of Lanyon Drive and also intercepts the Monaro Highway.	The surrounding area is predominantly pasture and an assumed agricultural land use. Jerrabomberra Creek can be seen in the east running parallel to the now Monaro Highway. Woodland appears to be located in the west, with less dense scattered trees in the south-west. There is a single residential dwelling to the west of the Monaro Highway with an unpaved access road and one residential dwelling to the north-east at the future Defence site.
1967 (B&W)	The unpaved roads visible in 1944 now appear to be asphalt.	The majority of the surrounding area remains unchanged. There is an additional suspected residential dwelling in the west. The Monaro Highway now appears to be an asphalt road.
1976 (B&W)	The site remains relatively unchanged since the 1967 imagery with the exception of vegetation growth. Construction of Sheppard Street appears to have has begun.	Infrastructure, likely industrial, is located south of the site along Sheppard Street. Further south is exposed / disturbed land. There is a new dirt access road west of Monaro Highway. East of the highway, within the Defence lands, a circular shaped piece of infrastructure is present but the purpose is unclear.

Year	Site Observations	Surrounding Area Observations
1985 (B&W)	The site remains relatively unchanged since the 1976 imagery with the exception of vegetation growth.	The road off Lanyon Drive running south-east is no longer visible. Lot divisions with construction of infrastructure can be seen directly south of the site along Sheppard Street. The small circular infrastructure within Defence lands now has a larger circular boundary (assumed fence line). The structure noted on Defence lands in the 1967 image to have two square boundaries is now surrounded by multiple small irregularly round-shaped clearings with tracks connecting each circle. The purpose of these is not clear. To the east of the Monaro Highway and north of the site, infrastructure development appears to have begun however the purpose is not clear.
1992 (Colour)	On the corner of the Monaro Highway and Lanyon Drive is a building / structure with associated infrastructure including evenly spaced bays / ponds, potentially a wastewater treatment plant.	Major upgrades to the Monaro Highway have occurred since 1985 with dual carriageway visible, consistent with the current configuration. Additional industrial/commercial infrastructure built along Sheppard Street in the south. A yard with stockpiles of various materials can be seen next to infrastructure on Sheppard Street just south of the site. A linear ground disturbance, potentially a pipeline installation, is visible between a dam in Jerrabomberra Block 2083 to immediately north of Dog Trap Creek, in the vicinity of the possible wastewater treatment plant. This dam appears greeny-blue potentially due to the possible connection to the wastewater treatment plant. Directly next to the Monaro Hwy to the west and north of Stage 1B and on the western border of the HVRA, a small area of land is cleared with a small concrete strip visible. Infrastructure is now located east of the highway and north of the site where construction appeared to have begun in 1985.
2005 (Colour)	The potential wastewater treatment plant visible in 1992 is no longer present with all visible infrastructure removed from the corner of Monaro Hwy and Lanyon Drive. The remainder of the site remains relatively unchanged.	The dam potentially connected to the suspected wastewater treatment plant remains greeny-blue in colour. Significant vegetation growth at the location indicates that the infrastructure may have been decommissioned. Further commercial and industrial infrastructure built offsite along Sheppard Street. A commercial petrol station located south west of the site is now visible. Construction of the helicopter base and the Alexander Maconochie Centre (Corrective Services Centre) appears to have started along the eastern border of site. Vegetation along Jerrabomberra Creek has been cleared. A single building structure is visible in the area west of the Monaro Highway where a previous concrete strip was present. Further west of the Monaro Highway, the Mugga Lane Resource Management Centre can now be seen, however, the landfill may have been present earlier but located outside the photograph frame.
2010 (Colour)	Lanyon Drive, near the intersection with Monaro Highway, has widened with dual carriageway configuration now visible. The remainder of the site remains relatively unchanged since 2005.	The Alexander Maconochie Centre has been constructed to the east of the site. The building located west of the Monaro Highway with the original concrete strip noted in 1992 appears to be cleared. The concrete strip remains.

Year	Site Observations	Surrounding Area Observations
2021 (Colour)	David Warren Road has been constructed. The dual carriageway configuration has been extended east along Lanyon Drive.	Further commercial / industrial infrastructure has been constructed in the south west. The helipad and related structures (currently known as the RFS South Pod) are now visible to the east of the site, south of the Alexander Maconochie Centre. Infrastructure here is limited with no building/shelter structures visible. Further infrastructure has been constructed at the Alexander Maconochie Centre. West of the Monaro Highway, a new building structure is present at the original concrete strip noted in 1992.

4.10 Land Title Document Review

Historical land title documents were obtained to assess for potential historical site uses that may have resulted in contamination. The land title documents are provided in **Appendix B** and summarised in **Table 4-6** below:

Table 4-6 Land title documents summary – Package 1C

Land Title	Date of Acquisition and Term Held	Registered Proprietor(s) and Occupation / Land Use	Title Reference
140 Bonshaw Road, Registered Rural Block 2250	08/03/1908 (1908 to 1924)	Bertie Blundell (Farmer)	Volume 521 Folio 221 & Volume 1479 Folio 108 & Volume 64 Folio 73
	04/09/1924	Acquired by the Commonwealth for Commonwealth purposes (under the Land Acquisition Act 1906)	Government Gazette published 04.09.1924 Folios 1752 to 1754
140 Bonshaw Road, Registered Rural Block 2250 Registered Rural Block 2083	18/04/1855 (1855 to 1912)	Octavia Caroline Stoll (Spinster) (Now Octavia Caroline Palmer) Edward Charles Close, the Younger (Gentleman) Robert Campbell Close (Gentlemen) (And their deceased estates)	Book 445 No. 188
	17/08/1912	Acquired by the Commonwealth for Commonwealth purposes (under the Land Acquisition Act 1906)	Government Gazette published 17.08.1912 Folio 1422
Lanyon Drive, Block 10 Section 8 89 David Warren Road, Block 16 Section 18 140 Bonshaw Road, Registered Rural Block 2250	27/10/1908 (1908 to 1912)	John Edward Robert Campbell (Colonel and late of the Sixth Battalion Royal Warwickshire Regiment, a Companion of the Distinguished Service Order)	Volume 1919 Folio 126
	27/07/1912	Acquired by the Commonwealth for Commonwealth purposes (under the Land Acquisition Act 1906)	Government Gazette published 27.07.1912 Folio 1316 to 1318
Registered Rural Block 2083	15/05/2006 (2006 to 2007)	Peter Langlar Eunice Marion Langlar	Volume 1779 Folio 37 (Crown Lease)
	29/01/2007 (2007 to 2009)	Prism Holdings (ACT) Pty Ltd	Volume 1779 Folio 37
	19/06/2009 (2009 to Date)	Prism Holdings (ACT) Pty Ltd (99/100 Share) Peter Robert Marchant (1/100 Share)	Volume 1779 Folio 37
89 David Warren Road, Block 16 Section 18	27/01/2012 (2012 to Date)	Australian Capital Territory	Volume 2014 Folio 100 (Crown Lease)
Registered Rural Block 2060	18/04/1855 (1855 to 1912)	Octavia Caroline Stoll (Spinster) (Now Octavia Caroline Palmer)	Book 445 No. 188

Land Title	Date of Acquisition and Term Held	Registered Proprietor(s) and Occupation / Land Use	Title Reference
		Edward Charles Close, the Younger (Gentleman) Robert Campbell Close (Gentleman) (And their deceased estates)	
	17/08/1912	Acquired by the Commonwealth for Commonwealth purposes (Under the Land Acquisition Act 1906)	Government Gazette published 17.08.1912 Folio 1422
Registered Rural Block 2060 (Southern section only)	27/10/1908 (1908 to 1912)	John Edward Robert Campbell (Colonel and late of the Sixth Battalion Royal Warwickshire Regiment, a Companion of the Distinguished Service Order)	Volume 1919 Folio 126
	27/07/1912	Acquired by the Commonwealth for Commonwealth purposes (Under the Land Acquisition Act 1906)	Government Gazette published 27.07.1912 Folios 1316 to 1318

4.11 Information suitability and data gaps

The reviewed site information is generally considered accurate, from reputable sources and suitable for the preliminary assessment of the likelihood of contamination existing on or potentially impacting the site. The following data gaps have been identified within the site history:

- A review of dangerous substances records was not undertaken. Based on the history of the site as a road with surrounding land use as pasture with some construction of industrial/commercial infrastructure in the south, it is unlikely that these unsearched records will contain information relevant to the contamination status of the site.
- Adjoining land users in the southern section of Package 1C were comprised of numerous light to heavy industrial land uses. Title searches were not undertaken for these off-site lots as the industrial business park as a whole is considered to be an area of environmental concern (AEC).
- Interviews with land owners were not undertaken.
- Review of some previous preliminary environmental assessments were not available and so were not reviewed.

5 Discussion

5.1 Areas of Environmental Concern

As a result of the desktop review and observations made during the site inspection, a consolidated list of areas of environmental concern (AEC) are summarised in **Table 5-1** below with the location of each AEC shown in **Figure 4** of **Appendix A**.

Table 5-1 Areas of Environmental Concern

AEC Identification	Description	Contaminants of Interest
AEC 1: Monaro Highway alignment	Potential contamination may have occurred as a result of general vehicle use along the highway and surrounding roads. These contaminants include, but are not limited to, rubber tyre fragments, hydrocarbons, traces of fly tipping, spills, traffic accident debris, and an array of metals. Within the alignment, a construction compound was located in between the north bound and south bound carriageway of the Monaro Highway within the southern section of the site. A diesel generator and an array of diesel-powered machinery were in use and may present a potential source of contamination. Fill emplacements associated with the historical construction of the site are evident at some locations. The origin of the fill material and its chemical properties are unknown.	Total Recoverable Hydrocarbons (TRH), Benzene Ethylbenzene Toluene, Xylenes (BTEX), Polycyclic Aromatic Hydrocarbons (PAH), Metals, Phenol, Volatile Organic Compounds (VOC), Semi-volatile Organic Compounds (SVOC). Organochlorinated Pesticides (OCP), Organophosphate Pesticides (OPP), Polychlorinated Biphenyls (PCB), Asbestos
AEC 2: Mugga Lane Resource Management Centre	Located approximately 1 km west of the site is a landfill and waste recycling centre. Dog Trap Creek is located on the south boundary of the landfill site with potential leachate ponds located nearby the creek. Leachate overflow may potentially contaminate the creek. As the creek flows towards the site, contaminants may be transported towards the site via the creek.	Leachate, Landfill Gases, Per- and Poly-Fluoroalkyl Substances (PFAS), TRH, BTEX, PAH, Metals, Phenol, VOC, SVOC
AEC 3: Hume Industrial Area	All land use south / south-west of the site is industrial, ranging from landscaping supply, fabrication and engineering, transport companies and service stations.	TRH; BTEX, PAH; Metals; Phenol, VOC, SVOC, PFAS, Asbestos
AEC 4: Fly tipping in cleared area of forested PAD area between north and south bound lanes of Monaro Hwy, just north of Lanyon Drive)	Domestic waste and fly tipping noted in this area along with disturbed surfaces, potentially fill. This area is located in the centre of the package 1B between northbound and southbound carriageways of the Monaro Highway and is in close proximity to the Dog Trap Creek. Whilst not within Package 1C its close proximity creates potential for migration of contaminants.	Metals, PAH, TRH, BTEX, Phenols, Organochlorinated Pesticides (OCP), Organophosphate Pesticides (OPP), Polychlorinated Biphenyls (PCB), Asbestos
AEC 5: Historical Building with Infrastructure – Possible Wastewater Treatment Plant	Historical buildings and infrastructure noted from historical images indicate the potential presence of a wastewater treatment plant on site, the corner of Lanyon Drive and the Monaro Hwy. Infrastructure appears to include large rectangular waterbodies, possible ponds, or flat, cleared areas. The buildings and infrastructure are demolished but residual waste and potentially hazardous building materials may remain.	TRH, BTEX, PAH, Metals, Phenol, Asbestos, Nutrients, Biological Contaminants (E. coli, Enterococci, etc)
AEC 6: Helipad RFS South Pod and Emergency Services Agency Training Centre	Current helipad area and aerodrome located along the eastern border of the site. Evidence of a training area, potentially for firefighting, was noted during the site inspection. Anecdotal evidence of asbestos was noted by Jacobs in the vicinity of the “Helipad	PFAS, TRH, BTEX, PAH, Metals, Phenol, Asbestos

AEC Identification	Description	Contaminants of Interest
	RFS South Pod" and "Emergency Services Agency Training Centre".	
AEC 7: Alexander Maconochie Centre	This correction facility, located on site and along the eastern boundary of the site, was noted to have potential fill and is likely to store diesel onsite for backup generators. Depending on further activities, there is also potential for waste management and waste water management related contamination.	TRH, BTEX, PAH, Metals, Phenol, OCP, OPP, Asbestos
AEC 8: Grazing and Nature Reserve Area	Agriculture usage on parts of these lands, sections of which are located on site, may include the use of pesticides, herbicides and/or fertilisers.	OCP, OPP, metals
AEC 9: Department of Defence	Historical petroleum storage was referenced to Commonwealth Lands located approx. 1.5km to the east of the Monaro Highway. A compound with former building structures and ground disturbances (many) in the surrounding lands were historically located on these lands. HMAS Harman remains in the north-eastern part of the Commonwealth Lands. The exact activities on the land are unknown.	PFAS, TRH, PAH, BTEX, Metals, Phenols, VOC, OCP, OPP, PCB, SVOC, Asbestos
AEC 10: Water Storage/Historical Dam	A dam is visible approximately 700m north-north east of Package 1C. Historical imagery suggests that the dam may have historically received water from the suspected sewerage treatment plant observed in the 1992 aerial image, located east of the Lanyon Drive and Dog Trap Creek intersection (AEC 5). Whilst unconfirmed, the potential receipt of effluent is sufficient to warrant the area as a potential source of contamination.	PFAS, TRH, BTEX, PAH, Metals, Phenol, Asbestos, Nutrients, Biological Contaminants (E. coli, Enterococci, etc), OCP, OPP

PFAS: per- and poly- fluoroalkyl substances; PAH: polycyclic aromatic hydrocarbons; TRH: total recoverable hydrocarbons; BTEX: benzene, toluene, ethylbenzene, xylene; OCP: organochlorine pesticides; OPP: organophosphorus pesticides; PCB: polychlorinated biphenyls

In addition to the AECs listed, an apparent sewerage pipe was mapped on historic titles from close proximity to Dog Trap Creek (near AEC 5), running parallel to Jerrabomberra Creek north to a large water body/dam approximately 1km north of Package 1C area (see historical image 1992 – 1 and 1992 – 2 from LotSearch report in Appendix B). This is a potential concern due to the possibility of sewage outfall or treatment in the vicinity of the site and AEC 5 and potential interaction with the alignment.

5.2 Preliminary conceptual site model

A conceptual site model (CSM) provides an assessment of the fate and transport of contaminants of concern within the context of site-specific subsurface conditions with regard to their potential risk to human health and the environment. Risk to human health and the environment is identified through complete Source – Pathway – Receptor (SPR) linkages. In order to identify SPR linkages the CSM considers site specific factors, including:

- Source(s) of contamination;
- Identification of contaminants of concern associated with past (and present) source(s);
- Site specific information including soil type(s), inferred depth to groundwater, inferred permeability, inferred groundwater flow direction, surface water bodies and interactions;
- Location of any identified sources relative to Package 1C; and
- Actual or potential receptors considering both current and future land use both for the site, adjacent properties and any sensitive ecological receptors.

Based on the information collected as part of this PSA, including site history information, site observations, the preliminary CSM in **Table 5-2** has been developed showing potential SPR linkages considered to be complete or potentially complete under our understanding of the current and future land use.

Identified receptors for the potential Site contamination include:

- Ecological receptors dependent on-site soils in potentially impacted areas;
- Ecological receptors, both onsite and downgradient, dependent on surface water and groundwater flows passing through the site;

- Current site users and workers disturbing potentially impacted materials; and
- Future site users and workers disturbing potentially impacted materials.

Overall the developed CSM is considered typical of a major road corridor within a developed urban and agricultural area with primary contaminant sources described in **Table 5-2**.

Table 5-2 Preliminary conceptual site model

Source	Potential Contaminants	Potential Impacted media	Route/Mechanism of Migration to the site	Pathway to Receptors	Site Receptors	Likelihood of Complete Exposure Pathway
AEC 1: Monaro Highway alignment	TRH, BTEX, PAH, Metals, Phenol, VOC, SVOC, OCP, OPP, PCB, Asbestos	Soil Surface water Groundwater	Direct onsite source due to materials of construction, illegal or accidental dumping, vehicle accidents, spills, migration from off-site sources. Leaching and surface run-off.	Direct contact Incidental ingestion Inhalation Flora and fauna uptake	**Human**: Current and future site workers and users **Ecological**: Flora and fauna Aquatic ecosystems of Dog Trap Creek	**Low to medium (soil, groundwater, surface water, sediments**) – There was limited visual evidence of significant contamination observed during the site walk-over, however, some evidence of undulating land within or adjacent to heavy underbrush made further visual assessment not possible. History of spilling and vehicle accident is not known but should be considered as a potential activity along the existing highway. Outcome of a hazard workshop reported in Jacobs PSP, 2021 "Appendix A, HSiD Register" noted that asbestos pipe and conduits, asbestos pieces and farm tips within the site could be a hazard. Workers at the site may be exposed to site contaminants, if any, during excavation and water management works. Flora and fauna located within the site may be exposed to site contaminants, if any, during and after works.
AEC 2: Mugga Lane Resource Management Centre	Landfill Gases, Per- and Poly-Fluoroalkyl Substances (PFAS), TRH, BTEX, PAH, Metals, Phenol, VOC, SVOC		Leachate releases and migration in Dog Trap Creek Groundwater transport Wind and atmospheric dispersion			**Medium (groundwater, surface water, and sediments)** – This source of potential contamination is located upgradient of the site (>1km), however, there are sufficient migration pathways towards the site. Workers at the site may be exposed to these contaminants, if any, during excavation and water management works. The landfill may have leachate control measures and a monitoring programme that would mitigate against contamination releases,

Source	Potential Contaminants	Potential Impacted media	Route/Mechanism of Migration to the site	Pathway to Receptors	Site Receptors	Likelihood of Complete Exposure Pathway
						however, the details of leachate management and any releases at the landfill are not known. Potential contaminants are also likely to be intermittently airborne, however, exposure at the site will be dependent on wind direction, speed and distance from landfill. Airborne contaminants may disperse to soil surfaces with run-off to surface water bodies or leaching to groundwater.
AEC 3: Hume Industrial Area	TRH, BTEX, PAH, Metals, Phenol, VOC, SVOC, PFAS, Asbestos		Leaching to groundwater followed by groundwater transport. Surface runoff and migration to surface waters			**Medium to high (groundwater, surface water, sediments, soil)** – Given the concentration of heavy industrial activities located up-gradient of the site with drainage ways leading surface water into Dog Trap Creek and areas of Package 1C, there is a medium likelihood of contamination migration in groundwater, surface waters (including man-made stormwater drains) and sediments of water bodies. Workers at the site may be exposed to contaminants, if any, during excavation and water management works. Flora and fauna located within the site may be exposed to site contaminants, if any, during and after works.
AEC 4: Fly tipping in cleared area of forested PAD area between north and south bound lanes of Monaro Hwy, just north of Lanyon Drive)	Metals, PAH, TRH, BTEX, Phenols, OCP, OPP, PCB, Asbestos		Leaching to groundwater and transport. Surface runoff and migration to surface waters			**Low (soil, groundwater, surface water)** – Illegal dumping of inert waste materials was observed on visible parts of the land near Dog Trap Creek within Package 1B. Whilst not within Package 1C the AEC is close enough that potential migration of contaminants could occur. Undulating ground surfaces in some areas also indicated the potential for

Source	Potential Contaminants	Potential Impacted media	Route/Mechanism of Migration to the site	Pathway to Receptors	Site Receptors	Likelihood of Complete Exposure Pathway
						ground disturbances or buried fill. The quantity and quality of materials at surface or buried is not known along with the potential of leach from these materials into the groundwater and nearby Dog Trap Creek. Workers at the site may be exposed to site contaminants, if any, during excavation and water management works. Flora and fauna located within the site may be exposed to site contaminants, if any, during and after works.
AEC 5: Historical Building with Infrastructure – Possible Wastewater Treatment Plant	TRH, BTEX, PAH, Metals, Phenol, Asbestos, Nutrients, Biological Contaminants (E. coli, Enterococci, etc)		Direct onsite source Leaching to groundwater and transport. Surface runoff and migration to surface waters Incidental soil transport			**High (soil, groundwater, surface water)** – The quality of demolition and removal of historic building and infrastructure is not known. The building and infrastructure were located on the site and residual materials may be present on surface or buried. Workers at the site may be exposed to contaminants, if any, during excavation and water management works. Flora and fauna located within the site may be exposed to site contaminants, if any, during and after works.
AEC 6: Helipad RFS South Pod and Emergency Services Agency Training Centre	PFAS, TRH, BTEX, PAH, Metals, Phenol, Asbestos		Surface runoff and migration to surface waters Groundwater transport Incidental soil transport and illegal dumping Air dispersion			**High (groundwater, surface waters, sediments); medium (soil)** - Given the activities including the use of fuels and fire training substances and the close proximity to the eastern boundary and the large paddock area of Package 1C, there is a high likelihood of migration of contaminants via run-off, leaching, and air dispersion to surface water and groundwater and soil migration. Workers at the site may be exposed to contaminants, if any, during excavation and water management

Source	Potential Contaminants	Potential Impacted media	Route/Mechanism of Migration to the site	Pathway to Receptors	Site Receptors	Likelihood of Complete Exposure Pathway
						works. Flora and fauna located within the site may be exposed to site contaminants, if any, during and after works.
AEC 7: Alexander Maconochie Centre	TRH, BTEX, PAH, Metals, Phenol, OCP, OPP, Asbestos		Surface runoff and migration to surface waters Groundwater transport Incidental soil transport and illegal dumping Air dispersion			**Low (soil, groundwater**) – The majority of the Alexander Maconochie Centre is located at the inferred hydraulically down-gradient side of Package 1C, however, the site does overlap with some areas. As such groundwater contaminants are more likely to migrate towards the east. Given the potential of fuel and mild industrial activities at the eastern boundary of the Monaro Highway, there is a low to medium likelihood of cross contamination. Workers at the site may be exposed to contaminants, if any, during excavation and water management works. Flora and fauna located within the site may be exposed to site contaminants, if any, during and after works.
AEC 8: Grazing and Nature Reserve Area	OCP, OPP, metals		Migration through surface water runoff Groundwater transport Direct site source			**Low to Medium (groundwater, surface water, and soil)** - Given the potential of fertiliser, pesticide and herbicide use at the western boundary of the site, inferred hydraulically up-gradient of the site, up there is a low to medium likelihood of contaminant migration. Workers at the site may be exposed to contaminants, if any, during excavation and water management works. Flora and fauna located within the site may be exposed to site contaminants, if any, during and after works.

Source	Potential Contaminants	Potential Impacted media	Route/Mechanism of Migration to the site	Pathway to Receptors	Site Receptors	Likelihood of Complete Exposure Pathway
AEC 9: Commonwealth, Department of Defence	PFAS, TRH, PAH, BTEX, Metals, Phenols, VOC, OCP, OPP, PCB, SVOC, Asbestos		Surface runoff and migration to surface waters (most likely Jerrabomberra Creek which flows in a northerly direction). Groundwater transport Incidental soil transport and illegal dumping Air dispersion			**Medium** – The Defence lands are located hydraulically down-gradient of the site and there is historical evidence of petroleum storage and ground disturbances. The actual use of the lands by Defence or Commonwealth is not known. Given the history of land use by Defence in Australia, the potential for contamination on the Defence lands is considered to be medium to high. Migration of contamination to the site will vary depending on the nature of the contaminant.
AEC 10: Water Storage/Historical Dam	TRH, BTEX, PAH, Metals, Phenol, Asbestos, Nutrients, Biological Contaminants (E. coli, Enterococci, etc)		Migration of potential sewage wastewater due to a possible connection to AEC 5			**Low –** This area is located hydraulically down gradient of the site however, the flow direction of the sewer alignment is unknown, hence, this site has been considered as a precaution with a low likelihood of contamination located on site as a result of this dam. Workers at the site may be exposed to contaminants, if any, during excavation and water management works. Flora and fauna located within the site may be exposed to site contaminants, if any, during and after works.

PFAS: per- and poly- fluoroalkyl substances; PAH: polycyclic aromatic hydrocarbons; TRH: total recoverable hydrocarbons; BTEX: benzene, toluene, ethylbenzene, xylene; OCP: organochlorine pesticides; OPP: organophosphorus pesticides; PCB: polychlorinated biphenyls.

6 Conclusions and Recommendations

6.1 Conclusions

Cardno has undertaken a PSA of the Package 1C area of the Monaro Highway Upgrade project on behalf of IDPG. The purpose of the assessment was to review, assess and document whether contamination has the potential to exist or impact on the Package 1C boundaries and whether further investigation is needed.

The assessment has identified areas of environmental concern and potential complete exposure pathways to receptors associated with the Monaro Highway and the Package 1C upgrade as detailed in the preliminary CSM, **Table 5-2**. Ten areas of environmental concern with potential complete exposure pathways were identified as follows:

- **AEC 1: Monaro Highway alignment** – **Low to medium (soil, groundwater, surface water, sediments**) – There was limited visual evidence of significant contamination observed during the site walk-over, however, some evidence of undulating land within or adjacent to heavy underbrush made further visual assessment not possible. History of spilling and vehicle accident is not known but should be considered as a potential activity along the existing highway. Asbestos pipe and conduits, asbestos pieces and farm tips have been noted as a potential hazard within the site.
- **AEC 2: Mugga Lane Resource Management Centre - Medium (groundwater, surface water, and sediments)** – This source of potential contamination is located upgradient of the site (>1km), however, there are sufficient migration pathways towards the site. The landfill may have leachate control measures and a monitoring programme that would mitigate against contamination releases, however, the details of leachate management and any releases at the landfill are not known. Potential contaminants are likely to be intermittently airborne, however, exposure at the site will be dependent on wind direction, speed and distance from landfill. Airborne contaminants may disperse to soil surfaces with run-off to surface water bodies or leaching to groundwater.
- **AEC 3: Hume Industrial Area – Medium to high (groundwater, surface water, sediments, soil)** – Given the concentration of heavy industrial activities located up-gradient of the site with drainage ways leading surface water into Dog Trap Creek and areas of Package 1C, there is a medium likelihood of contamination migration in groundwater, surface waters (including man-made stormwater drains) and sediments of water bodies.
- **AEC 4: Fly tipping in cleared area of forested PAD area between north and south bound lanes of Monaro Hwy, just north of Lanyon Drive) - Low (soil, groundwater, surface water)** – Illegal dumping of inert waste materials was observed on visible parts of the land near Dog Trap Creek within Package 1B. Whilst not within Package 1C the AEC is close enough that potential migration of contaminants could occur. Undulating ground surfaces in some areas also indicated the potential for ground disturbances or buried fill. The quantity and quality of materials at surface or buried is not known along with the potential of leach from these materials into the groundwater and nearby Dog Trap Creek.
- **AEC 5: Historical Building with Infrastructure (Possible Wastewater Treatment Plant) and their demolition - High (soil, groundwater, surface water)** – The quality of demolition and removal of historic building and infrastructure is not known. The building and infrastructure were located on the site (Historical aerial imagery from 1992, LotSearch Report LS029221, **Appendix B**) and residual materials may be present on surface or buried.
- **AEC 6: Helipad RFS South Pod and Emergency Services Agency Training Centre - High (groundwater, surface waters, sediments); Medium (soil)** - Given the activities including the use of fuels and fire training substances and the close proximity to the eastern boundary and the large paddock area of Package 1C, there is a high likelihood of migration of contaminants via run-off, leaching, and air dispersion to surface water and groundwater and soil migration.
- **AEC 7: Alexander Maconochie Centre - Low (soil, groundwater)** – The Alexander Maconochie Centre is located the inferred hydraulically down-gradient of Package 1C, however, the site does overlap with some areas. As such groundwater contaminants are more likely to migrate towards the east. Given the potential of fuel and mild industrial activities at the northern section of David Warren Road located on site, there is a low to medium likelihood of cross contamination.
- **AEC 8: Grazing and Nature Reserve Area – Low to medium (groundwater, surface water, and soil)** - Given the potential of fertiliser, pesticide and herbicide use on site and to the west inferred hydraulically up-gradient of the site, there is a medium likelihood of contamination.

- **AEC 9: Commonwealth, Department of Defence - Medium** – The Defence lands are located hydraulically down-gradient of the site and there is historical evidence of petroleum storage (located ~1.2 km northeast of the northern extent of Package 1C) and ground disturbances. The actual use of the lands by Defence or Commonwealth is not known. Given the history of land use by Defence in Australia, the potential for contamination on the Defence lands is considered to be medium to high. Migration of contamination to the site will vary depending on the nature of the contaminant.
- **AEC 10: Water Storage/Historical Dam - Low** – This area is located hydraulically down gradient of the site however, the flow direction of the sewer alignment is unknown, hence, this site has been considered as a precaution with a low likelihood of contamination located on site as a result of this dam.

For each of the AECs described above, current and future workers at the site may be exposed to contaminants, if any, during excavation and water management works. Flora and fauna located within the site may be exposed to site contaminants, if any, during and after works.

6.2 Recommendations

Further assessment, including soil, groundwater, surface water, and sediment investigation (sampling and analyses as needed), is recommended to determine if contamination is present, at what levels and if further management is required. Specifically:

- Undertake an intrusive targeted Phase 2 Detailed Site Assessment in accordance with the PSA findings presented and that is considerate of the design and proposed earthworks extents of the Stage 1C Monaro Highway upgrade. The requirement and extent to which offsite contaminant sources are investigated should be determined in consideration of the proximity to the works areas and in consideration of the design.
- Observations and data gathered during future assessments should be compared to applicable land use and waste classification guidelines and criteria in consideration to current and future users of the site, including construction workers and ecological receptors. The future assessment is to consider the suitability of the site, to determine the requirement for remedial works or contamination management, to determine preliminary waste classification of soils for off-site disposal, and to determine the environmental suitability of soils to be re-used on the site during proposed Highway constructions.
- Any future site environmental management plans should consider the findings of this assessment and future reports.

7 References

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NSW OEH. (2019). *Soil Landscapes of Central and Eastern NSW - v2.* NSW Office of Environment and Heritage.

8 Limitations

This assessment report is not any of the following:

- A Site Audit Report or Site Audit Statement as defined under the *Contaminated Land Management Act 1997* (CLM Act).
- A Detailed or Environmental Site Investigation sufficient for an Environmental Auditor to be able to conclude a Site Audit Report and Site Audit Statement.
- A geotechnical report.
- A detailed hydrogeological assessment in conformance with NSW DEC (2007) *Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination*.
- An assessment of groundwater contaminants potentially arising from other sites or sources nearby.
- A total assessment of the site to determine suitability of the entire parcel of land at the site for one or more beneficial uses of land.
- A hazardous building material survey that will identify any specific building materials on site, which may pose a risk to human health or the environment.
- The agreed scope of this assessment has been limited for the current purposes of the Client. The assessment may not identify contamination occurring in all areas of the site.

This Document has been provided by Cardno subject to the following limitations:

- This Document has been prepared for the particular purpose outlined in Cardno's proposal and no responsibility is accepted for the use of this Document, in whole or in part, in other contexts or for any other purpose.
- The scope and the period of Cardno's services are as described in Cardno's proposal, and are subject to restrictions and limitations. Cardno did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Document. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Cardno in regards to it.
- Conditions may exist which were undetectable given the limited nature of the enquiry Cardno was retained to undertake with respect to the site. Variations in conditions may occur between investigatory locations, and there may be special conditions pertaining to the site which have not been revealed by the investigation and which have not therefore been taken into account in the Document. Accordingly, additional studies and actions may be required.
- In addition, it is recognised that the passage of time affects the information and assessment provided in this Document. Cardno's opinions are based upon information that existed at the time of the production of the Document. It is understood that the services provided allowed Cardno to form no more than an opinion of the actual conditions of the site at the time this Document was prepared and cannot be used to assess the effect of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.
- Any assessments made in this Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this Document.
- Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Cardno for incomplete or inaccurate data supplied by others.

APPENDIX A

FIGURES

Cardno

now

Stantec

SITE

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User

MONARO HIGHWAY

MONARO HIGHWAY

DAVID WARREN ROAD

LANYON DRIVE

SHEPPARD STREET

ARNOTT STREET

TERRITORY PARADE

Legend

- Stage 1C Boundary
- Cadastre (ACT EPD, 2019)

FIGURE 1

1:5,500 Scale at A3

m

0 50 100 150 200

Site Location

MONARO HIGHWAY UPGRADE - STAGE 1C

N

[redacted]

Map Produced by W & E
Date: 2022-03-22
Project: 5052201701
Coordinate System: GDA 1994 MGA Zone 55
Map: 50522017 - 001 - Site 1C Location.mxd 01

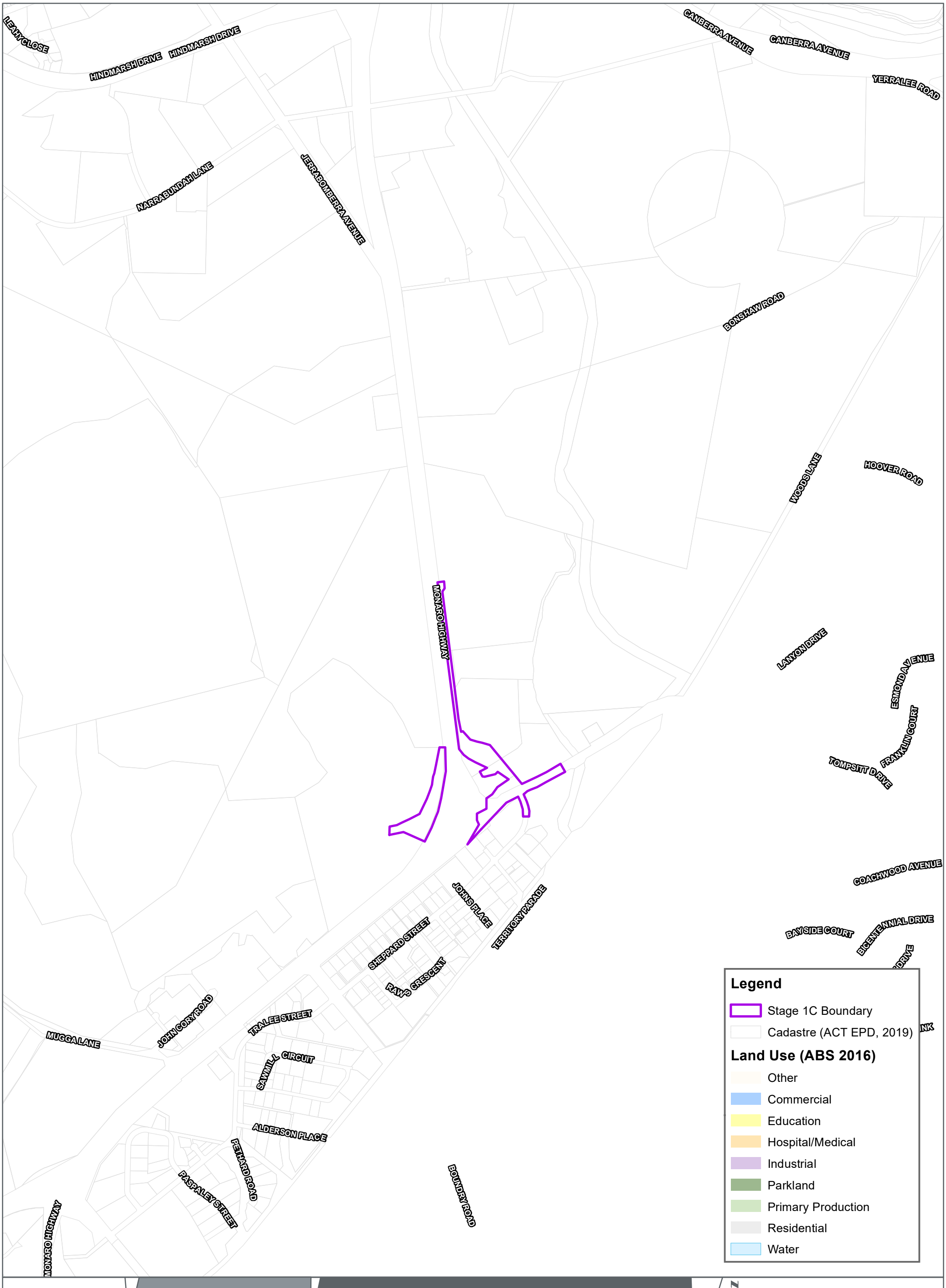

FIGURE 2

1:20,000Scale at A3

Surrounding Land Uses

MONARO HIGHWAY UPGRADE - STAGE 1C

[redacted]

Map Produced by W & E
Date: 2022-03-22
Project: 5052201701
Coordinate System: GDA 1994 MGA Zone 55
Map: 50522017 - 010 - Site 1C LandUse.mxd 01

JERRABOMBERRA CREEK

JERRABOMBERRA CREEK

JERRABOMBERRA CREEK

JERRABOMBERRA CREEK

Woden Creek

Legend

- Stage 1B Boundary
- Stage 1C Boundary
- HVRA Site Boundary
- Cadastre (ACT EPD, 2019)
- Creek Flow Direction

Stream Order (DPI Water, 2017)

- 1, 2
- 3
- 4
- 5

Lot

- Hume: Block10 Section 18
- Hume: Block 16 Section 18
- Jerrabomberra: Block 2060
- Jerrabomberra: Block 2083
- Jerrabomberra: Block 2250

FIGURE 3

1:18,000Scale at A3

Meters

0 200 400 600 800

Historical Title Search Lots

MONARO HIGHWAY UPGRADE

[redacted]

Map Produced by W & E
Date: 2022-04-20
Project: 50522017
Coordinate System: WGS 1984 World Mercator
Map: 50522017 - 012 - HVRALandTitles.mxd 01

AEC 9

AEC 10

AEC 8

AEC 7

AEC 6

AEC 4

AEC 1

AEC 2

AEC 3

Woden Creek

JERRABOMBERRA CREEK

DOGTRAP GULLY

Legend

- Stage 1B Boundary
- Site 1C Boundary
- HVRA Site Boundary
- Cadastre (ACT EPD, 2019)
- Creek Flow Direction

Areas of Environmental Concern

- AEC 1: Monaro Highway Alignment
- AEC 2: Mugga Lane Resource Management Centre
- AEC 3: Industrial Area
- AEC 4: Area Containing Fly Tipping
- AEC 5: Historical Building with Infrastructure
- AEC 6: Helipad RFS South Pod and Emergency Services Agency Training Centre
- AEC 7: Alexander Maconochie Centre
- AEC 8: Grazing and Nature Reserve Area
- AEC 9: Department of Defence
- AEC 10: Water Storage/Historical Dam

ACT Government

FIGURE 4

1:28,000Scale at A3

Meters

0 250 500 750 1,000

Areas of Environmental Concern

MONARO HIGHWAY UPGRADE

Cardno

Map Produced by W & E
Date: 2022-05-13
Project: 50522017
Coordinate System: WGS 1984 World Mercator
Map: 50522017 - 013 -AECs_1C.mxd 01

APPENDIX

B

LOTSEARCH DATA REPORT

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now

Stantec

LOTSEARCH

LOTSEARCH ENVIRO PROFESSIONAL

Address: Stage 1b, 2c & Hvra, Canberra, ACT 2601

Date: 15 Feb 2022 15:12:50

Reference: LS029221 EP

Report Buffer: 1000m

Dataset Listing

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

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	No. Features Onsite	No. Features within 100m	No. Features within Buffer
Land Administration Databases	ACT Government	08/07/2021	06/07/2021	Quarterly	-	-	-
Register of Contaminated Sites	ACT Government - Environment Protection Authority	11/01/2022	11/01/2022	Monthly	0	0	0
National Waste Management Facilities Database	Geoscience Australia	12/05/2021	07/03/2017	Annually	0	0	0
National Liquid Fuel Facilities	Geoscience Australia	15/02/2021	15/03/2012	Annually	0	0	1
Defence PFAS Investigation & Management Program - Investigation Sites	Department of Defence	28/01/2022	28/01/2022	Monthly	0	0	0
Defence PFAS Investigation & Management Program - Management Sites	Department of Defence	28/01/2022	28/01/2022	Monthly	0	0	0
Airservices Australia National PFAS Management Program	Airservices Australia	09/02/2022	09/02/2022	Monthly	0	0	0
Defence 3 Year Regional Contamination Investigation Program	Department of Defence	06/01/2022	06/01/2022	Quarterly	0	0	0
EPA Authorisations	Environment Protection Authority	12/01/2022	12/01/2022	Monthly	2	4	19
EPA Agreements	Environment Protection Authority	11/01/2022	11/01/2022	Monthly	0	0	0
UBD Business Directories (Premise & Intersection Matches)	Hardie Grant			Not required	0	65	68
UBD Business Directories (Road & Area Matches)	Hardie Grant			Not required	-	7	7
UBD Business Directory Dry Cleaners & Motor Garages/Service Stations (Premise & Intersection Matches)	Hardie Grant			Not required	0	0	0
UBD Business Directory Dry Cleaners & Motor Garages/Service Stations (Road & Area Matches)	Hardie Grant			Not required	-	0	0
Features of Interest	ACT Government	04/02/2022	04/02/2022	Quarterly	6	6	13
Hydrogeology Map of Australia	Commonwealth of Australia (Geoscience Australia)	08/10/2014	17/03/2000	As required	1	1	1
Hydrogeological Landscapes Units	ACT Government - Environment, Planning and Sustainable Development Directorate	04/01/2018	22/11/2017	As required	1	1	1
Groundwater Boreholes (ACT)	ACT Government	04/02/2022	04/02/2022	Quarterly	2	2	4
Groundwater Boreholes (Bureau of Meteorology)	Commonwealth of Australia (Bureau of Meteorology)	20/11/2017	25/08/2017	Annually	5	6	33
Geological Units 1:250,000	NSW Department of Industry, Resources & Energy	20/08/2014		Annually	4	-	9
Geological Structures 1:250,000	NSW Department of Industry, Resources & Energy	20/08/2014		Annually	0	-	0
Atlas of Australian Soils	ABARES	19/05/2017	17/02/2011	As required	2	2	2
Soil Landscapes	NSW Office of Environment & Heritage	12/08/2014		None planned	3	-	5
Atlas of Australian Acid Sulfate Soils	CSIRO	19/01/2017	21/02/2013	As required	2	2	2
Territory Plan Zones	ACT Government - Environment, Planning and Sustainable Development Directorate	05/08/2021	05/08/2021	Quarterly	8	11	17

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	No. Features Onsite	No. Features within 100m	No. Features within Buffer
Territory Plan Overlays (Areas)	ACT Government - Environment, Planning and Sustainable Development Directorate	04/02/2022	04/02/2022	Quarterly	2	2	3
Territory Plan Overlays (Lines)	ACT Government - Environment, Planning and Sustainable Development Directorate	18/03/2019	18/03/2019	Quarterly	0	3	10
Commonwealth Heritage List	Australian Government Department of Agriculture, Water and the Environment	18/05/2021	20/11/2019	Annually	1	1	1
National Heritage List	Australian Government Department of Agriculture, Water and the Environment	18/05/2021	20/11/2019	Annually	1	1	1
Heritage Sites	ACT Government - Environment, Planning and Sustainable Development Directorate	04/02/2022	04/02/2022	Quarterly	8	9	38
Bushfire Prone Areas	ACT Government - Environment, Planning and Sustainable Development Directorate	23/07/2021	23/07/2021	Quarterly	1	1	1
Bushfire Abatement Zones	ACT Government - Environment, Planning and Sustainable Development Directorate	23/07/2021	23/07/2021	Quarterly	3	3	3
Bushfire Operational Plan - Access Management	ACT Government - Environment, Planning and Sustainable Development Directorate	07/01/2020	07/01/2020	Quarterly	0	0	0
Bushfire Operational Plan - Fuel Management	ACT Government - Environment, Planning and Sustainable Development Directorate	07/01/2020	07/01/2020	Quarterly	6	6	11
Flood 1 percent Annual Exceedance Probability	ACT Government - Environment, Planning and Sustainable Development Directorate	20/05/2021	10/09/2019	Annually	1	1	1
Vegetation Communities	ACT Government	10/02/2022	21/12/2018	Annually	15	37	55
Vegetation Subformation	ACT Government	14/01/2019	14/01/2019	Annually	0	0	0
Threatened Woodland	ACT Government	10/02/2022	08/06/2021	Annually	9	11	25
Tree Register	ACT Government	03/11/2021	03/11/2021	Annually	0	0	0
Important Wetlands	ACT Government	03/11/2021	03/11/2021	Annually	0	0	0
Groundwater Dependent Ecosystems Atlas	Bureau of Meteorology	14/08/2017	15/05/2017	Annually	1	1	2
NSW BioNet Species Sightings	NSW Office of Environment & Heritage	23/06/2021	23/06/2021	Weekly	-	-	-

Aerial Imagery 2021

Stage 1b, 2c & Hvra, Canberra, ACT 2601

Scale:	Data Sources: Aerial Imagery © Aerometrex Pty Ltd	Coordinate System: GDA 1994 MGA Zone 55	Date: 15 February 2022

0 300 600 900 1,200
Meters

Contaminated Land

Stage 1b, 2c & Hvra, Canberra, ACT 2601

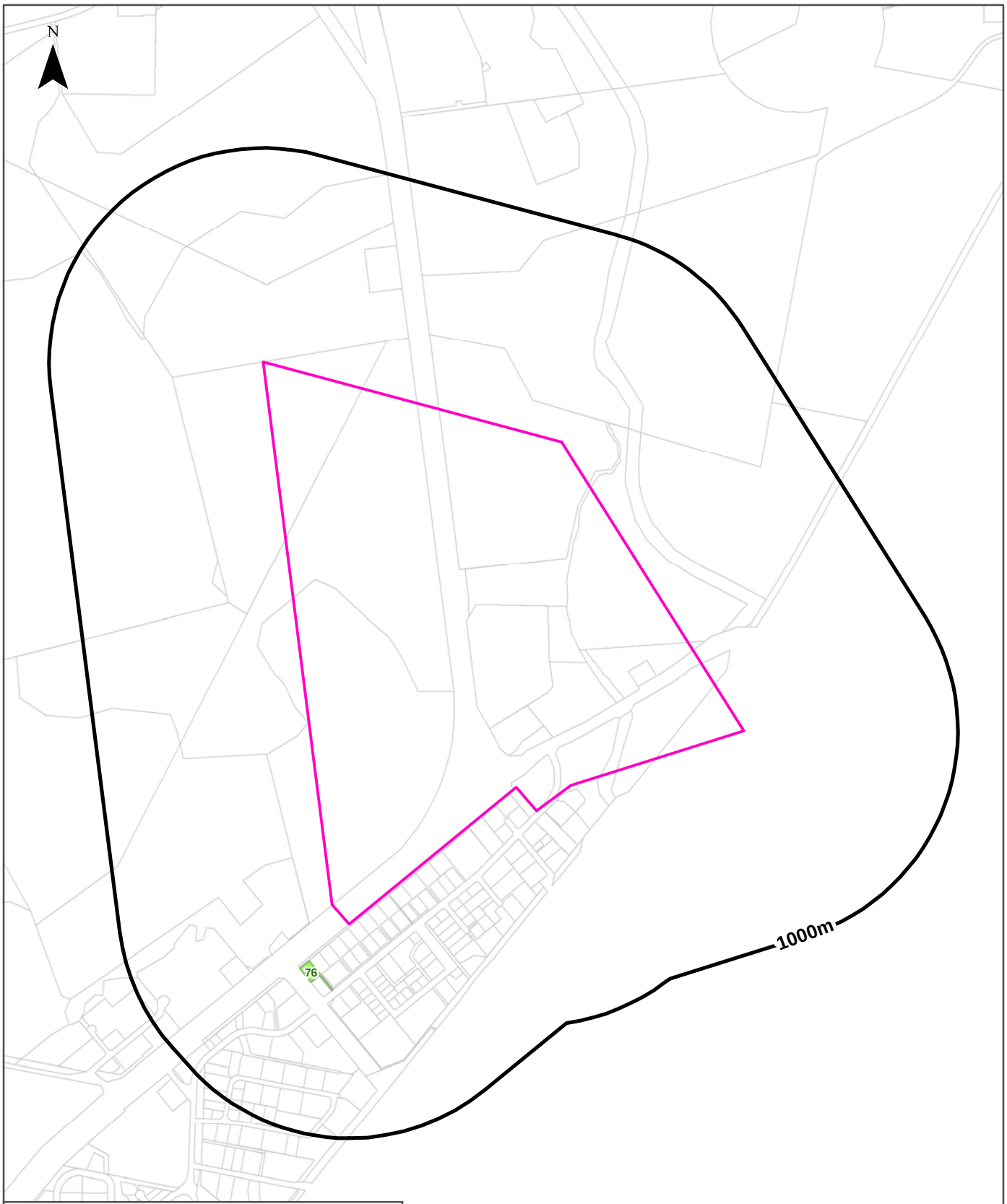
Register of Contaminated Sites

Records from the ACT Register of Contaminated Sites within the report buffer:

Map Id	Site Description	Notification	District	Division	Section	Block	Status	Loc Conf	Dist	Direction
N/A	No records in buffer									

Waste Management & Liquid Fuel Facilities

Stage 1b, 2c & Hvra, Canberra, ACT 2601



Legend

- Site Boundary
- Report Buffer
- Property Boundary
- National Liquid Fuel Facility
- Waste Management Facility

Scale:	Data Sources: Property Boundaries & Topographic Data - Environment, Planning and Sustainable Development Directorate	Coordinate System: GDA 1994 MGA Zone 55	Date: 15 February 2022

0 100 200 400
Meters

Waste Management and Liquid Fuel Facilities

Stage 1b, 2c & Hvra, Canberra, ACT 2601

National Waste Management Site Database

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

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

National Liquid Fuel Facilities

National Liquid Fuel Facilties within the dataset buffer:

Map Id	Owner	Name	Address	Suburb	Class	Operational Status	Operator	Revision Date	Loc Conf	Dist (m)	Direction
76	Caltex	Woolworths Caltex Hume	96 Sheppard Street	Hume	Petrol Station	Operational		25/07/2011	Premise Match	253m	South West

PFAS Investigation and Management Programs

Stage 1b, 2c & Hvra, Canberra, ACT 2601

Defence PFAS Investigation and Management Program Investigation Sites

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

Map ID	Base Name	Address	Location Confidence	Distance	Direction
N/A	No records in buffer				

Defence PFAS Investigation and Management Program Data Source: Department of Defence, Australian Government

Defence PFAS Investigation and Management Program Management Sites

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

Map ID	Base Name	Address	Location Confidence	Distance	Direction
N/A	No records in buffer				

Defence PFAS Investigation and Management Program Data Source: Department of Defence, Australian Government

Airservices Australia National PFAS Management Program

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

Map ID	Site Name	Impacts	Location Confidence	Distance	Direction
N/A	No records in buffer				

Airservices Australia National PFAS Management Program Data Custodian: Airservices Australia

Defence Sites

Stage 1b, 2c & Hvra, Canberra, ACT 2601

Defence 3 Year Regional Contamination Investigation Program

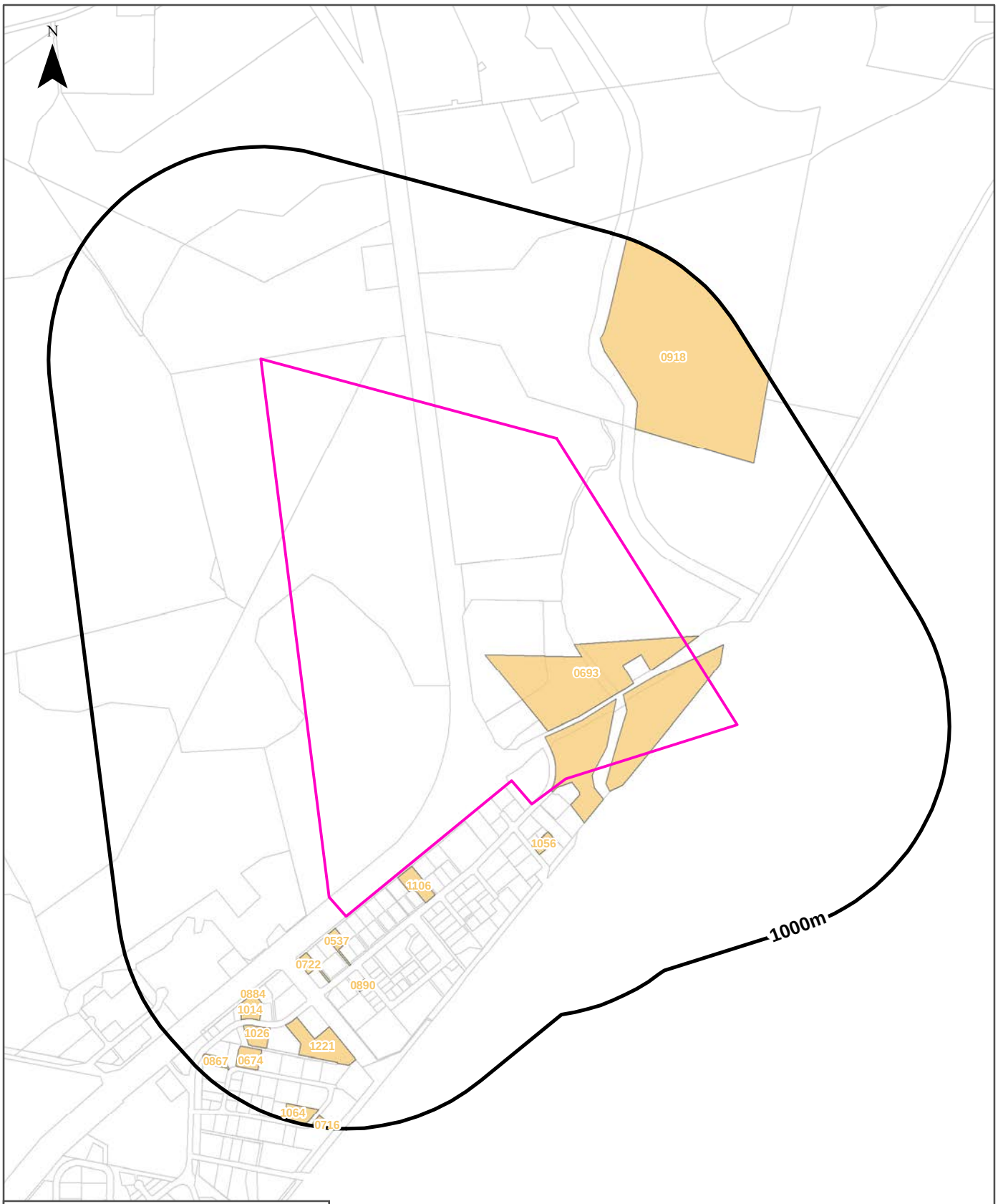
Sites which have been assessed as part of the Defence 3 Year Regional Contamination Investigation Program within the dataset buffer:

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

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

EPA Authorisations and Agreements

Stage 1b, 2c & Hvra, Canberra, ACT 2601



Data Sources: Property Boundaries & Topographic Data - Environment, Planning and Sustainable Development Directorate

Coordinate System: GDA 1994 MGA Zone 55

Date: 15 February 2022

EPA Authorisations & Agreements

Stage 1b, 2c & Hvra, Canberra, ACT 2601

EPA Authorisations

EPA Authorisations within the report buffer:
Note. Please click on ID Number to activate a hyperlink to online documentation. If link does not work, no documentation is accessible via the EPA.

ID Number	Activity	Business / Individual Name	Grant Date	Expiry Date	Status	Loc Conf	Distance	Direction
0693	Extraction of Material from waterways; Greater than 100m3 (Activity 1)	ACT Procurement Solutions	10/3/2009	10/3/2011	Expired	Premise Match	0m	On-site
0693	Extraction of Material from waterways; Greater than 100m3 (Activity 1)	ACT Procurement Solutions	10/3/2009	10/3/2011	Expired	Premise Match	0m	On-site
1106	Petroleum storage (Activity 30)	Canberra Data Centres Pty Ltd - Hume	11/24/2016		Current	Premise Match	9m	South
0537	Commercial use of chemicals (Activity 29)	Turf Management Australia Pty Ltd	12/20/2005	3/25/2014	Ceased	Premise Match	77m	South
1056	Transport of Controlled Waste (Activity 8)	Cabiria Pty Ltd	12/2/2015	12/12/2017	Ceased	Premise Match	151m	South
0722	Petroleum storage (Activity 30)	EG Fuelco (Australia) Limited - HUME	1/14/2010		Current	Premise Match	252m	South West
0890	Waste petroleum (Activity 32)	Ampcontrol Services (NSW) Pty Ltd	4/19/2012		Current	Premise Match	305m	South
0918	Petroleum storage (Activity 30)	Department of Defence, Defence Support Group	12/20/2012	4/11/2018	Cancelled	Premise Match	336m	North East
1221	Petroleum storage (Activity 30)	Canberra Data Centres Pty Ltd	11/18/2019		Current	Premise Match	525m	South
0884	Petroleum storage (Activity 30)	Mini-Tankers Australia Pty Ltd	1/18/2012	1/18/2015	Expired	Premise Match	564m	South West
1014	Petroleum storage (Activity 30)	Mini-Tankers Australia Pty Ltd	2/19/2015		Current	Premise Match	564m	South West
1026	Regulated Waste (Activity 9)	Dale & Hitchcock Civil Enineering Pty Ltd	5/7/2015		Current	Premise Match	637m	South West
0674	Regulated Waste (Activity 9)	Cleanaway Pty Ltd	8/26/2009		Current	Premise Match	744m	South West
0867	Petroleum storage (Activity 30)	Ampol Australia Petroleum Pty Ltd - HUME	12/20/2011		Current	Premise Match	872m	South West
1064	Transport of Controlled Waste (Activity 8)	J.J. Richards & Sons Pty Ltd	12/22/2015		Current	Premise Match	915m	South
1064	Transport of Controlled Waste (Activity 8)	J.J. Richards & Sons Pty Ltd	12/22/2015		Current	Premise Match	915m	South
0716	Production of road building materials (Activity 42)	Downer EDI Works Pty Ltd	12/2/2010		Current	Premise Match	946m	South
0109	Commercial use of chemicals (Activity 29)	Capital Pest Control	9/30/1998	11/16/2006	Ceased	Suburb/Area Match	-	-
0389	Timber (Activity 38)	Integrated Forest Products Pty Ltd	10/18/2002	12/12/2007	Ceased	Suburb/Area Match	-	-

EPA Authorisations Data Source: ACT Government Environment Protection Authority

EPA Agreements

Note. Due to the lack of premise details within the documentation, this list does not include the following agreement:
Land development

EPA Agreements within the report buffer:
Note. Please click on ID Number to activate a hyperlink to online documentation. If link does not work, no documentation is accessible via the EPA.

ID Number	Agreement Type	Business / Individual Name	Grant Date	Expiry Date	Status	Loc Conf	Distance	Direction
N/A	No records in buffer							

Historical Business Directories

Stage 1b, 2c & Hvra, Canberra, ACT 2601

Legend

- Site Boundary
- Buffer 150m
- Property Boundary
- Business directory records mapped to a specific premise
- Business directory records mapped to a road intersection
- Business directory records mapped to a road corridor
- Business directory records mapped to a general area

Scale: 0 210 420 630 840 Meters

Coordinate System: GDA 1994 MGA Zone 55

Date: 15 February 2022

Data Sources: Reproduced with permission of UBD and Hardie Grant Media Pty Ltd DD 01/08/2018

Historical Business Directories

Stage 1b, 2c & Hvra, Canberra, ACT 2601

Business Directory Records 1950-1991
Premise or Road Intersection Matches

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

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
1	JOINERY MANUFACTURERS &/OR MERCHANTS.	A.C.T. Advanced Joinery., 2 Arnott Pl Hume	4718	1991	Premise Match	0m	South
	ALUMINIUM FABRICATORS	Dee Bee Fabricators., 3/2 Arnott Pl Hume	1284	1991	Premise Match	0m	South
	ENGINEERS - FABRICATING.	Dee Bee Fabricators., Unit 3/2 Arnett Place Hume	2824	1991	Premise Match	0m	South
	WELDERS.	Felsdo Pty. Ltd., 6/2 Arnett Pl Hume	5575	1991	Premise Match	0m	South
	ENGINEERS - FABRICATING.	Felsdo Pty. Ltd., 6/2 Arnott Pl Hume	2832	1991	Premise Match	0m	South
	ENGINEERS - GENERAL.	Felsdo Pty. Ltd., 6/2 Arnott Pl Hume	2843	1991	Premise Match	0m	South
	STAINLESS STEEL FABRICATORS.	Felsdo Pty. Ltd., 6/2 Arnott Pl Hume	1999	1991	Premise Match	0m	South
	STEEL FABRICATORS.	Felsdo Pty. Ltd., 6/2 Arnott Pl Hume	2043	1991	Premise Match	0m	South
2	BATHROOM EQUIPMENT &/OR FITTINGS MFRS. &/OR DISTS	Builders Market Pty Ltd. The 52 Sheppard St., Hume	845	1991	Premise Match	10m	South
	BOLT, NUT &/OR RIVET MFRS. &/OR DISTS.	Builders Market Pty. Ltd. The., 52 Sheppard St Hume	85	1991	Premise Match	10m	South
	BUILDERS SUPPLIES	Builders Market Pty. Ltd. The., 52 Sheppard St Hume	303	1991	Premise Match	10m	South
	CEMENT MERCHANTS &/OR DISTS.	Builders Market Pty. Ltd. The., 52 Sheppard St Hume	1906	1991	Premise Match	10m	South
	CUSTOM MADE STEEL SECURTY DOORS & GRILLES	Builders Market Pty. Ltd. The., 52 Sheppard St Hume	7188	1991	Premise Match	10m	South
	HOT WATER SYSTEMS &/OR FITTINGS MFRS. &/OR DISTS.	Builders Market Pty. Ltd. The., 52 Sheppard St Hume	6249	1991	Premise Match	10m	South
	RANGE HOODS MFRS. &/OR DISTS.	Builders Market Pty. Ltd. The., 52 Sheppard St Hume	8446	1991	Premise Match	10m	South
	STOVE &/OR RANGE MFRS. &/OR DISTS. - ELECTRIC	Builders Market Pty. Ltd. The., 52 Sheppard St Hume	8005	1991	Premise Match	10m	South
	TIMBER MERCHANTS &/OR SAWMILLERS.	Builders Market Pty. Ltd. The., 52 Sheppard St Hume	7405	1991	Premise Match	10m	South
	WALLBOARD MFRS. &/OR IMPS. &/OR DISTS.	Builders Market Pty. Ltd. The., 52 Sheppard St Hume	5534	1991	Premise Match	10m	South
3	CUSTOM MADE STEEL SECURTY DOORS & GRILLES	A.B.I.S. Joinery., 15 Sheppard St Hume	7180	1991	Premise Match	15m	South East
	CUSTOM MADE STEEL SECURTY DOORS & GRILLES	A.B.I.S. Joinery., 15 Sheppard St Hume	7181	1991	Premise Match	15m	South East
	JOINERY MANUFACTURERS &/OR MERCHANTS.	A.B.I.S. Joinery., 15 Sheppard St Hume	4717	1991	Premise Match	15m	South East

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
3	WINDOW FRAME MFRS. &/OR DISTS. WOOD	A.B.I.S. Joinery., 15 Sheppard St Hume	5609	1991	Premise Match	15m	South East
	ROOF TRUSSES MFRS. &/OR DISTS.	A.C.T. Frames & Roof Trusses., 15 Sheppard St Hume	7797	1991	Premise Match	15m	South East
	WALL FRAMES	A.C.T. Frames & Roof Trusses., 15 Sheppard Street., Hume	5525	1991	Premise Match	15m	South East
	ROOF TRUSSES MFRS. &/OR DISTS.	ACT Frames & Roof Trusses., 15 Sheppard St Hume	7799	1991	Premise Match	15m	South East
	WALL TRUSSES & WALL FRAMES	ACT Frames & Roof Trusses., 15 Sheppard St Hume	5526	1991	Premise Match	15m	South East
	BUILDERS SUPPLIES	Smith EM Building Supplies., 13 Sheppard St Hume	324	1991	Premise Match	15m	South East
	TIMBER MERCHANTS &/OR SAWMILLERS.	Smith EM Building Supplies., 13 Sheppard St Hume	7416	1991	Premise Match	15m	South East
	BUILDERS SUPPIIERS	Smith EM Building Supplies, 13 Sheppard St., Hume., Canberra .(A.C.T.)	1042	1982	Premise Match	15m	South East
	TIMBER MERCHANTS &/OR SAWMILLERS	Smith EM Building Supplies, 13 Sheppard St., Hume., Canberra .(A.C.T.)	7066	1982	Premise Match	15m	South East
	TIMBER MERCHANTS &/OR SAWMILLERS	Smith EM Building Supplies, 13 Sheppard St., Hume., Canberra .(A.C.T.)	7067	1982	Premise Match	15m	South East
4	ROOF TRUSSES MFRS. &/OR DISTS.	Glenroy Roof Trusses Pty. Ltd., 17 Sheppard St Hume	7798	1991	Premise Match	27m	South East
	ROOF TRUSSES MFRS. &/OR DISTS.	Glenroy Roof Trusses., 17 Sheppard St Hume	7801	1991	Premise Match	27m	South East
	WALL TRUSSES & WALL FRAMES	Glenroy Root Trusses., 17 Sheppard St Hume	5528	1991	Premise Match	27m	South East
	ROOF TRUSSES MFRS. &/OR DISTS	Glenroy Roof Trusses, 17 Sheppard St, Hume., Canberra .(A.C.T.)	6153	1982	Premise Match	27m	South East
5	AIR CONDITIONING SALES &/OR SERVICE.	A C T. Specialised Filter Services., Unit 14/60 Sheppard St Hume	1220	1991	Premise Match	96m	South
	FILTERING MATERIALS &/OR SUPPLIES.	A.C.T. Specialised Filter Services., Unit 14/60 Sheppard St Hume	4273	1991	Premise Match	96m	South
	MINING MACHINERY &/OR EQUIPMENT REPAIRERS	Austuds Pty. Ltd., Unit 8/60 Sheppard St Hume	6751	1991	Premise Match	96m	South
	WELDING EQUIPMENT &/OR SUPPLIES MFRS. &/OR DISTS.	Austuds Pty. Ltd., Unit 8/60 Sheppard St Hume	5583	1991	Premise Match	96m	South
	SIGNS - GENERAL.	C. & G. Signs., Unit 1/60 Sheppard St Hume	3199	1991	Premise Match	96m	South
	SCAFFOLD MFRS. &/OR ERECTORS &/OR HIRERS.	Modular Building Systems., Unit 12/60 Sheppard St Hume	7904	1991	Premise Match	96m	South
	SHELVING &/OR STORAGE SYSTEMS	Modular Building Systems., Unit 12/60 Sheppard St Hume	3159	1991	Premise Match	96m	South
	SHELVING &/OR STORAGE SYSTEMS	Oaks Estate Enterprises Pty. Ltd., 60 Sheppard St Hume	3160	1991	Premise Match	96m	South
	STORE &/OR PACKING ROOM EQUIPMENT MFRS. &/OR DISTS.	Oaks Estate Enterprises Pty. Ltd., 60 Sheppard St Hume	8001	1991	Premise Match	96m	South
	ELECTRICAL CONTRACTORS.	Stirling Electrical., Unit 12/60 Sheppard St Hume	2661	1991	Premise Match	96m	South
	BURGLAR ALARM &/OR PROTECTION SYSTEMS MFRS. &/OR DISTS. &/OR INSTALLERS.	W I N. Electrics - Electron., Unit 10/60 Sheppard St Hume	395	1991	Premise Match	96m	South
	ELECTRICAL CONTRACTORS.	W I N. Electrics., Unit 10/60 Sheppard St Hume	2663	1991	Premise Match	96m	South
	INTER-COMMUNICATING SYSTEMS MFRS. &/OR INSTALLERS.	W. I.N. Electrics., Unit 10/60 Sheppard St Hume	6468	1991	Premise Match	96m	South
	ELECTRICAL CONTRACTORS.	W.I.N. Electrics - Electron., Unit 10/60 Sheppard St Hume	2664	1991	Premise Match	96m	South

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
5	INTER-COMMUNICATING SYSTEMS MFRS. &/OR INSTALLERS.	W.I.N. Electrics - Electron., Unit 10/60 Sheppard St Hume	6469	1991	Premise Match	96m	South
	MUSIC SYSTEMS - BACKGROUND	W.I.N. Electrics - Electron., Unit 10/60 Sheppard St Hume	3648	1991	Premise Match	96m	South
	SECURITY SYSTEMS &/OR EQUIPMENT MFRS. &/OR SUPPLIERS.	W.I.N. Electrics - Electron., Unit 10/60 Sheppard St Hume	3129	1991	Premise Match	96m	South
	VACUUM CLEANER - DOMESTIC - SALES &/OR SERVICE.	W.I.N. Electrics - Electron., Unit 10/60 Sheppard St Hume	2510	1991	Premise Match	96m	South
	BURGLAR ALARM &/OR PROTECTION SYSTEMS MFRS. &/OR DISTS. &/OR INSTALLERS.	W.I.N. Electrics., Unit 10/60 Sheppard St Hume	394	1991	Premise Match	96m	South
	MUSIC SYSTEMS - BACKGROUND	W.I.N. Electrics., Unit 10/60 Sheppard St Hume	3647	1991	Premise Match	96m	South
	SECURITY SYSTEMS &/OR EQUIPMENT MFRS. &/OR SUPPLIERS.	W.I.N. Electrics., Unit 10/60 Sheppard St Hume	3128	1991	Premise Match	96m	South
	VACUUM CLEANER - DOMESTIC - SALES &/OR SERVICE.	Win. Electrics., Unit 10/60 Sheppard St Hume	2509	1991	Premise Match	96m	South
6	REAL ESTATE DEVELOPERS.	Euro Struct Industries Pty. Ltd., 4 Arnott Pl Hume	8551	1991	Premise Match	96m	South
	BUILDERS &/OR BUILDING CONTRACTORS.	Euro Struct Industries Pty. Ltd., 4 Arnott Pl., Hume	201	1991	Premise Match	96m	South
	CONTRACTORS GENERAL.	Euro Struct Industries Pty. Ltd., 4 Arnott Pl., Hume	5427	1991	Premise Match	96m	South
	SHOP &/OR OFFICE FITTERS.	Euro Struct Industries Pty. Ltd., 4 Arnott Pl., Hume	3168	1991	Premise Match	96m	South
	BUILDERS &/OR BUILDING CONTRACTORS.	Euro Struct Industries Pty. Ltd., 4 Arnott Place Hume	175	1991	Premise Match	96m	South
	SCAFFOLD MFRS. &/OR ERECTORS &/OR HIRERS.	Waco International Sales Pty. Limited 4 Arnott Place., Hume	7898	1991	Premise Match	96m	South
	BUILDERS SUPPLIES	Waco International Sales Pty. Ltd., 4 Arnott Pl Hume	333	1991	Premise Match	96m	South
7	LAWN MOWER SALES &/OR SERVICE	Turf Machinery Tractors (T.M.T.), 76 Sheppard St Hume	4912	1991	Premise Match	96m	South
8	CRANE &/OR TRAVEL TOWER PROPRIETORS &/OR HIRERS	Sherrin M. J Pty. Ltd., 9 Arnott Pl Hume	5467	1991	Premise Match	138m	South
	CRANES - MOBILE & TRAVEL TOWER - PROPRIETORS &/OR HIRERS	Sherrin, M. J., Arnott St., Hume., Canberra . (A.C.T.)	1832	1982	Premise Match	138m	South
9	PLUMBERS SUPPLIES.	Watson & Crane Canberra., Cnr Amott & Sheppard Sts Hume, New South Wales	8984	1991	Road Intersection	140m	South

Business Directory Records 1950-1991
Road or Area Matches

Universal Business Directory records from years 1950, 1961, 1970, 1982 and 1991, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published.

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
10	WALL FRAMES	Glenroy Wall Framing Pty. Ltd., 9 Sheppard St., Hume., Canberra .(A.C.T.)	7394	1982	Road Match	0m
	ENGINEERS - CIVIL	Holland, John .(Construction) Pty. Ltd., 4 Sheppard St, Hum., Canberra .(A.C.T.)	2568	1982	Road Match	0m
	BUILDERS &/OR BUILDING CONTRACTORS	Holland, John .(Construction) Pty. Ltd., 4 Sheppard St, Hume., Canberra .(A.C.T.)	918	1982	Road Match	0m
	CONTRACTORS GENERAL	Holland, John .(Construction) Pty. Ltd., 4 Sheppard St, Hume., Canberra .(A.C.T.)	1780	1982	Road Match	0m
	BUILDERS &/OR BUILDING CONTRACTORS	Holland, John .(Constructions) Pty. Ltd., 4 Sheppard St., Hume., Canberra .(A.C.T.)	919	1982	Road Match	0m
11	TIMBER MERCHANTS &/OR SAWMILLERS	Integrated Forest Products Pty. Ltd., Monaro H'way., Canberra .(A.C.T.)	7060	1982	Road Match	0m
12	PLUMBERS SUPPLIES.	Watson & Crane., Amott St Heme	1453	1991	Road Match	85m

Historical Business Directories

Stage 1b, 2c & Hvra, Canberra, ACT 2601

Dry Cleaners, Motor Garages & Service Stations 1950-1991 Premise or Road Intersection Matches

Dry Cleaners, Motor Garages & Service Stations from UBD Business Directories for years 1950, 1961, 1970, 1982 and 1991, mapped to a premise or road intersection, within the dataset buffer:

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

Dry Cleaners, Motor Garages & Service Stations 1950-1991 Road or Area Matches

Dry Cleaners, Motor Garages & Service Stations from UBD Business Directories for years 1950, 1961, 1970, 1982 and 1991, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published.

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

Aerial Imagery 2021

Stage 1b, 2c & Hvra, Canberra, ACT 2601

Scale:	Data Sources: Aerial Imagery © Aerometrex Pty Ltd	Coordinate System: GDA 1994 MGA Zone 55	Date: 16 February 2022

0 300 600 900 1,200
Meters

Aerial Imagery 2010

Stage 1b, 2c & Hvra, Canberra, ACT 2601

Scale:
0 300 600 900 1,200
Meters

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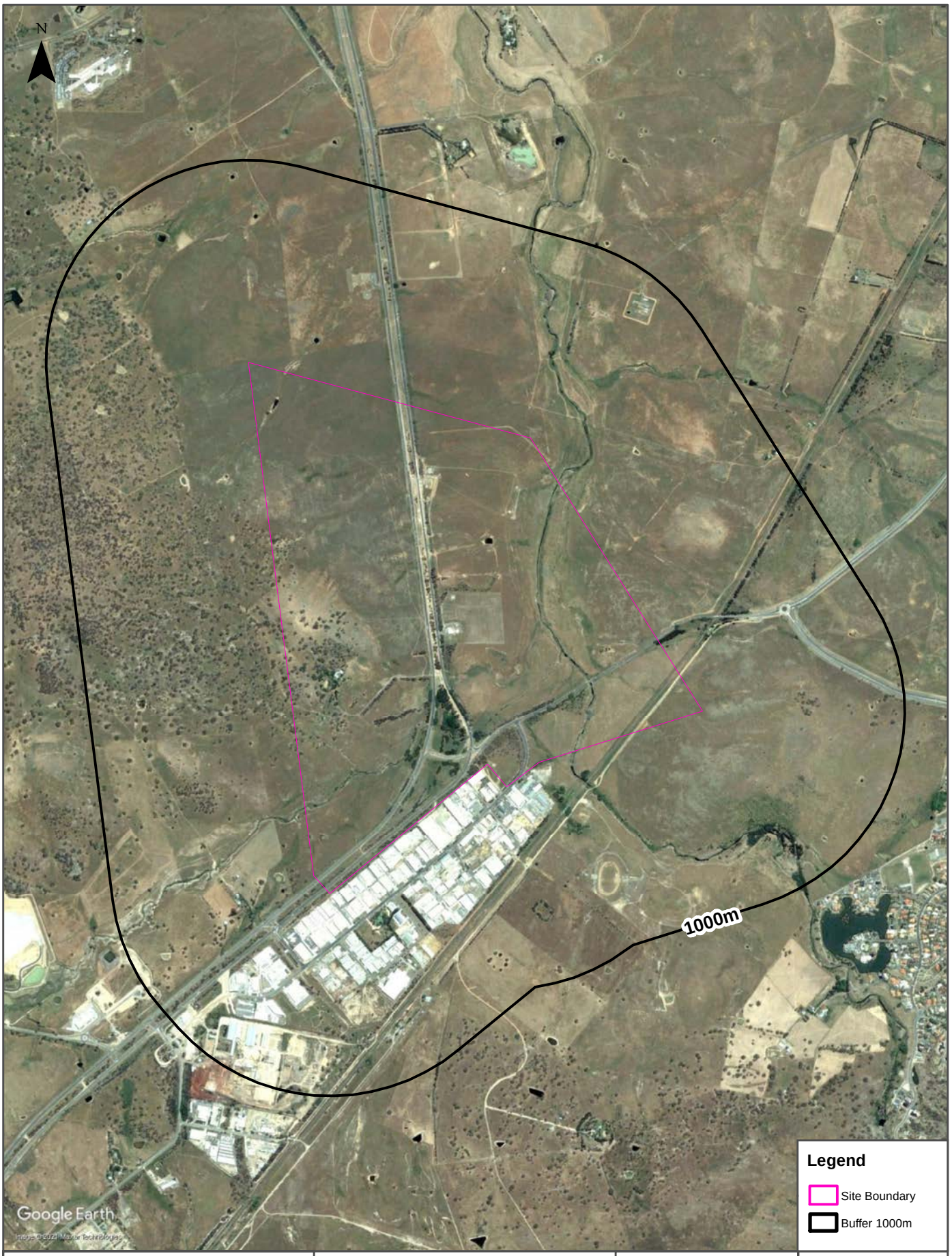
Coordinate System:
GDA 1994 MGA Zone 55

Date: 15 February 2022

Aerial Imagery 2005

Stage 1b, 2c & Hvra, Canberra, ACT 2601



Scale:
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Meters

Data Source Aerial Imagery: © 2022 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.

Coordinate System:
GDA 1994 MGA Zone 55

Date: 15 February 2022

Aerial Imagery 1992

Stage 1b, 2c & Hvra, Canberra, ACT 2601

Legend

- Site Boundary
- Buffer 1000m

Scale:
0 300 600 900 1,200
Meters

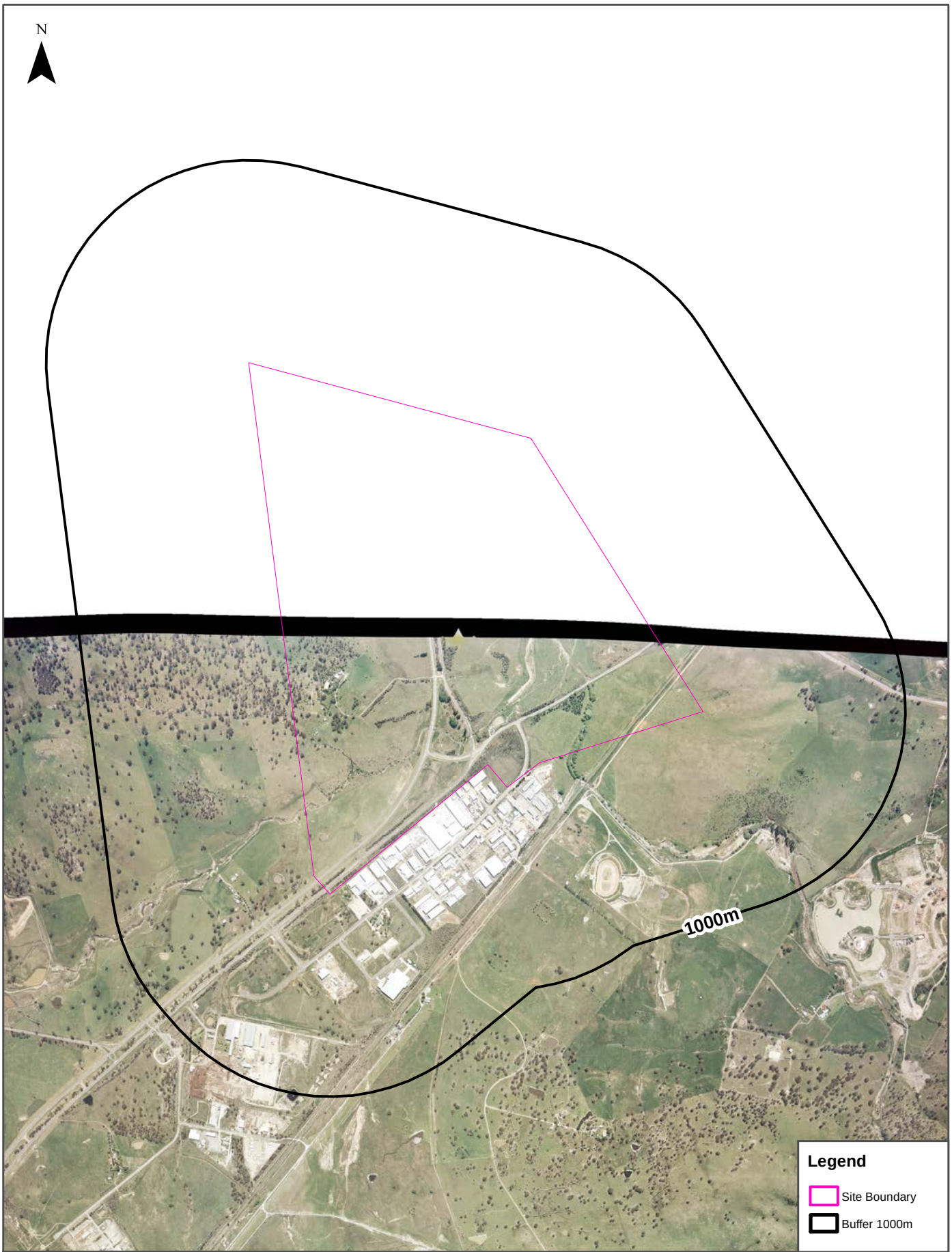
Data Source Aerial Imagery:
© NSW Department of Customer Service

Coordinate System:
GDA 1994 MGA Zone 55

Date: 16 February 2022

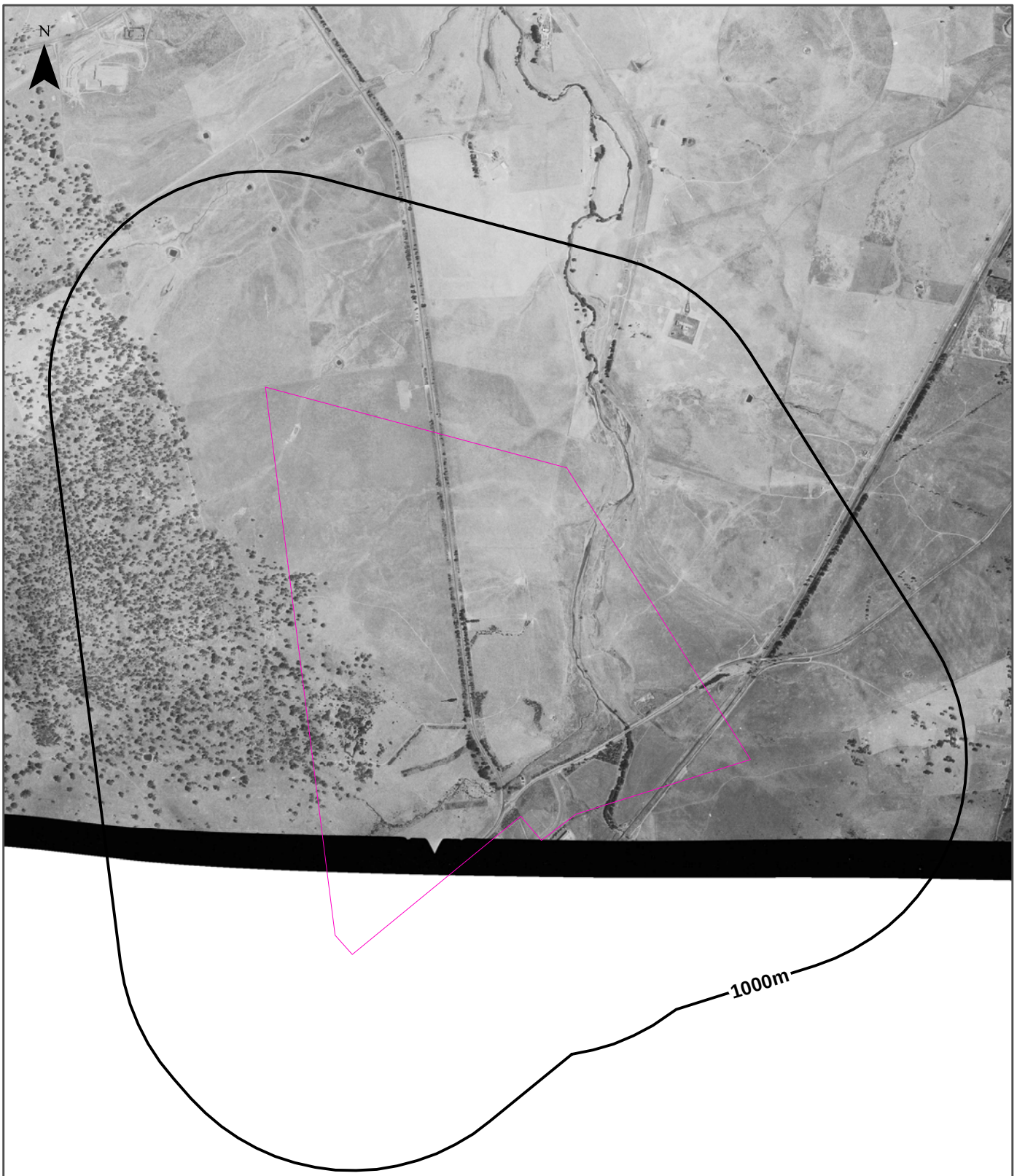
Aerial Imagery 1992

Stage 1b, 2c & Hvra, Canberra, ACT 2601



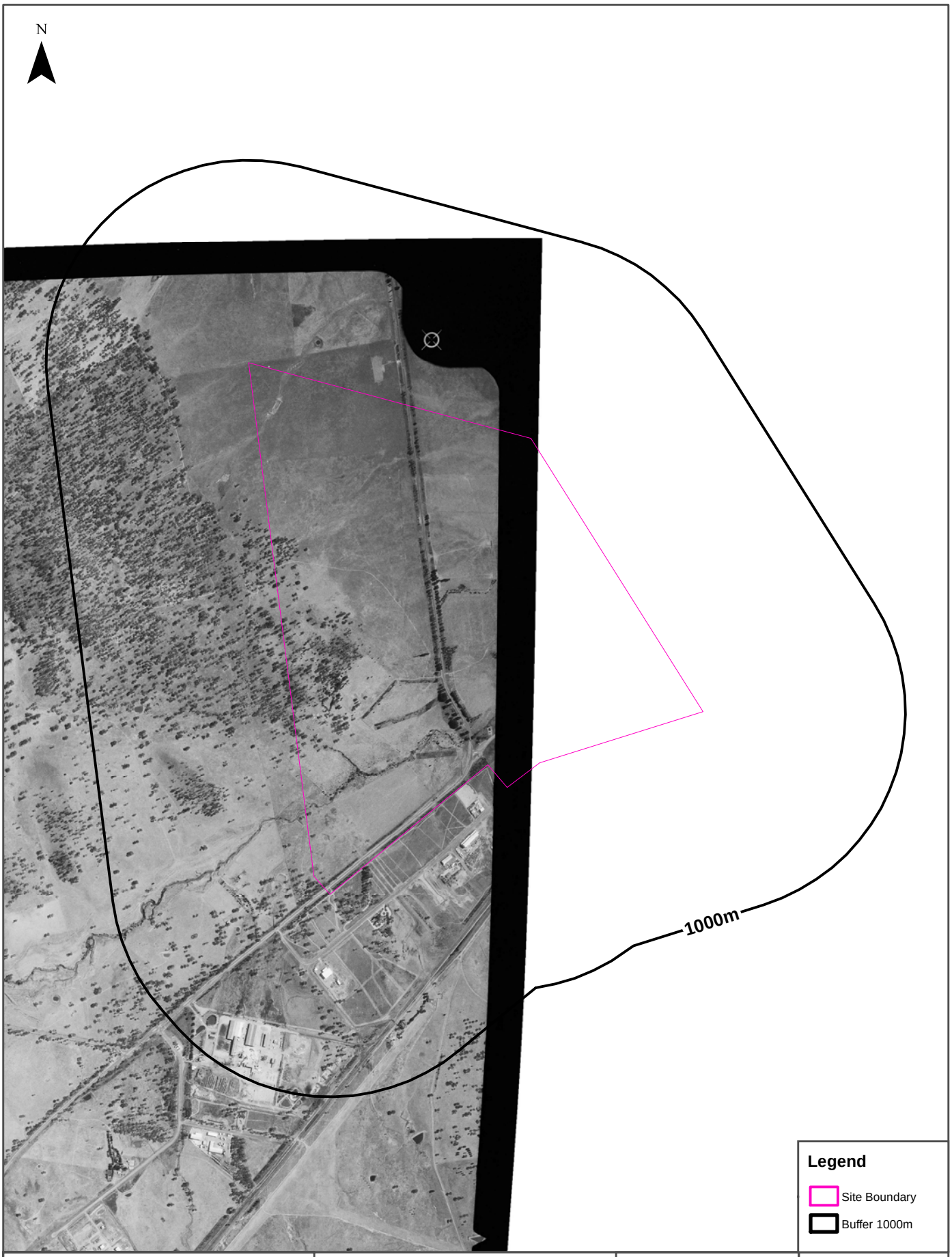
Aerial Imagery 1985

Stage 1b, 2c & Hvra, Canberra, ACT 2601



Aerial Imagery 1985

Stage 1b, 2c & Hvra, Canberra, ACT 2601



Aerial Imagery 1985

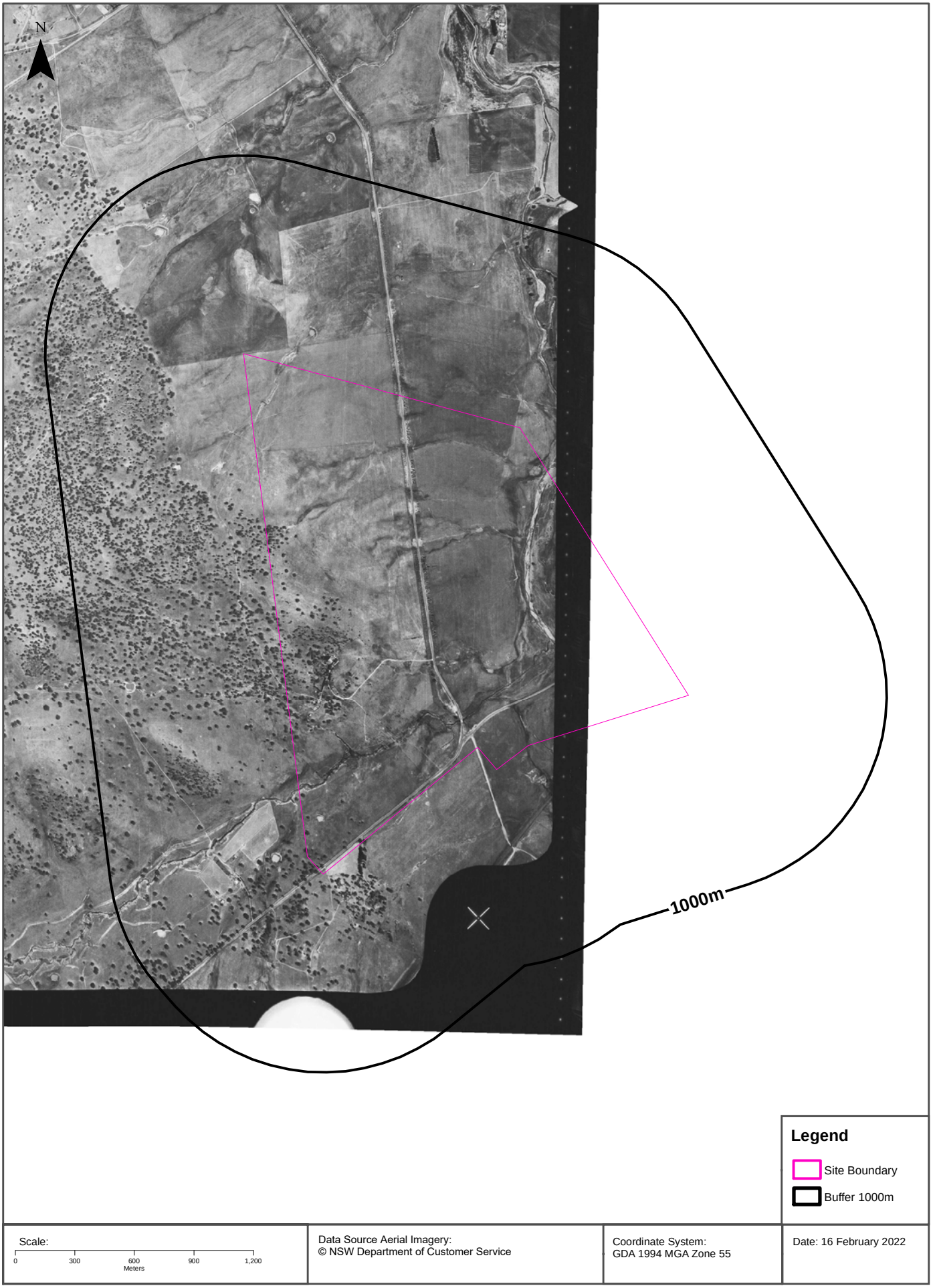
Stage 1b, 2c & Hvra, Canberra, ACT 2601

Aerial Imagery 1976

Stage 1b, 2c & Hvra, Canberra, ACT 2601

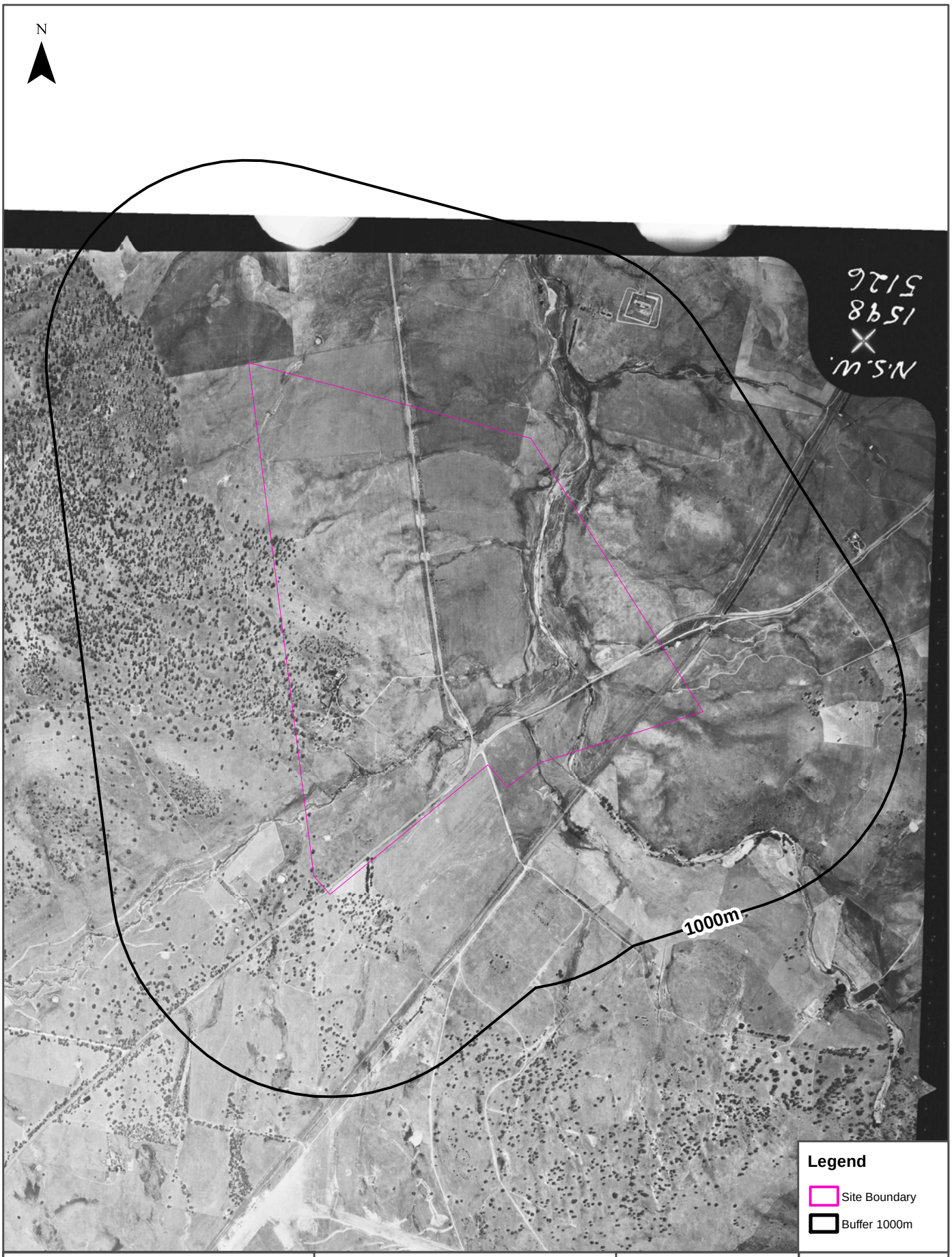
Aerial Imagery 1967

Stage 1b, 2c & Hvra, Canberra, ACT 2601



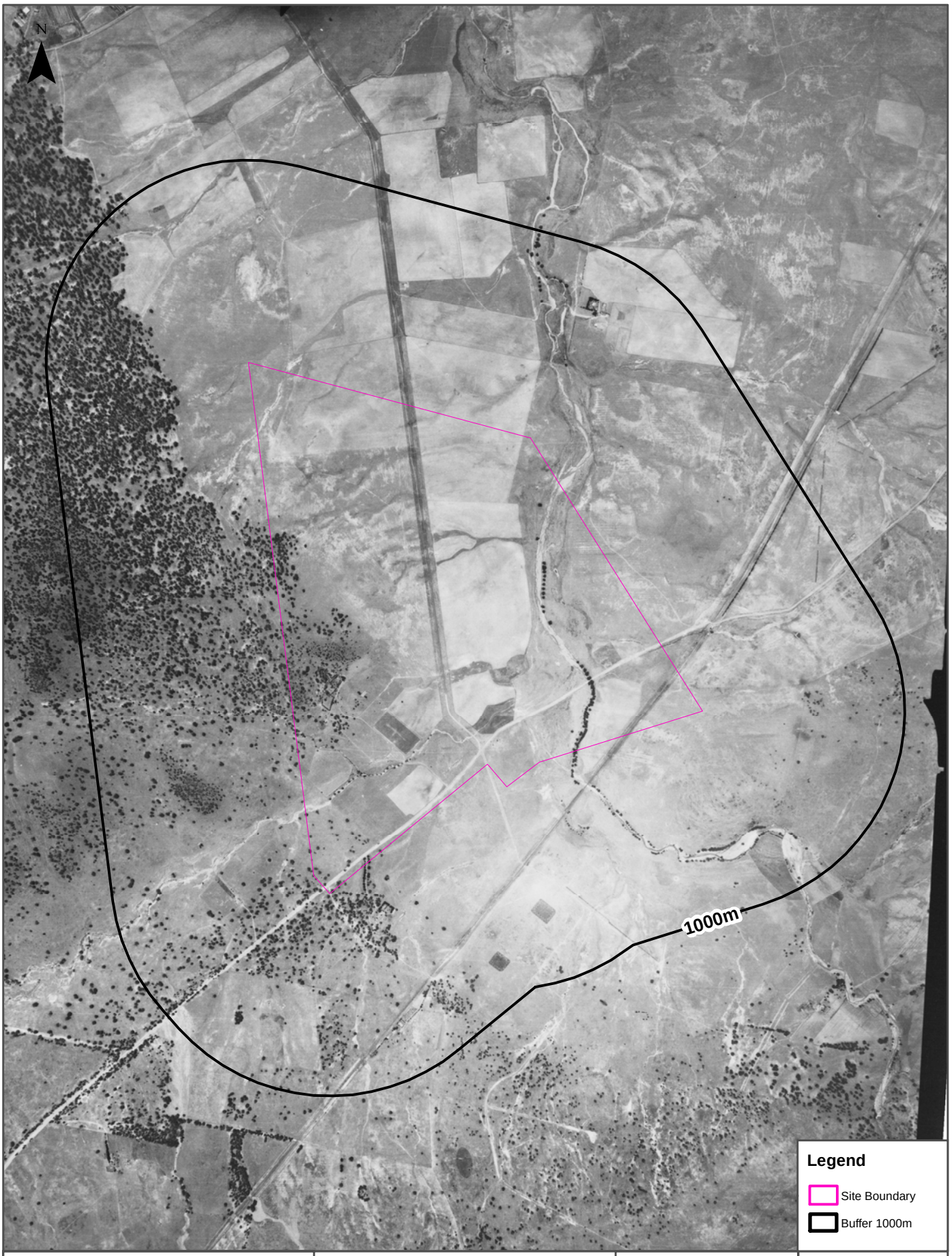
Aerial Imagery 1967

Stage 1b, 2c & Hvra, Canberra, ACT 2601



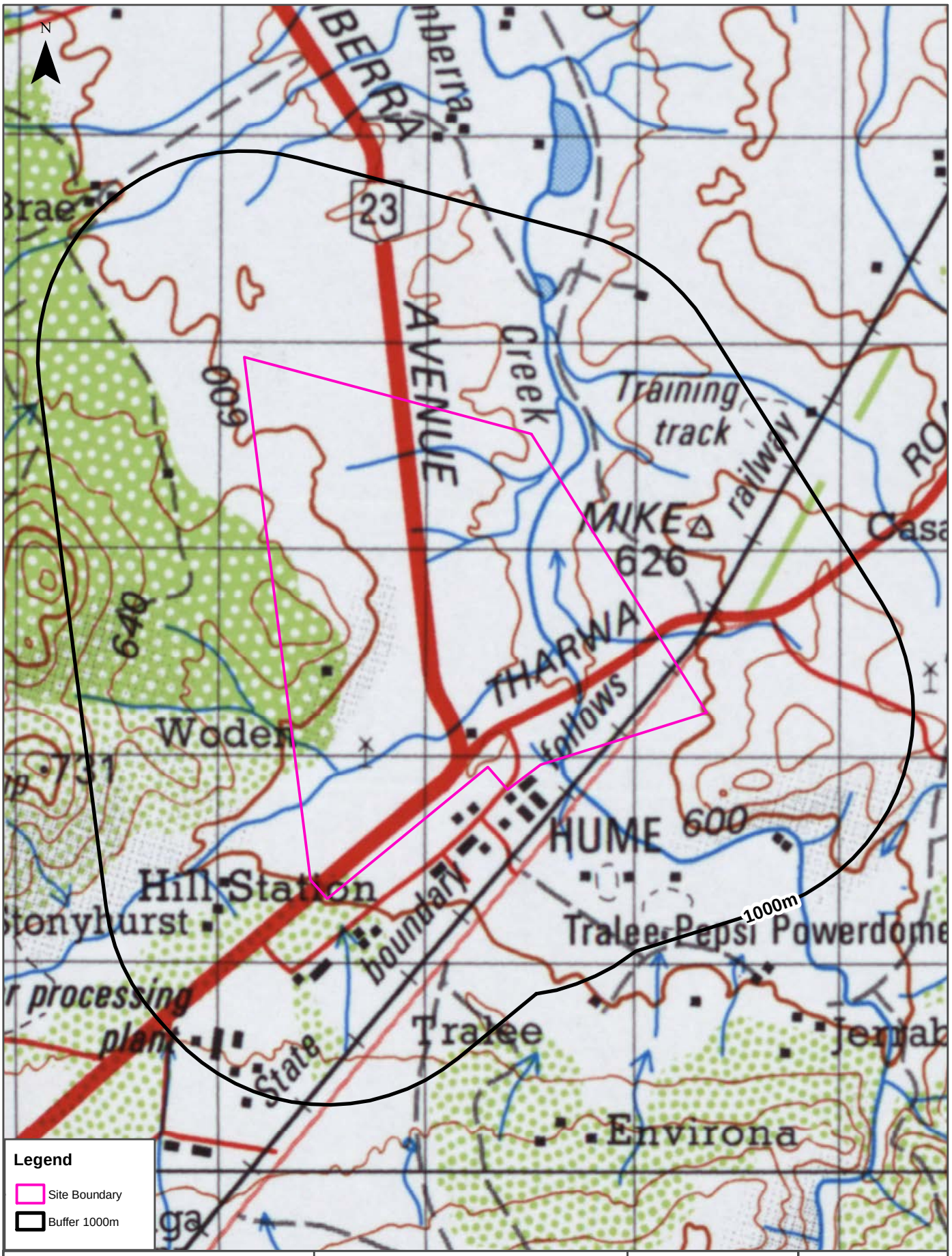
Aerial Imagery 1944

Stage 1b, 2c & Hvra, Canberra, ACT 2601



Historical Map 1987

Stage 1b, 2c & Hvra, Canberra, ACT 2601



Scale: 0 200 400 800 1,200 Meters

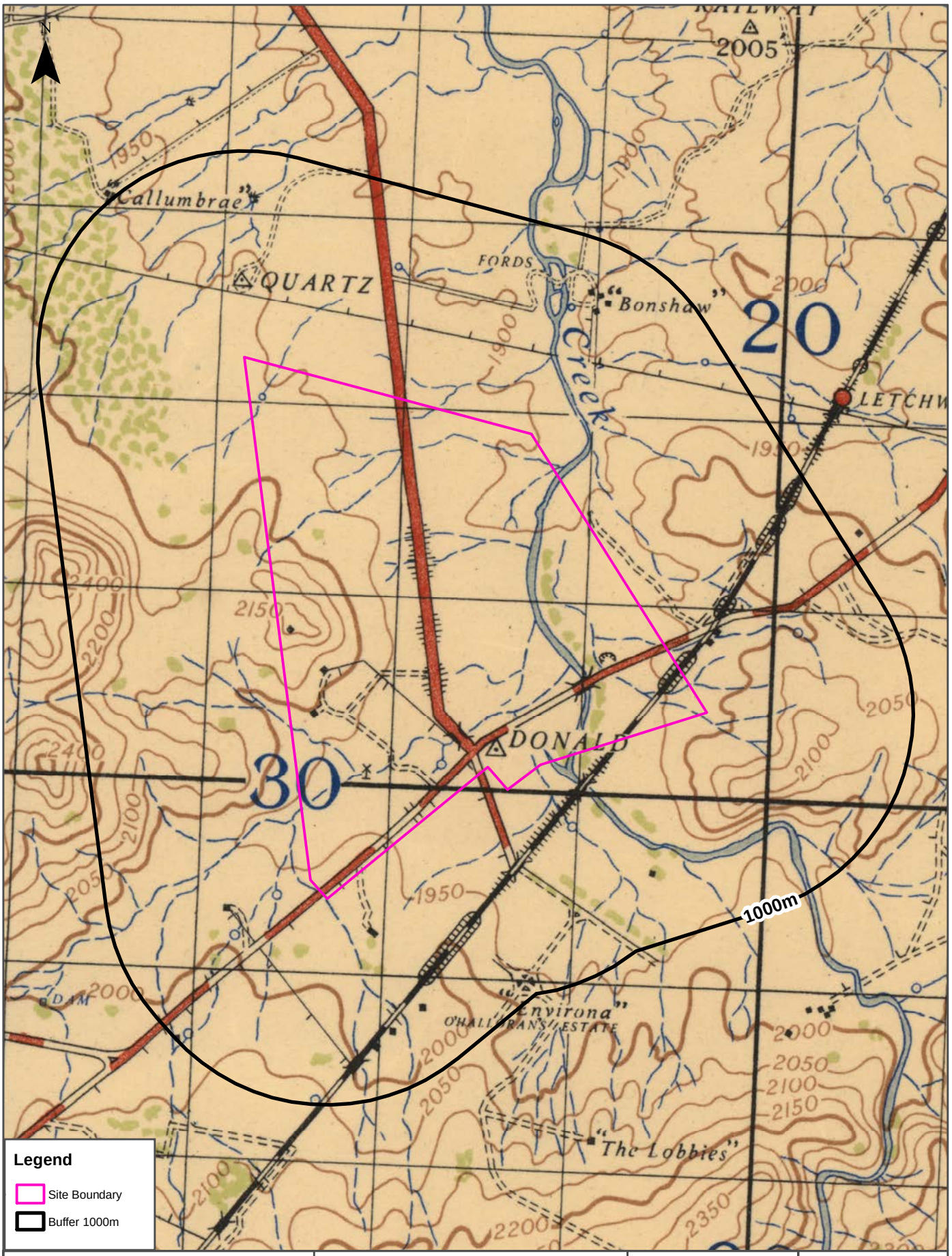
Data Sources: NATMAP 1:100,000 Topographic Maps
Geoscience Australia

Coordinate System:
GDA 1994 MGA Zone 55

Date: 15 February 2022

Historical Map 1942

Stage 1b, 2c & Hvra, Canberra, ACT 2601



Scale: 0 200 400 800 1,200 Meters

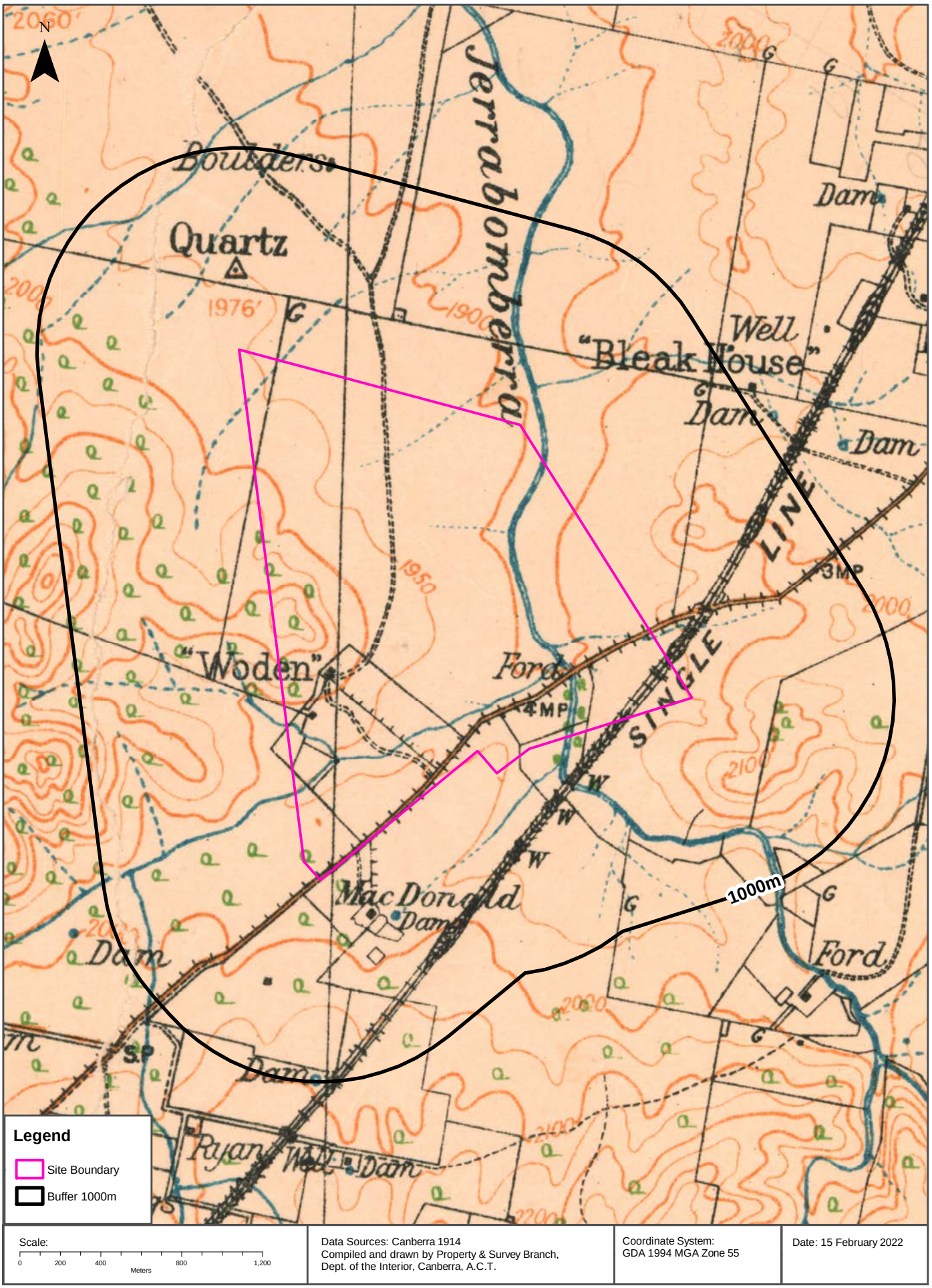
Data Sources: Canberra, Federal Territory & N.S.W. Commonwealth Department of Defence
Prepared by Commonwealth Section, Imperial General Staff

Coordinate System: GDA 1994 MGA Zone 55

Date: 15 February 2022

Historical Map 1914

Stage 1b, 2c & Hvra, Canberra, ACT 2601



Scale: 0 200 400 800 1,200 Meters

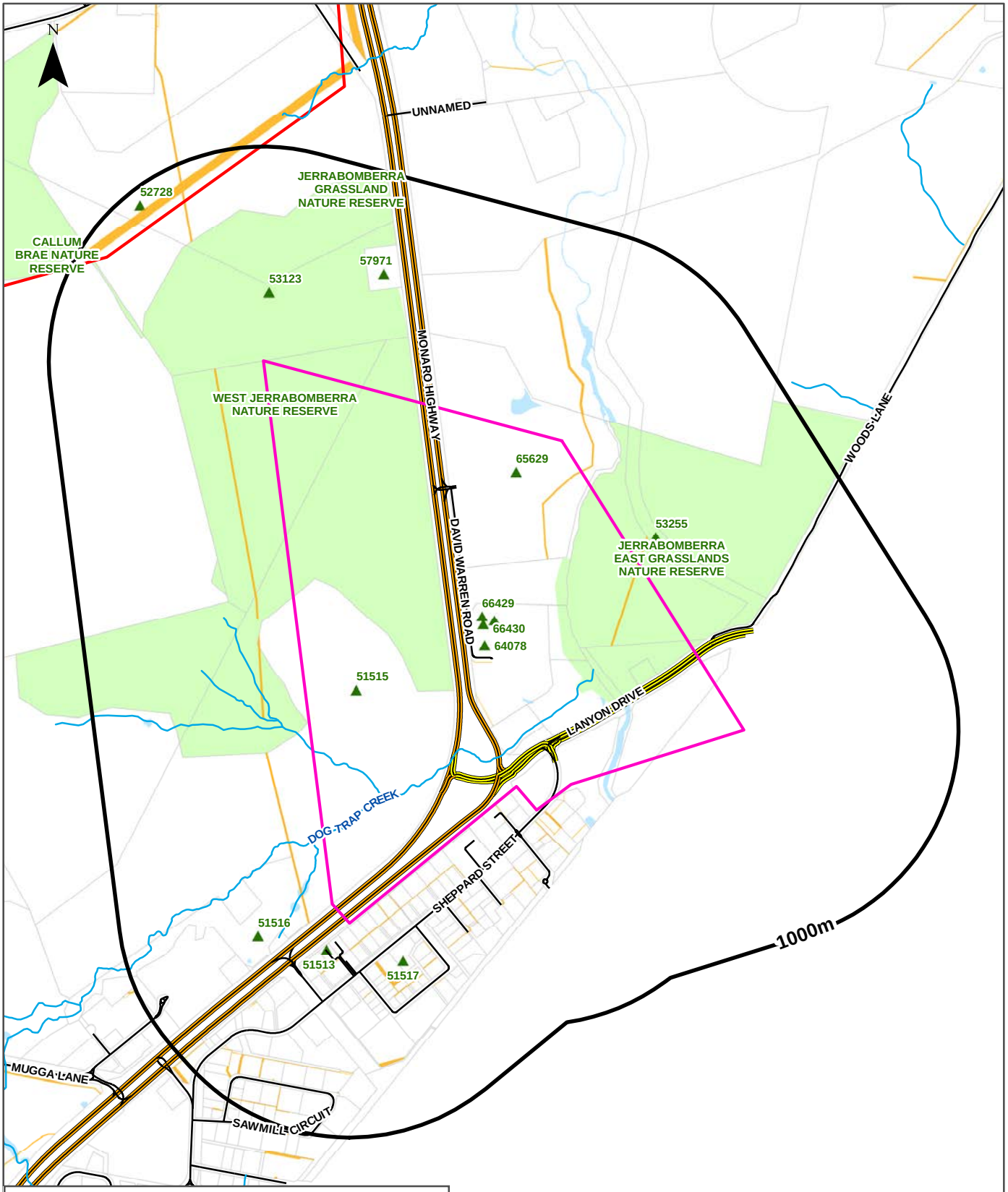
Data Sources: Canberra 1914
Compiled and drawn by Property & Survey Branch, Dept. of the Interior, Canberra, A.C.T.

Coordinate System: GDA 1994 MGA Zone 55

Date: 15 February 2022

Topographic Features

Stage 1b, 2c & Hvra, Canberra, ACT 2601



Legend

- Points of Interest
- Site Boundary
- Report Buffer
- Property Boundaries
- Easements
- Reserves
- Airport
- Water Area
- Water Line
- Major Pipelines
- Highway
- Arterial Road
- Road
- Railway
- Major Powerlines

Scale: 0 100 200 400 Meters

Data Sources: Property Boundaries & Topographic Data - Environment, Planning and Sustainable Development Directorate

Coordinate System: GDA 1994 MGA Zone 55

Date: 15 February 2022

Topographic Features

Stage 1b, 2c & Hvra, Canberra, ACT 2601

Features of Interest

What Features of Interest exist within the report buffer?

Map Id	Feature Type	Name	Description	Distance	Direction
51515	HOMESTEAD, OUTSTATION, OUTCAMP, WOOLSHED	Woden Homestead	AGRICULTURE - HORSE AGISTMENT, LIVESTOCK GRAZING	0m	Onsite
64078	HELIPAD, HELIPORT	Southcare Helicopter Base	HELICOPTER LANDING FACILITY	0m	Onsite
65629	BUILDING	Alexander Maconochie Centre	CORRECTIONS FACILITY - CORRECTIONS CENTRE, PRISON	0m	Onsite
66071	HELIPAD, HELIPORT	RFS Helicopter Base BASE	HELICOPTER LANDING FACILITY	0m	Onsite
66429	HELIPAD, HELIPORT	Helipad RFS North Pod	HELICOPTER LANDING FACILITY	0m	Onsite
66430	HELIPAD, HELIPORT	Helipad RFS South Pod	HELICOPTER LANDING FACILITY	0m	Onsite
53255		Googong Pipeline	MAJOR UTILITY INSTALLATION	130m	North East
51513	BUILDING	Hume Estate	OFFICE - CHANCELLERY, DEPARTMENTAL OFFICES	163m	South
51517	HOMESTEAD, OUTSTATION, OUTCAMP, WOOLSHED	Hill Station	CULTURAL FACILITY - ART GALLERY, LIBRARY, MUSEUM	295m	South
53123	HILL, KNOLL, KNOB, MESA, SUGARLOAF, LOOKOUT	Quartz Hill	UNCATEGORIZED	320m	North West
51516	HOMESTEAD, OUTSTATION, OUTCAMP, WOOLSHED	Stonyhurst	AGRICULTURE - HORSE AGISTMENT, LIVESTOCK GRAZING	376m	South West
57971		Canberra Model Aeroplane Club	COMMUNITY USE	536m	North
52728	HOMESTEAD, OUTSTATION, OUTCAMP, WOOLSHED	Callum Brae	AGRICULTURE - HORSE AGISTMENT, LIVESTOCK GRAZING	922m	North West

Elevation Contours (2015 - 1m)

Stage 1b, 2c & Hvra, Canberra, ACT 2601

Legend

- Site Boundary
- Report Buffer
- Property Boundaries
- Elevation Contour (m)

Automatically generated 1m contours of the ACT derived from 1m hydro-flattened DEM. Major lakes and dams within the ACT were assigned an elevation to produce a hydro-flattened DEM. 1m DEMs derived from 4ppm and 8ppm LiDAR were used as the input DEMs and polygons of major water bodies were used to determine the extent of lakes within the DEM extent. The input DEM defines the classified Australian Height Datum (AHD) LiDAR point cloud data as a 1 meter Digital Elevation Model (DEM). The Water Features data were digitised in 1995 from the following map sources - 1:10,000 Plan Series, 1:2,500 Cadastre, 1:2,500 Detail, 1:1,000 Detail and traced from Topobase. The mean elevation of each of these polygons was used to hydro -flatten the corresponding water bodies in the DEM. Contours were generated from the DEM using ESRI ArcGIS Contour tool.

Scale:
0 100 200 400
Meters

Data Sources: Property Boundaries & Topographic Data - Environment, Planning and Sustainable Development Directorate

Coordinate System:
GDA 1994 MGA Zone 55

Date: 15 February 2022

Hydrogeology & Groundwater

Stage 1b, 2c & Hvra, Canberra, ACT 2601

Hydrogeology

Description of aquifers on-site:

Description
Fractured or fissured, extensive aquifers of low to moderate productivity

Description of aquifers within the report buffer:

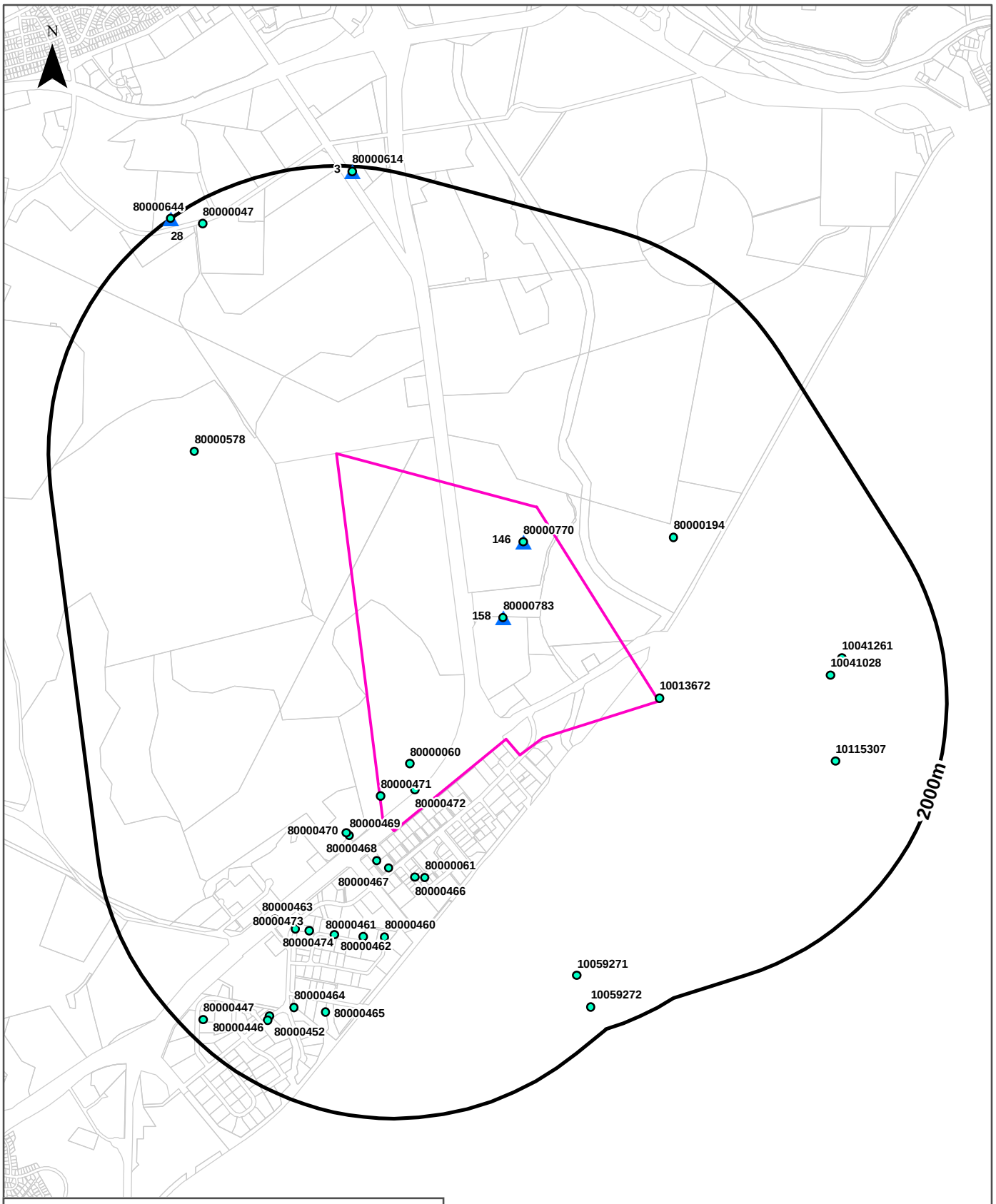
Description
Fractured or fissured, extensive aquifers of low to moderate productivity

Hydrogeological Landscapes Units

Unit No	Landscape Name	Land Salinity	Stream Salinity	Stream EC	Salt Store	Salt Availability	Salt Mobility	Hazard Impact	Hazard Likelihood	Hazard Overall	Distance	Direction
24	Symonston	Low	Low	Low	Moderate	Moderate	Moderate	Limited	Moderate	Low	0m	Onsite

Groundwater Boreholes

Stage 1b, 2c & Hvra, Canberra, ACT 2601



Hydrogeology & Groundwater

Stage 1b, 2c & Hvra, Canberra, ACT 2601

Groundwater Boreholes (ACT)

Please note that this dataset does not include investigation and/or monitoring bores associated with possible contaminated sites in the search area. If you require more information please contact the Environmental Quality team via email environment.protection@act.gov.au or phone via Access Canberra 13 22 81.
Boreholes from an ACT Government Data Source within 2km of the site:

Bore Id	Bore Type	Method	Date	Bore Depth To	Bit Diameter	1st Water Intersection Depth From	1st Water Intersection Depth To	Final Static GW Level IM	1st Est Yield	Final Yield	Dist	Direction
146	Abstraction	Air blade, D	11/12/2007	90.00	250/170	69.0	71.0	4.00	0.90	2.50	0m	Onsite
158	Abstraction	Rotary Air	14/07/2010	60.00	180	30.0	32.0	18.00	0.50	1.00	0m	Onsite
3	Abstraction										1964m	North
28	Abstraction	Bore Assessment		12.00							1996m	North West

Hydrogeology & Groundwater

Stage 1b, 2c & Hvra, Canberra, ACT 2601

Groundwater Boreholes (Bureau of Meteorology)

Boreholes (Bureau of Meteorology) within 2km of the site:

Hydro ID	State Bore ID	Drilled Date	Final Depth	Drilled Depth	Elevevation	Distance	Direction
80000060	47	01/01/1952	24.69	24.69	591.14	0m	Onsite
80000471	628		4.52	4.52	594.88	0m	Onsite
80000472	629		4.50	4.50	592.43	0m	Onsite
80000770	578	11/12/2007	90.00	90.00	578.02	0m	Onsite
80000783	798	14/07/2010	60.00	60.00	583.34	0m	Onsite
10013672	410716				597.48	14m	East
80000468	625		5.75	5.75	607.25	240m	South
80000469	626		5.87	5.87	605.35	262m	South West
80000467	624		5.71	5.71	607.56	263m	South
80000470	627		5.85	5.85	606.13	271m	South West
80000466	623		5.41	5.41	608.41	355m	South
80000061	48	14/08/1954	39.62	39.62	608.17	390m	South
80000194	223	13/05/1967	14.63	14.63	599.30	693m	North East
80000460	617		6.83	6.83	621.77	743m	South
80000461	618		4.06	4.06	618.17	768m	South
80000462	619		6.84	6.84	620.40	833m	South West
80000473	630		5.17	5.17	620.60	910m	South West
80000474	631		4.58	4.58	620.39	966m	South West
80000578	741	18/01/1983	42.67	42.67	618.12	984m	North West
80000463	620		5.67	5.67	619.37	1026m	South West
10041028	GW025629	01/02/1965	23.20	23.20	613.98	1208m	East
10115307	GW402607	04/12/2003	90.00	90.00	607.14	1300m	East
10041261	GW025867	01/02/1965	21.30	21.30	615.19	1308m	East
80000465	622		4.30	4.30	635.27	1349m	South
80000464	621				634.30	1410m	South West
80000446	603	11/06/1981	4.40	4.40	634.30	1553m	South West
80000452	609	22/06/1981	15.55	15.55	634.13	1584m	South West
10059271	GW043846	01/10/1969	40.50	40.50	634.14	1586m	South
10059272	GW043847	01/08/1969	37.70	37.80	650.52	1816m	South
80000047	34	01/05/1958	18.90	18.90	601.29	1846m	North West

Hydro ID	State Bore ID	Drilled Date	Final Depth	Drilled Depth	Elevevation	Distance	Direction
80000447	604	11/06/1981	5.94	5.94	632.42	1868m	South West
80000614	25				578.58	1963m	North
80000644	73		12.00	12.00	609.52	1996m	North West

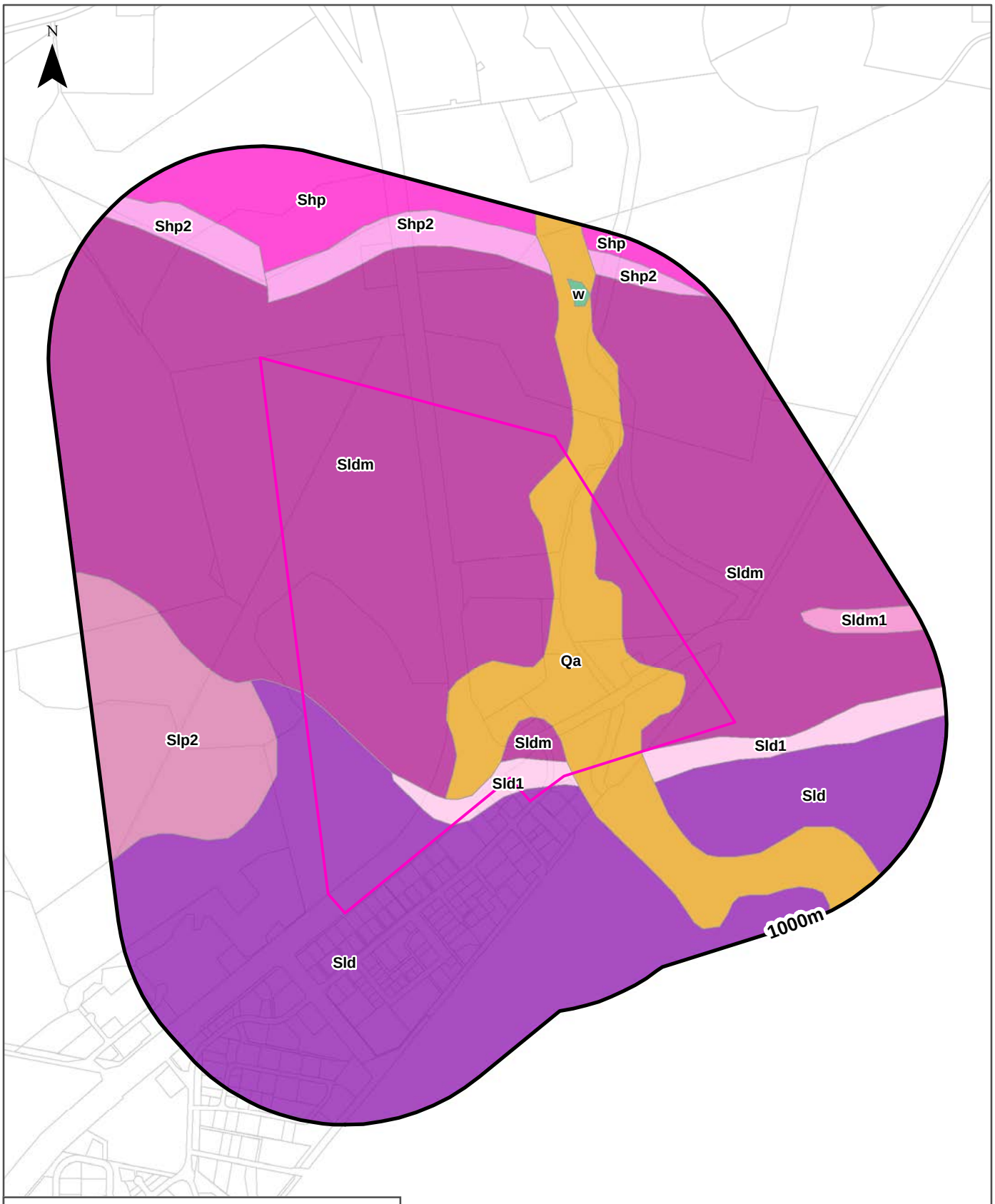
Driller's Logs (Bureau of Meteorology)

Drill log data relevant to the Boreholes (Bureau of Meteorology) within 2km of the site:

Hydro ID	State Bore ID	Drillers Log	Distance	Direction
80000060	47	0.00m-13.41m Clay or mud 13.41m-16.15m Sands on sandy clay 16.15m-16.46m Bedrock	0m	Onsite
80000194	223	0.00m-5.18m Clay and sand 5.18m-14.63m Gravel and sand	693m	North East
80000578	741	0.00m-1.08m Mugga Porphyry	984m	North West
10041028	GW025629	0.00m-3.05m Clay 3.05m-18.29m Granite decomposed water supply 18.29m-23.16m Porphyry	1208m	East
10115307	GW402607	0.00m-8.00m Soil 8.00m-15.00m Shale 15.00m-90.00m Dacite	1300m	East
10041261	GW025867	0.00m-6.10m Clay 6.10m-9.14m Porphyry 9.14m-19.81m Granite black red 19.81m-21.34m Porphyry	1308m	East
80000446	603	0.00m-0.07m Brown coarse sandy gravel 0.07m-0.09m Light brown coarse sandy silt 0.09m-0.11m Light brown silty sand	1553m	South West
80000452	609	0.00m-0.12m No core 0.12m-0.16m Coarse clayey gravel 0.16m-0.18m Pale grey heavy clay 0.18m-0.26m Moderately weathered purple dacite 0.26m-0.39m Slightly weathered purple dacite	1584m	South West
10059271	GW043846	0.00m-1.83m Soil subsoil 0.00m-1.83m Clay 1.83m-17.98m Porphyry decomposed 17.98m-30.78m Porphyry very hard 30.78m-40.54m Porphyry hard	1586m	South
10059272	GW043847	0.00m-1.22m Soil subsoil 1.22m-25.30m Porphyry decomposed 25.30m-37.80m Porphyry hard 37.80m-37.81m Bedrock hard water supply	1816m	South
80000047	34	0.00m-0.13m Soil 0.13m-0.64m Weathered Porphyry 0.64m-0.76m Fresh Porphyry 0.76m-0.84m Limonite Stained Porphyry (Main Aquifer) 0.84m-1.27m Fresh Porphyry	1846m	North West
80000447	604	0.00m-0.01m Dark brown organic silt 0.01m-0.06m Bleached gravelly silt 0.06m-0.08m Yellow-grey mottled clay and feldspars 0.08m-0.13m Light brown gravelly silt 0.13m-0.13m Red and grey mottled clay 0.13m-0.15m Purple volcanic (dacite)	1868m	South West

Geology 1:250,000

Stage 1b, 2c & Hvra, Canberra, ACT 2601



Legend

- Site Boundary
- Report Buffer
- Property Boundary
- Fault
- Dyke
- Fold
- Marker Bed
- Metamorphic Boundary
- Shear Zone
- Structure
- Thrust Fault
- Lineament

Scale: 0 100 200 400 Meters	Data Sources: Property Boundaries & Topographic Data - Environment, Planning and Sustainable Development Directorate	Coordinate System: GDA 1994 MGA Zone 55	Date: 15 February 2022

Geology

Stage 1b, 2c & Hvra, Canberra, ACT 2601

Geological Units (1:250,000 scale)

What are the Geological Units onsite?

Symbol	Description	Unit Name	Group	Sub Group	Member	Era	Period	Dataset
Qa	Alluvium, fluvial deposits: gravel, sand, silt and clay	undifferentiated	unknown			Cainozoic	Quaternary	1:250,000
Sld	Rhyodacitic ignimbrite and minor volcaniclastic and argillaceous sediments	Deakin Volcanics	Laidlaw Volcanic Suite			Palaeozoic	Silurian	1:250,000
Sld1	Tuff, tuffaceous sandstone, shale and ashstone	Deakin Volcanics	Laidlaw Volcanic Suite		unnamed member	Palaeozoic	Silurian	1:250,000
Sldm	Rhyodacite lava	Deakin Volcanics	Laidlaw Volcanic Suite		Mugga Mugga Porphyry Member	Palaeozoic	Silurian	1:250,000

What are the Geological Units within the report buffer?

Symbol	Description	Unit Name	Group	Sub Group	Member	Era	Period	Dataset
Qa	Alluvium, fluvial deposits: gravel, sand, silt and clay	undifferentiated	unknown			Cainozoic	Quaternary	1:250,000
Shp	Dacitic ignimbrite with lithic xenoliths and dacitic autoliths, minor tuff and ashstone	Mount Painter Volcanics	Hawkins Volcanic Suite			Palaeozoic	Silurian	1:250,000
Shp2	Tuff and ashstone	Mount Painter Volcanics	Hawkins Volcanic Suite			Palaeozoic	Silurian	1:250,000
Sld	Rhyodacitic ignimbrite and minor volcaniclastic and argillaceous sediments	Deakin Volcanics	Laidlaw Volcanic Suite			Palaeozoic	Silurian	1:250,000
Sld1	Tuff, tuffaceous sandstone, shale and ashstone	Deakin Volcanics	Laidlaw Volcanic Suite		unnamed member	Palaeozoic	Silurian	1:250,000
Sldm	Rhyodacite lava	Deakin Volcanics	Laidlaw Volcanic Suite		Mugga Mugga Porphyry Member	Palaeozoic	Silurian	1:250,000
Sldm1	Tuffaceous siltstone and shale	Deakin Volcanics	Laidlaw Volcanic Suite		Mugga Mugga Porphyry Member	Palaeozoic	Silurian	1:250,000
Slp2	Coarse grey rhyodacite porphyry, massive and foliated (associated with Laidlaw volcanic Suite)	Laidlaw Volcanics	Laidlaw Volcanic Suite			Palaeozoic	Silurian	1:250,000
w	Water	water	water			Cainozoic	Quaternary	1:250,000

Geological Structures (1:250,000 scale)

What are the Geological Structures onsite?

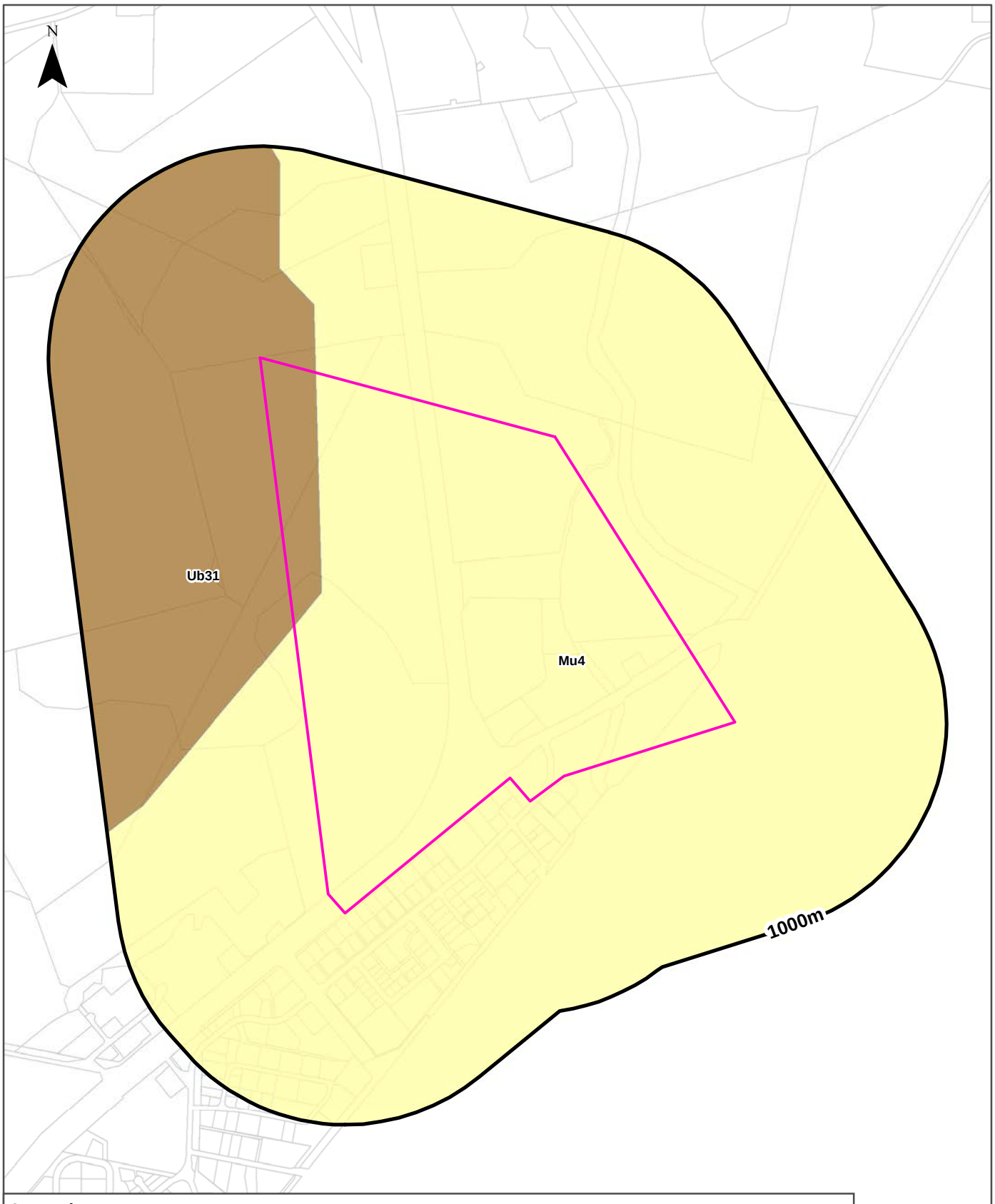
Feature	Name	Description	Map Sheet	Dataset
No features				1:250,000

What are the Geological Structures within the report buffer?

Feature	Name	Description	Map Sheet	Dataset
No features				1:250,000

Atlas of Australian Soils

Stage 1b, 2c & Hvra, Canberra, ACT 2601



Legend

- Site Boundary
- Report Buffer
- Property Boundary

Australian Soil Classification Orders

Anthroposol	Dermosol	Kandosol	Podosol	Tenosol	No Data
Calcarosol	Ferrosol	Kurosol	Rudosol	Vertosol	
Chromosol	Hydrosol	Organosol	Sodosol	Lake	

Scale: 0 100 200 400 Meters

Data Sources: Property Boundaries & Topographic Data - Environment, Planning and Sustainable Development Directorate

Coordinate System: GDA 1994 MGA Zone 55

Date: 15 February 2022

Soils

Stage 1b, 2c & Hvra, Canberra, ACT 2601

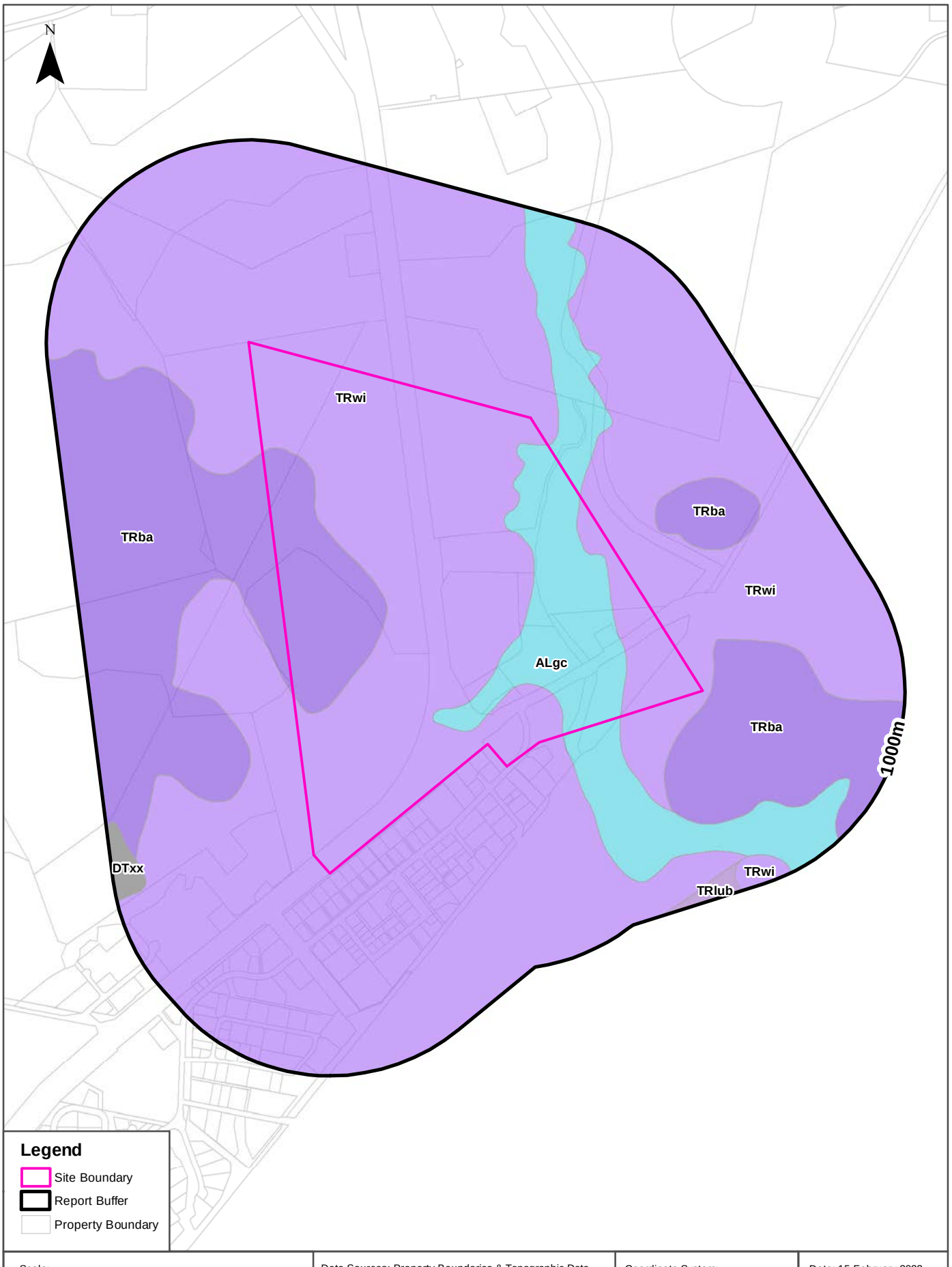
Atlas of Australian Soils

Australian soil types within the dataset buffer:

Symbol	Soil Order	Map Unit Description	Distance
Mu4	Kandosol	Gently to strongly undulating plains at moderate to low elevations (<2000 ft) with basins, stream terraces, and low residual hills and ridges; buried, layered soil materials are present: undulating plains of neutral leached red earths (Gn2.15) in the better-drained sites and yellow earths (Gn2.25) in intermediate drainage situations, with yellow leached earths (Gn2.75) often associated with hard neutral and/or alkaline yellow mottled soils (Dy3.42 and Dy3.43) in poorly drained areas, swampy sites, and seepage situations--all often with heavy clay D horizons below the solum. Associated are: low residual hills and ridges of (Dr2.22 and Dr2.42) or (Dy3.22 and Dy3.42) soils, with small areas of (Um4.2) soils and rock outcrops; basins of (Gn2.15 and Gn2.25) or (Dy3.42) soils; and stream terraces of variable width and development with (Um1) soils on present flood-plains, (Um6.11) soils on the youngest terraces, (Gn2.15, Gn2.25, and Gn2.75) in drainage sequence from well-drained to poorly drained sites on the next, and most extensive, terrace, adjacent to which sand sheets of (Uc1.2) soils may occur; (Dr2.42), (Dy3.42), and (Dy3.43) soils on remnants of the highest terrace, above which gravel fills and ironstone slabs may occur.	0m
Ub31	Sodosol	Low step-like range country--stepped rolling country with scarps, hills, and valleys: chief soils are hard neutral yellow and yellow mottled soils (Dy3.42), (Dy2.42), (Dy2.22), and (Dy3.22) with a variety of other (D) soils and some (Gn2) and (Um4) soils, generally associated as follows: irregularly spaced cuesta-like ranges with (i) moderate to steep scarps of rock outcrops, (Um4.1), (Dr3.42), (Dr2.22), and other (D) soils passing to (iia) long rolling back slopes of (Dy3.42), (Dy2.42), (Dy3.22) with (Dr2.22 and Dr2.42) and sometimes (Gn2.1 and Gn2.2) soils through the mid and upper slope positions, which in turn merge with (iib) undulating basins of (Dy3.42 and Dy3.43) soils sometimes with (Gn2.7) soils, and gullies of (Dy3.42) and/or (Gn2.7) and (Gn2.9) soils; this sequence may be broken by (iii) hills and mountains with slopes and/or scarps of (Um4.1), (Um4.2), (Dr2.21), (Dy3.41), and other (D) soils, also sometimes with belts of partially dissected upland basins of (Dy3.42) soils along the crests--i.e. with areas similar to (iib) but at a relatively higher elevation (compare unit Ub38); the whole area is traversed by (iv) narrow stream valleys of (Um1) soils on flood-plains, (Um6.11) and (Gn2) soils respectively on the next two terraces; and finally there are (v) minor occurrences of other soils, such as (Dr4.12) (e.g. Red Hill) and (Db3.12) on some basaltic areas. Saline patches are fairly common in low-lying situations, especially the (iib) areas.	0m

Soil Landscapes

Stage 1b, 2c & Hvra, Canberra, ACT 2601



Soils

Stage 1b, 2c & Hvra, Canberra, ACT 2601

Soil Landscapes

What are the onsite Soil Landscapes?

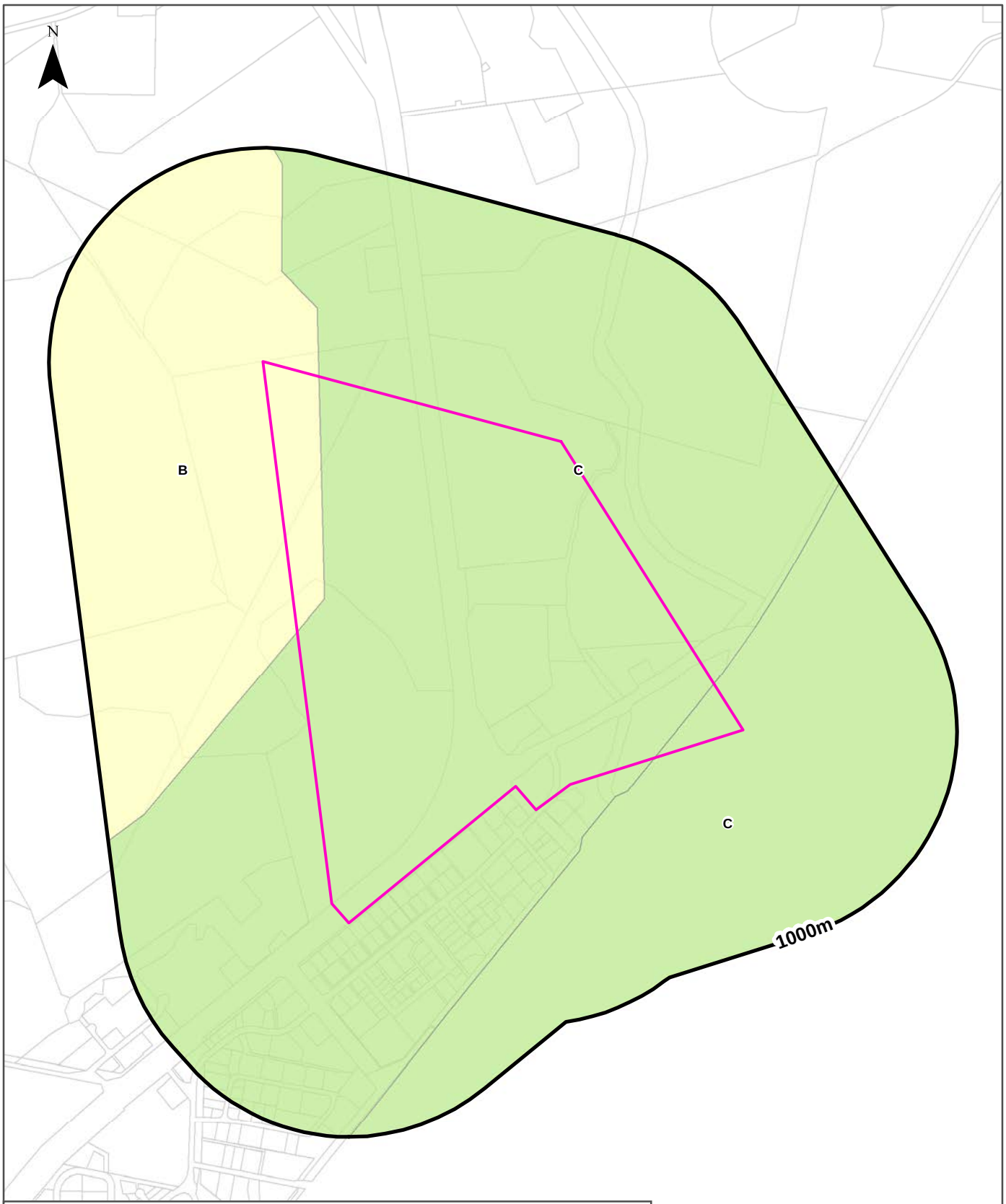
Soil Code	Name	Group	Process	Map Sheet	Scale
ALgc	GINNINDERRA CREEK		ALLUVIAL	Canberra	1:100,000
TRba	BURRA		TRANSFERRAL	Canberra	1:100,000
TRwi	WILLIAMSDALE		TRANSFERRAL	Canberra	1:100,000

What are the Soil Landscapes within the report buffer?

Soil Code	Name	Group	Process	Map Sheet	Scale
ALgc	GINNINDERRA CREEK		ALLUVIAL	Canberra	1:100,000
DTxx	DISTURBED TERRAIN		DISTURBED TERRAIN	Canberra	1:100,000
TRba	BURRA		TRANSFERRAL	Canberra	1:100,000
TRlub	LUXOR variant b		TRANSFERRAL	Canberra	1:100,000
TRwi	WILLIAMSDALE		TRANSFERRAL	Canberra	1:100,000

Atlas of Australian Acid Sulfate Soils

Stage 1b, 2c & Hvra, Canberra, ACT 2601



Legend

- Site Boundary
- Report Buffer
- Property Boundary

Probability of occurrence of Acid Sulfate Soils

- A. High (>70%)
- B. Low (6-70%)
- C. Extremely Low (1-5%)
- D. No Chance (0%)
- No Data

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

Data Sources: Property Boundaries & Topographic Data - Environment, Planning and Sustainable Development Directorate

Coordinate System: GDA 1994 MGA Zone 55

Date: 15 February 2022

Acid Sulfate Soils

Stage 1b, 2c & Hvra, Canberra, ACT 2601

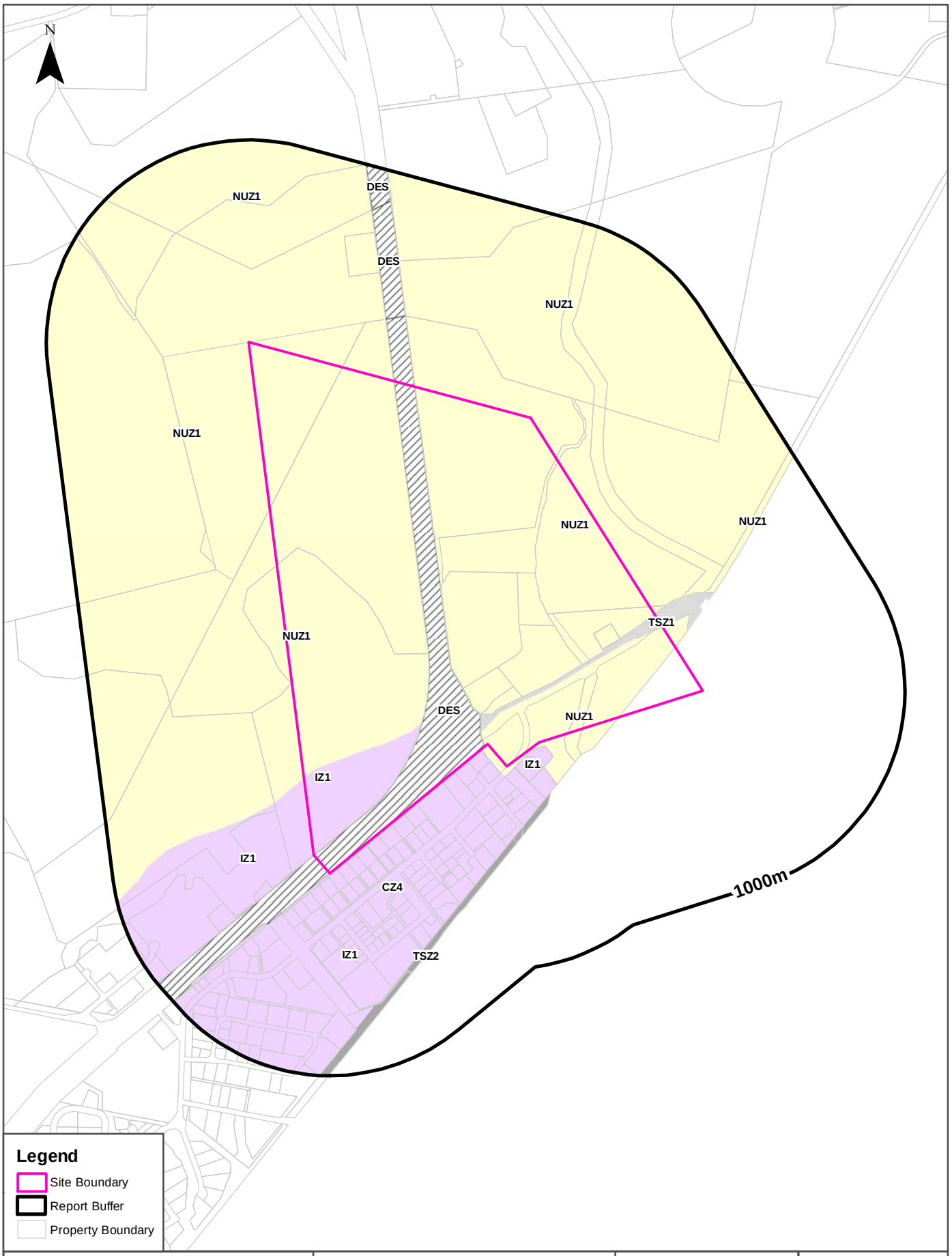
Atlas of Australian Acid Sulfate Soils

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

Class	Description	Distance
B	Low Probability of occurrence. 6-70% chance of occurrence.	0m
C	Extremely low probability of occurrence. 1-5% chance of occurrence with occurrences in small localised areas.	0m

Territory Plan Zones

Stage 1b, 2c & Hvra, Canberra, ACT 2601



Scale: 0 100 200 400 Meters	Data Sources: Property Boundaries & Topographic Data - Environment, Planning and Sustainable Development Directorate	Coordinate System: GDA 1994 MGA Zone 55	Date: 15 February 2022

Planning

Stage 1b, 2c & Hvra, Canberra, ACT 2601

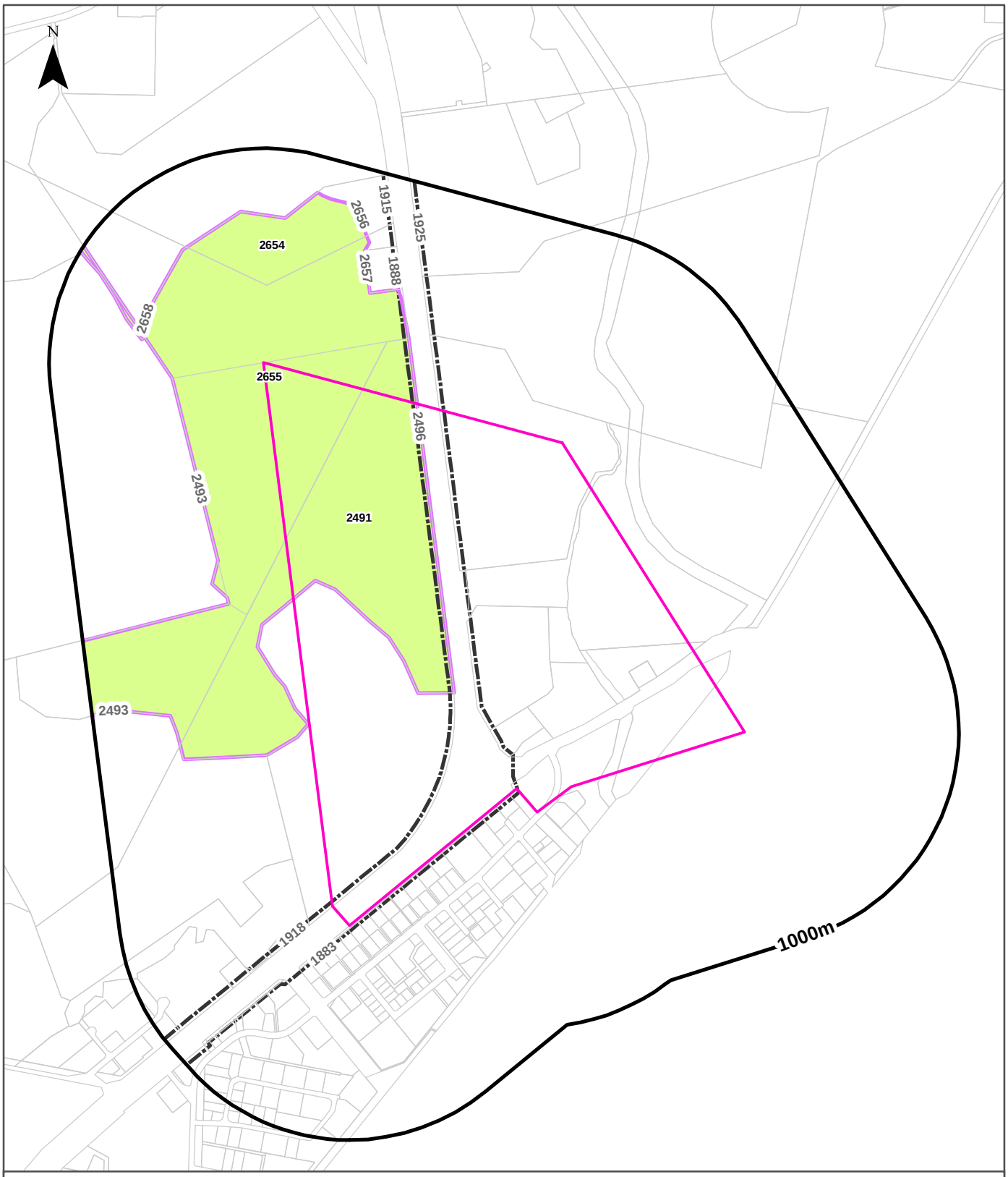
Territory Plan Zones

What Plan Zones exist within the report buffer?

Zone Code	Zone Name	Description	Variation	Gazettal Name	Gazettal Date	Distance	Direction
NUZ1	BROADACRE		TP 2008	NI2008-27	31/03/2008	0m	Onsite
NUZ1	BROADACRE		TP 2008	NI2008-27	31/03/2008	0m	Onsite
DES	DESIGNATED		TP 2008	NI2008-27	31/03/2008	0m	Onsite
NUZ1	BROADACRE		TA2009-26	NI2010-22	22/01/2010	0m	Onsite
NUZ1	BROADACRE		TP 2008	NI2008-27	31/03/2008	0m	Onsite
IZ1	GENERAL INDUSTRY		TP 2008	NI2008-27	31/03/2008	0m	Onsite
IZ1	GENERAL INDUSTRY		TP 2008	NI2008-27	31/03/2008	0m	Onsite
TSZ1	TRANSPORT		TP 2008	NI2008-27	31/03/2008	0m	Onsite
IZ1	GENERAL INDUSTRY		TA2009-37	NI2009-570	22/01/2010	0m	South
IZ1	GENERAL INDUSTRY		TA2009-37	NI2009-570	13/11/2009	7m	South East
IZ1	GENERAL INDUSTRY		TA2009-26	NI2010-22	22/01/2010	24m	South East
NUZ1	BROADACRE		TP 2008	NI2008-27	31/03/2008	150m	North East
CZ4	LOCAL CENTRE		TP 2008	NI2008-27	31/03/2008	219m	South
TSZ2	SERVICES		TA2009-26	NI2010-22	22/01/2010	229m	South
DES	DESIGNATED		TP 2008	NI2008-27	31/03/2008	285m	North
NUZ1	BROADACRE		TP 2008	NI2008-27	31/03/2008	361m	North West
DES	DESIGNATED		TP 2008	NI2008-27	31/03/2008	787m	North

Territory Plan Overlays

Stage 1b, 2c & Hvra, Canberra, ACT 2601



Legend

- Site Boundary
- Report Buffer
- Property Boundary
- Inter-town Public Transport
- Main Avenues & Approach Routes
- Future Urban Areas
- Special Requirements
- National Land
- Kingston Foreshore
- Public Land
- Wilderness Area
- National Park
- Nature Reserve
- Special Purpose Reserve
- Urban Open Space
- Cemetery or Burial Ground
- Protection of Water Supply
- Lake
- Sport and Recreation Reserve
- National Land Proposed for Urban Development

Scale: 0 100 200 400 Meters

Data Sources: Property Boundaries & Topographic Data - Environment, Planning and Sustainable Development Directorate

Coordinate System: GDA 1994 MGA Zone 55

Date: 15 February 2022

Planning

Stage 1b, 2c & Hvra, Canberra, ACT 2601

Territory Plan Overlays (areas)

What Plan Overlays (areas) exist within the report buffer?

Id	Overlay Code	Overlay Name	Variation	Gazettal Name	Distance	Direction
2491	Pc	Nature Reserve.	TP 2008	NI2008-27	0m	Onsite
2655	Pc	Nature Reserve.	TP 2008	NI2008-27	0m	Onsite
2654	Pc	Nature Reserve.	TP 2008	NI2008-27	359m	North West

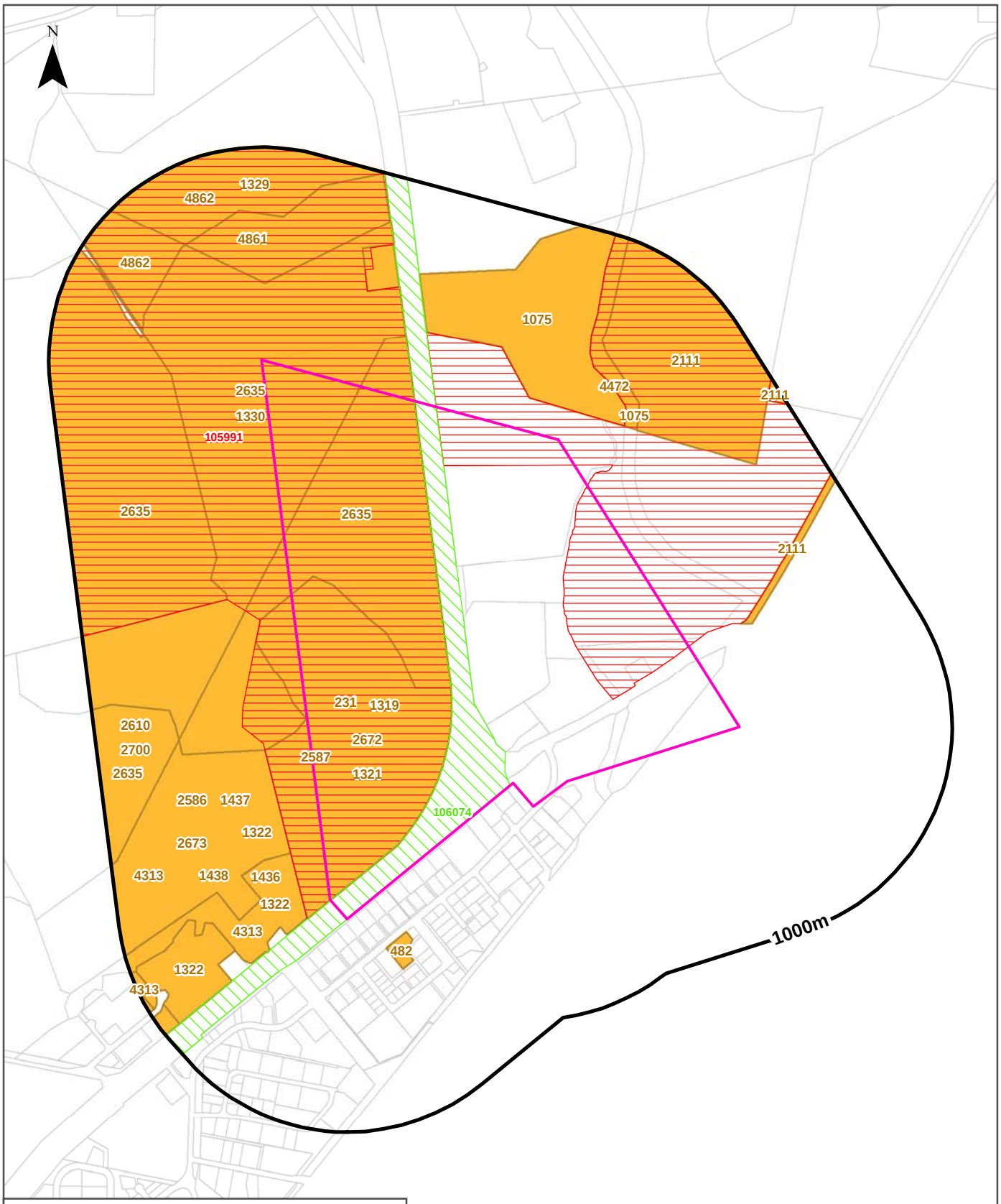
Territory Plan Overlays (lines)

What Plan Overlays (lines) exist within the report buffer?

Id	Overlay Code	Overlay Name	Variation	Gazettal Name	Distance	Direction
1883	MAAR	Main Avenues and Approach Routes	TP 2008	NI2008-27	0m	South West
1918	MAAR	Main Avenues and Approach Routes	TP 2008	NI2008-27	0m	South West
2496	PUBLAN	Public Land	TP 2008	NI2008-27	0m	West
1888	MAAR	Main Avenues and Approach Routes	TP 2008	NI2008-27	275m	North
2657	PUBLAN	Public Land	TP 2008	NI2008-27	284m	North
2493	PUBLAN	Public Land	TP 2008	NI2008-27	302m	North West
1925	MAAR	Main Avenues and Approach Routes	TP 2008	NI2008-27	327m	North
2658	PUBLAN	Public Land	TP 2008	NI2008-27	574m	North West
2656	PUBLAN	Public Land	TP 2008	NI2008-27	646m	North West
1915	MAAR	Main Avenues and Approach Routes	TP 2008	NI2008-27	772m	North

Heritage Items

Stage 1b, 2c & Hvra, Canberra, ACT 2601



Heritage

Stage 1b, 2c & Hvra, Canberra, ACT 2601

Commonwealth Heritage List

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

Place Id	Name	Address	Place File No	Class	Status	Register Date	Distance	Direction
105991	Natural Areas around and within Majura, Pialligo and Jerrabomberra	Majuar Rd, Majura ACT	8/01/000/0132	Natural	Nominated place		0m	Onsite

National Heritage List

What are the National Heritage List Items located within the dataset buffer?
Note. Please click on Place Id to activate a hyperlink to online website.

Place Id	Name	Address	Place File No	Class	Status	Register Date	Distance	Direction
106074	Canberra and Surrounding Areas	Northbourne Av, Canberra ACT	8/01/000/0134	Historic	Nominated place		0m	Onsite

Heritage Sites

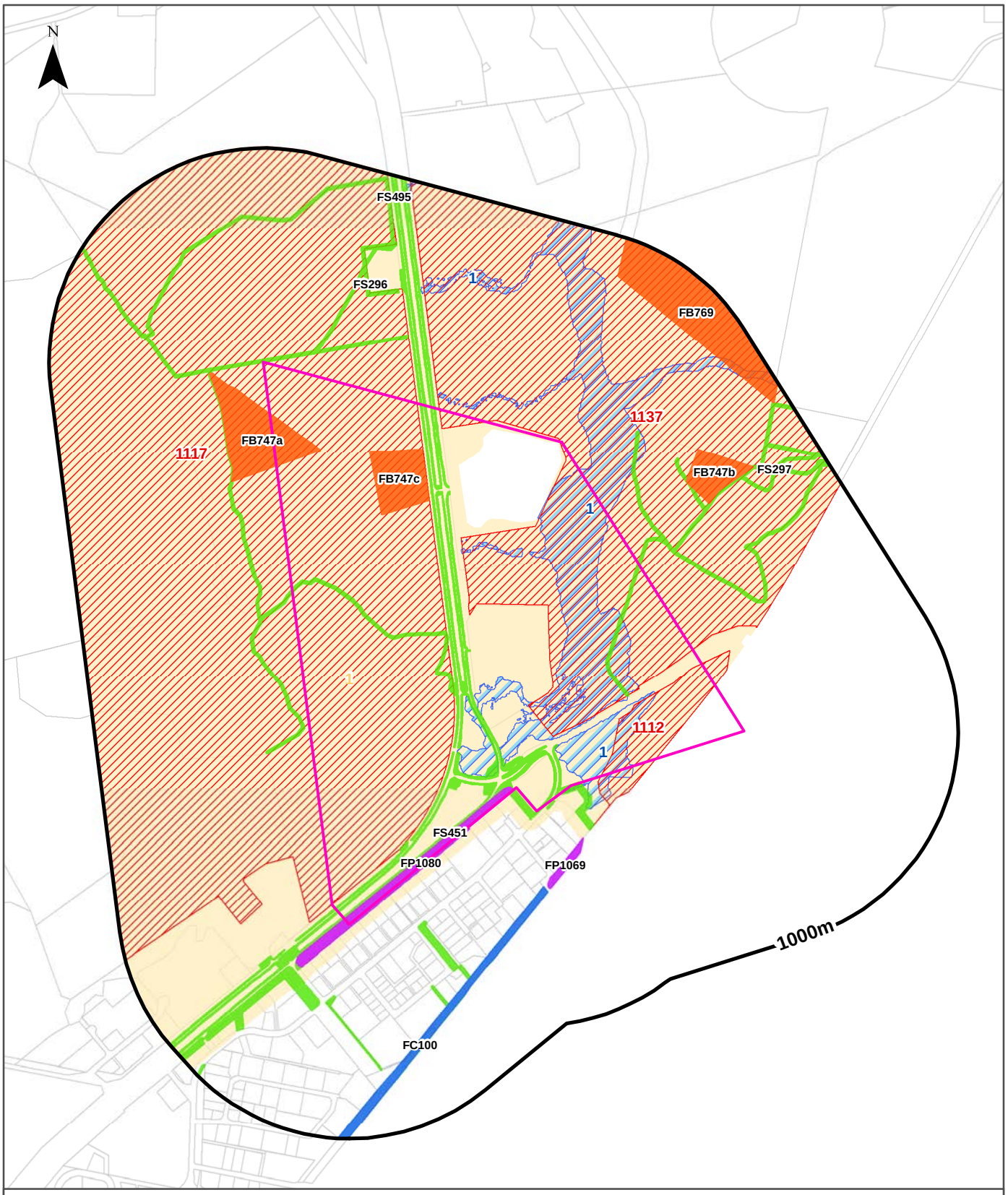
What Heritage SItes exist within the report buffer?

Map Id	Heritage Id	Name	Description	Status	Status Date	Location Type	Block Key	District	Division	Dist	Dir
231	139	Woden Homestead and grasslands	Section 17 Block 4 and 6 (part)	Final Registration		Historic		JERRABOMBERRA	HUME	0m	Onsite
2672	1166	HA3		Final Registration	09/03/2005	Restricted	88020170008	JERRABOMBERRA	HUME	0m	Onsite
1319	1166	HA8		Final Registration	09/03/2005	Restricted	88020170008	JERRABOMBERRA	HUME	0m	Onsite
2587	1166	HA9		Final Registration	09/03/2005	Restricted	88020170008	JERRABOMBERRA	HUME	0m	Onsite
1321	1166	HUME PAD 3		Final Registration	09/03/2005	Restricted	88020170008	JERRABOMBERRA	HUME	0m	Onsite
2635	1166	HUME PAD 2		Final Registration	09/03/2005	Restricted	88020170007	JERRABOMBERRA	HUME	0m	Onsite
1330	1166	MUGGA Q 2		Final Registration	09/03/2005	Restricted	80000002231	JERRABOMBERRA		0m	Onsite
2635	1166	HUME PAD 2		Final Registration	09/03/2005	Restricted	80000002231	JERRABOMBERRA		0m	Onsite
4861	243	Callum Brae	Section 102 Blocks 14,15 Part	Final Registration		Historic		JERRABOMBERRA	Various	0m	North West
4313	1020	Hume Paleontological Site		Final Registration		Restricted	88020230029	JERRABOMBERRA	HUME	126m	South West
1322	1166	HUME PAD 4		Final Registration	09/03/2005	Restricted	88020230029	JERRABOMBERRA	HUME	126m	South West

Map Id	Heritage Id	Name	Description	Status	Status Date	Location Type	Block Key	District	Division	Dist	Dir
1436	2029	HA PAD 4		Final Registration	08/03/2005	Restricted	88020230029	JERRABOMBERRA	HUME	126m	South West
1075	1166	JA8 (IF1)		Final Registration	09/03/2005	Restricted	80000002060	JERRABOMBERRA		149m	North
1322	1166	HUME PAD 4		Final Registration	09/03/2005	Restricted	88020230024	JERRABOMBERRA	HUME	155m	South West
1437	1166	HA4		Final Registration	09/03/2005	Restricted	88020230024	JERRABOMBERRA	HUME	155m	South West
2673	1166	HA5		Final Registration	09/03/2005	Restricted	88020230024	JERRABOMBERRA	HUME	155m	South West
1438	1166	HA6		Final Registration	09/03/2005	Restricted	88020230024	JERRABOMBERRA	HUME	155m	South West
2586	1166	HA7		Final Registration	09/03/2005	Restricted	88020230024	JERRABOMBERRA	HUME	155m	South West
4313	1020	Hume Paleontological Site		Final Registration		Restricted	88020230024	JERRABOMBERRA	HUME	156m	South West
482	466	Hill Station	Section 5 Block 5	Final Registration		Historic		JERRABOMBERRA	HUME	220m	South
2111	1243	PN1 ; P1		Final Registration	09/03/2005	Restricted	80000002040	JERRABOMBERRA		265m	North East
1075	1166	JA8 (IF1)		Final Registration	09/03/2005	Restricted	80000002061	JERRABOMBERRA		295m	North East
4472	1166	Aboriginal Places in the District of Jerrabomberra		Final Registration	09/03/2005	Restricted	80000002061	JERRABOMBERRA		295m	North East
2635	1166	HUME PAD 2		Final Registration	09/03/2005	Restricted	80000002224	JERRABOMBERRA		302m	West
2111	1243	PN1 ; P1		Final Registration	09/03/2005	Restricted	80000002062			336m	North East
2111	1243	PN1 ; P1		Final Registration	09/03/2005	Restricted	80000002250	JERRABOMBERRA		336m	North East
1322	1166	HUME PAD 4		Final Registration	09/03/2005	Restricted	88020230028	JERRABOMBERRA	HUME	505m	South West
4862	243	Callum Brae	Blocks 2229,2231 and 2232	Final Registration		Historic		JERRABOMBERRA		574m	North West
2700	1166	HA10		Final Registration	09/03/2005	Restricted	80000002248	JERRABOMBERRA		611m	South West
2610	1166	HA13		Final Registration	09/03/2005	Restricted	80000002248	JERRABOMBERRA		611m	South West
2635	1166	HUME PAD 2		Final Registration	09/03/2005	Restricted	80000002248	JERRABOMBERRA		611m	South West
4862	243	Callum Brae	Blocks 2229,2231 and 2232	Final Registration		Historic		JERRABOMBERRA	SYMONSTON	646m	North West
1329	1166	Callum Brae PAD		Final Registration	09/03/2005	Restricted	88031020014	JERRABOMBERRA	SYMONSTON	647m	North West
1322	1166	HUME PAD 4		Final Registration	09/03/2005	Restricted	88020270007	JERRABOMBERRA	HUME	916m	South West
2111	1243	PN1 ; P1		Final Registration	09/03/2005	Restricted	80000002236	JERRABOMBERRA		928m	North East
1322	1166	HUME PAD 4		Final Registration	09/03/2005	Restricted	88020260007	JERRABOMBERRA	HUME	932m	South West
4313	1020	Hume Paleontological Site		Final Registration		Restricted	88020260007	JERRABOMBERRA	HUME	932m	South West
1322	1166	HUME PAD 4		Final Registration	09/03/2005	Restricted	88020260005	JERRABOMBERRA	HUME	974m	South West

Natural Hazards - Bushfire & Flood

Stage 1b, 2c & Hvra, Canberra, ACT 2601



Legend

- Site Boundary
- Report Buffer
- Property Boundaries
- Bushfire Prone Area
- Bushfire Abatement Zone
- Flood 1% AEP

Access Management

- Construction
- Maintenance
- Upgrade
- Vegetation Management

Fuel Management

- Chemical
- Cultural Burn
- Ecological Burn
- Grazing
- Physical Removal
- Prescribed Burn
- Prescribed Burn (RFS)
- Slashing

Scale: 0 100 200 400 Meters

Data Sources: Property Boundaries & Topographic Data - Environment, Planning and Sustainable Development Directorate

Coordinate System: GDA 1994 MGA Zone 55

Date: 15 February 2022

Natural Hazards

Stage 1b, 2c & Hvra, Canberra, ACT 2601

Bushfire Prone Areas

What Bushfire Prone Areas exist within the report buffer?

Feature Id	Description	Distance	Direction
1	Bushfire Prone Areas ACT	0m	Onsite

Bushfire Abatement Zones

What Bushfire Abatement Zones exist within the report buffer?

Feature Id	Feature	Distance	Direction
1117	Bushfire Abatement Zone	0m	Onsite
1137	Bushfire Abatement Zone	0m	Onsite
1112	Bushfire Abatement Zone	0m	Onsite

Bushfire Operational Plan - Access Management

What Bushfire Operational Plan - Access Management exist within the report buffer?

Map Id	Treatment	Distance	Direction
N/A	No records within buffer		

Bushfire Operational Plan - Fuel Management

What Bushfire Operational Plan - Fuel Management exist within the report buffer?

Unique Id	Treatment	Hectares	Distance	Direction
FS451	Slashing	36.13	0m	Onsite
FB747c	Ecological Burn	6.26	0m	Onsite
FP1080	Physical Removal	5.10	0m	Onsite
FB747a	Ecological Burn	10.70	0m	Onsite

Unique Id	Treatment	Hectares	Distance	Direction
FS296	Slashing	17.43	0m	Onsite
FS297	Slashing	6.88	0m	Onsite
FP1069	Physical Removal	0.69	230m	South East
FC100	Chemical	75.72	354m	West
FB747b	Ecological Burn	3.81	393m	North East
FB769	Ecological Burn	67.43	767m	North East
FS495	Slashing	51.67	798m	North

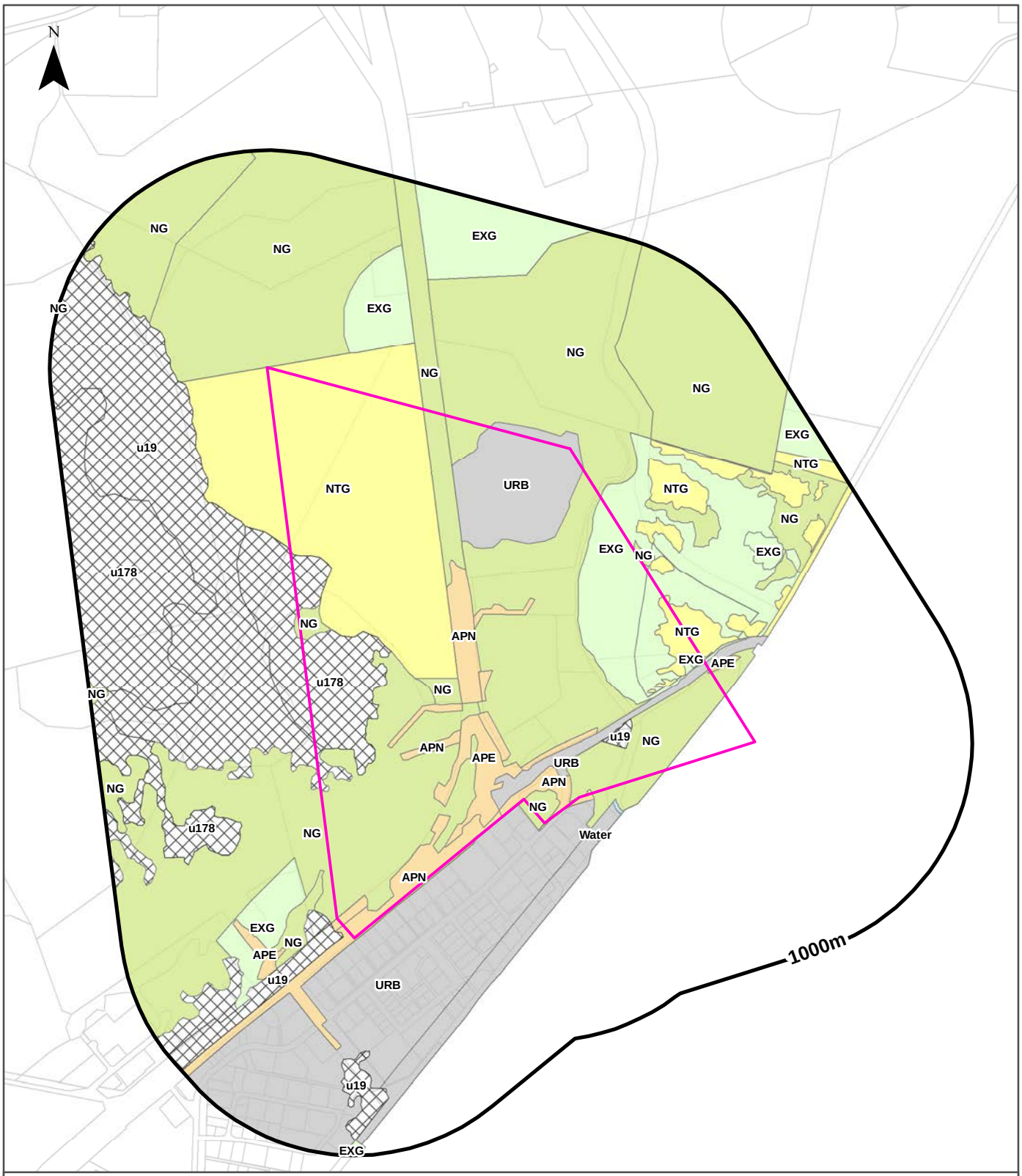
Flood (1 Percent Annual Exceedance Probability)

What Flood zone (1% AEP) exists within the report buffer?

Feature Id	Description	Distance	Direction
1	Flood 1% Annual Exceedance Probability	0m	Onsite

Ecological Constraints - Vegetation Communities

Stage 1b, 2c & Hvra, Canberra, ACT 2601



Legend

- Site Boundary
- Report Buffer
- Property Boundaries
- Alpine Complex
- Dry Sclerophyll Forests
- Freshwater Wetlands
- Forested Wetlands
- u52 Ribbon Gum
- u53 Mountain Gum
- u239 Alpine Ash
- Grassy Woodlands
- Grasslands
- APN, APE, ARB, EPN
- DNF, DNS, DNW
- EXF, EXS, EXW
- PLE Plantation exotic
- PWR Power easement
- EXG Exotic grassland
- NG Native grassland
- URB Urban and developed areas
- UOS Urban Open Space
- Sand
- Rock
- Water

Scale: 0 100 200 400 Meters

Data Sources: Property Boundaries & Topographic Data - Environment, Planning and Sustainable Development Directorate

Coordinate System: GDA 1994 MGA Zone 55

Date: 15 February 2022

Ecological Constraints

Stage 1b, 2c & Hvra, Canberra, ACT 2601

Vegetation Communities

What Vegetation Communities exist within the report buffer?

UMC Id	Community	Formation	"Keith" Vegetation Class	Mean Height	Canopy Cover	Distance	Direction
NTG	Natural Temperate Grassland_NTG	GRASSLANDS	Temperate Montane Grasslands	5.82	0.09	0m	Onsite
NG	Native grassland_NG			7.56	0.68	0m	Onsite
NG	Native grassland_NG			8.48	1.24	0m	Onsite
URB	Urban and developed areas_URB			4.17	0.33	0m	Onsite
u178	Yellow Box ± Apple Box tall grassy woodland_u178	GRASSY WOODLANDS	Southern Tableland Grassy Woodlands	8.88	17.14	0m	Onsite
EXG	Exotic grassland_EXG			6.16	0.04	0m	Onsite
APE	Amenity planting exotic_APE			9.57	40.95	0m	Onsite
APN	Amenity planting native_APN			7.34	17.88	0m	Onsite
NG	Native grassland_NG			7.53	8.62	0m	Onsite
APN	Amenity planting native_APN			9.21	22.95	0m	Onsite
EXG	Exotic grassland_EXG			5.84	0.20	0m	Onsite
URB	Urban and developed areas_URB			6.60	0.85	0m	Onsite
NTG	Natural Temperate Grassland_NTG	GRASSLANDS	Temperate Montane Grasslands	0.00	0.00	0m	Onsite
APN	Amenity planting native_APN			6.47	28.73	0m	Onsite
NG	Native grassland_NG			8.79	1.99	0m	Onsite
NG	Native grassland_NG			5.39	0.48	0m	South East
NG	Native grassland_NG			9.44	0.98	0m	West
u19	Blakely's Red Gum – Yellow Box tall grassy woodland_u19	GRASSY WOODLANDS	Southern Tableland Grassy Woodlands	8.71	23.00	0m	North West
APN	Amenity planting native_APN			8.50	29.25	0m	South West
APN	Amenity planting native_APN			8.88	43.96	0m	South
APN	Amenity planting native_APN			10.15	41.46	0m	South
APN	Amenity planting native_APN			8.23	44.10	0m	South East
APN	Amenity planting native_APN			6.77	32.30	0m	North East
u19	Blakely's Red Gum – Yellow Box tall grassy woodland_u19	GRASSY WOODLANDS	Southern Tableland Grassy Woodlands	9.63	15.71	0m	South East
APN	Amenity planting native_APN			5.54	13.44	0m	South West
APN	Amenity planting native_APN			7.61	10.67	0m	South
EXG	Exotic grassland_EXG			0.00	0.00	0m	East
NTG	Natural Temperate Grassland_NTG	GRASSLANDS	Temperate Montane Grasslands	4.63	1.66	0m	East
URB	Urban and developed areas_URB			8.07	3.22	0m	South

UMC Id	Community	Formation	"Keith" Vegetation Class	Mean Height	Canopy Cover	Distance	Direction
APE	Amenity planting exotic_APE			13.36	27.81	0m	East
NG	Native grassland_NG			5.92	0.16	0m	North West
NG	Native grassland_NG			0.00	0.00	2m	East
u19	Blakely's Red Gum – Yellow Box tall grassy woodland_u19	GRASSY WOODLANDS	Southern Tableland Grassy Woodlands	7.74	16.23	29m	South West
NG	Native grassland_NG			7.74	4.16	33m	South West
u19	Blakely's Red Gum – Yellow Box tall grassy woodland_u19	GRASSY WOODLANDS	Southern Tableland Grassy Woodlands	8.43	21.31	35m	South West
Water	Water			3.53	0.17	55m	South East
URB	Urban and developed areas_URB			8.28	12.31	68m	South
EXG	Exotic grassland_EXG			9.71	4.29	130m	South West
EXG	Exotic grassland_EXG			5.73	0.13	159m	North
Water	Water			3.90	0.57	166m	South East
NTG	Natural Temperate Grassland_NTG	GRASSLANDS	Temperate Montane Grasslands	3.22	0.05	174m	East
APE	Amenity planting exotic_APE			7.93	29.90	273m	South West
NTG	Natural Temperate Grassland_NTG	GRASSLANDS	Temperate Montane Grasslands	7.17	3.67	283m	North East
NG	Native grassland_NG			6.19	0.05	338m	North East
u178	Yellow Box ± Apple Box tall grassy woodland_u178	GRASSY WOODLANDS	Southern Tableland Grassy Woodlands	9.02	29.15	365m	West
u19	Blakely's Red Gum – Yellow Box tall grassy woodland_u19	GRASSY WOODLANDS	Southern Tableland Grassy Woodlands	10.01	11.92	488m	South West
u19	Blakely's Red Gum – Yellow Box tall grassy woodland_u19	GRASSY WOODLANDS	Southern Tableland Grassy Woodlands	10.43	9.09	523m	South
EXG	Exotic grassland_EXG			7.55	0.68	578m	North
NG	Native grassland_NG			7.87	1.63	580m	North West
NG	Native grassland_NG			8.96	0.73	768m	West
u178	Yellow Box ± Apple Box tall grassy woodland_u178	GRASSY WOODLANDS	Southern Tableland Grassy Woodlands	9.67	15.96	795m	South West
EXG	Exotic grassland_EXG			7.45	4.47	796m	North East
NG	Native grassland_NG			5.68	0.49	913m	West
EXG	Exotic grassland_EXG			6.85	1.43	930m	South
NG	Native grassland_NG			8.24	2.65	997m	North West

Ecological Constraints

Stage 1b, 2c & Hvra, Canberra, ACT 2601

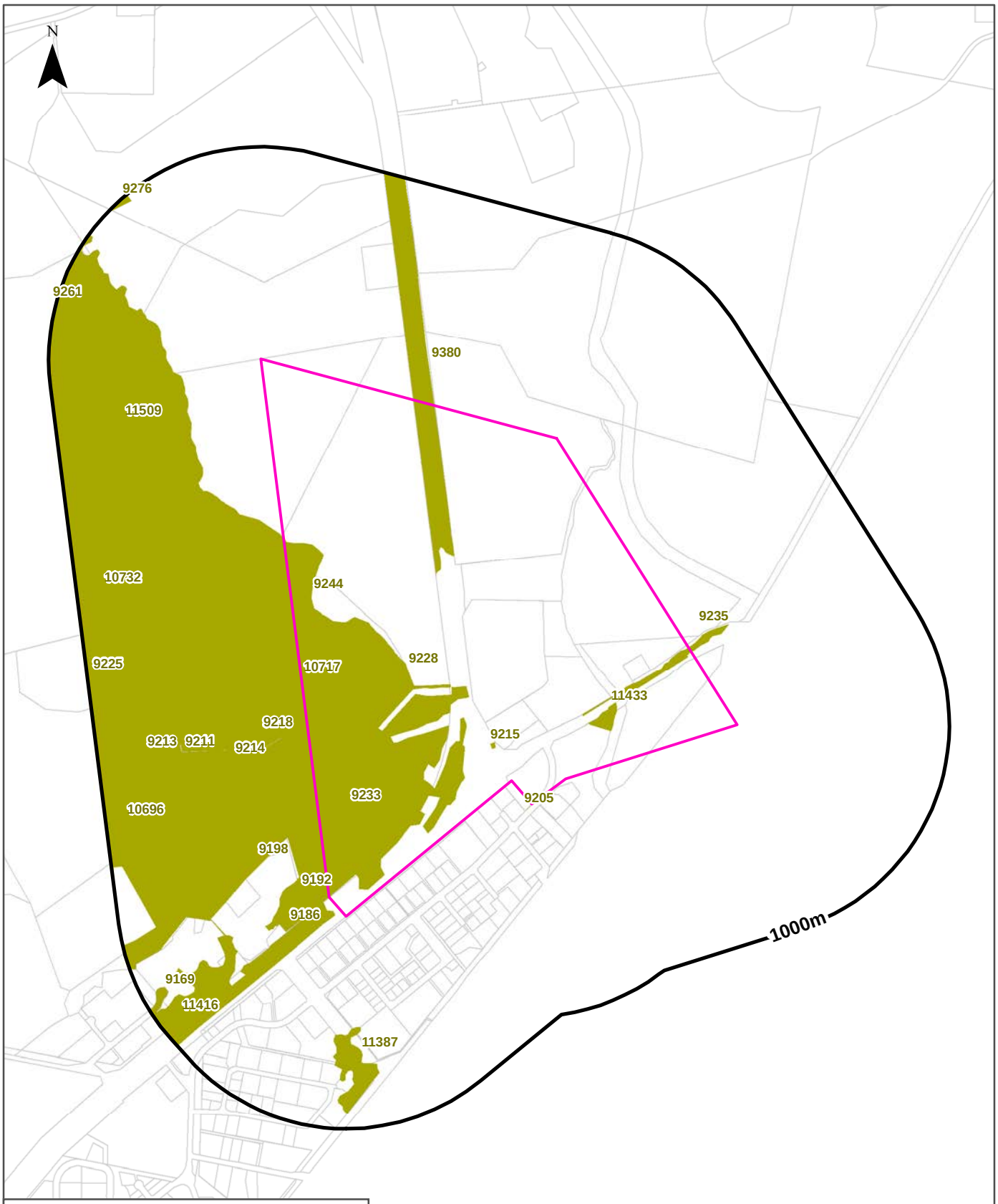
Vegetation Subformation

What Vegetation Subformations exist within the report buffer?

Object Id	Subformation	Distance	Direction
N/A	No records within buffer		

Ecological Constraints - Threatened Woodland, Wetlands & Tree Register

Stage 1b, 2c & Hvra, Canberra, ACT 2601



Data Sources: Property Boundaries & Topographic Data - Environment, Planning and Sustainable Development Directorate

Coordinate System: GDA 1994 MGA Zone 55

Date: 15 February 2022

Ecological Constraints

Stage 1b, 2c & Hvra, Canberra, ACT 2601

Threatened Woodland

What ACT Listed Threatened Woodland exists within the report buffer?

Feature Id	Community	EPBCStatus	ACT Status	Distance	Direction
9233	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	0m	Onsite
10717	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	0m	Onsite
9380	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	0m	Onsite
9235	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	0m	Onsite
9244	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	0m	Onsite
11509	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	0m	Onsite
11433	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	0m	Onsite
9215	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	0m	Onsite
9228	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	0m	Onsite
9205	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	6m	South
11416	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	29m	South West
9218	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	111m	South West
9192	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	132m	South West
9186	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	178m	South West
9198	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	257m	South West
9214	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	357m	South West
10732	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	365m	West
9211	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	507m	South West
11387	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	523m	South
9213	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	580m	South West

Feature Id	Community	EPBCStatus	ACT Status	Distance	Direction
10696	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	795m	South West
9169	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	877m	South West
9225	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	913m	West
9276	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	962m	North West
9261	Potential Yellow Box Blakely's Red Gum Grassy Woodland	Potentially threatened, field	Potentially threatened, field inspection required	997m	North West

Tree Register

What Trees on the ACT register exists within the report buffer?

Feature Id	Genus	Species	Tree Ref	Tree Height	Status	Date Edit	Distance	Direction
N/A	No records within buffer							

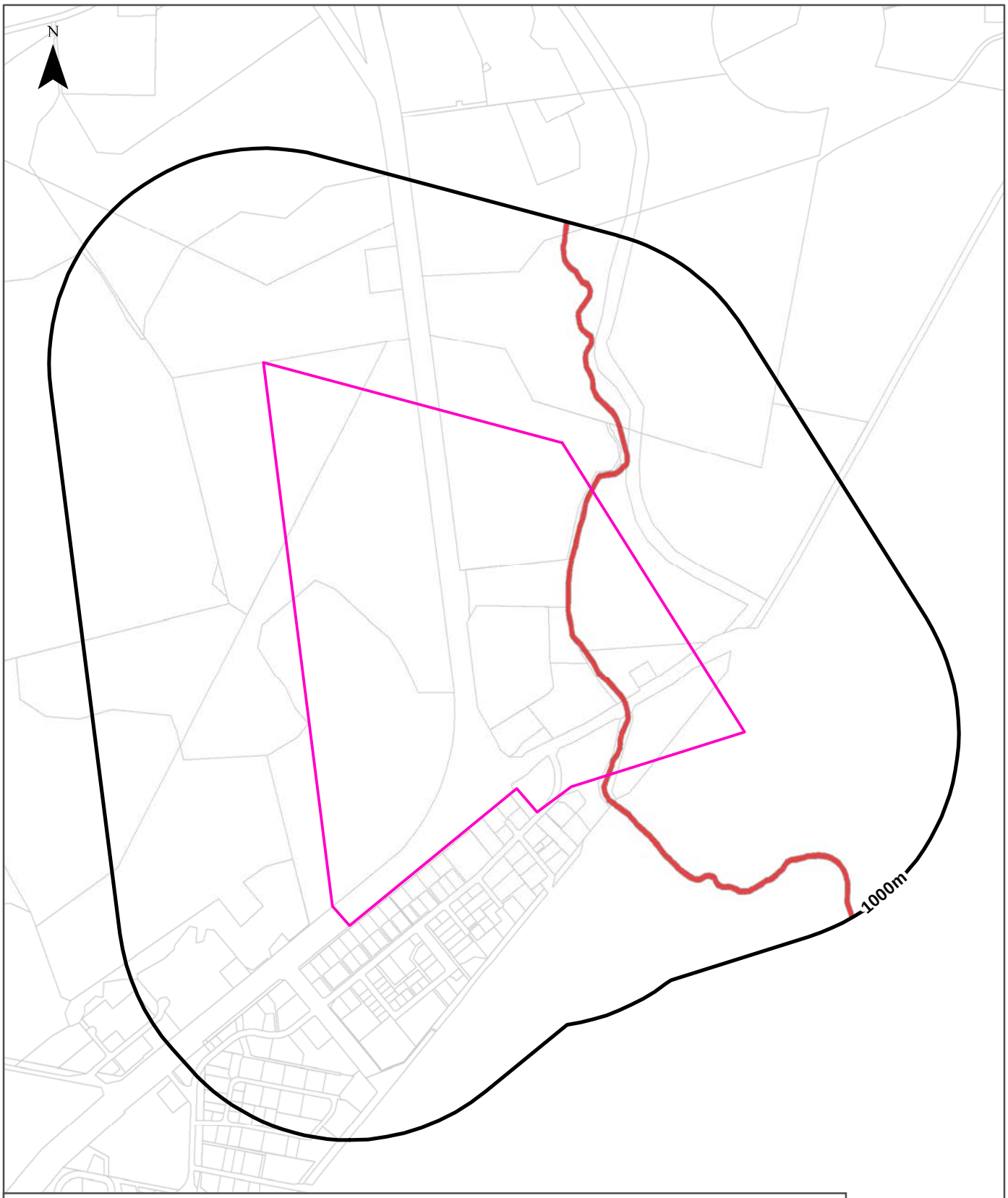
Important Wetlands

What Wetlands exist within the report buffer?

Feature Id	Name	Distance	Direction
N/A	No records within buffer		

Ecological Constraints - Groundwater Dependent Ecosystems Atlas

Stage 1b, 2c & Hvra, Canberra, ACT 2601



Legend

- Site Boundary
- Report Buffer
- Property Boundaries
- High potential GDE - from national assessment
- High potential GDE - from regional studies
- Moderate potential GDE - from national assessment
- Moderate potential GDE - from regional studies
- Low potential GDE - from national assessment
- Low potential GDE - from regional studies
- Known GDE - from regional studies
- Unclassified potential GDE - from national assessment
- Unclassified potential GDE - from regional studies

Scale:
0 100 200 400
Meters

Data Sources: Property Boundaries & Topographic Data - Environment, Planning and Sustainable Development Directorate

Coordinate System:
GDA 1994 MGA Zone 55

Date: 15 February 2022

Ecological Constraints

Stage 1b, 2c & Hvra, Canberra, ACT 2601

Groundwater Dependent Ecosystems Atlas

GDEs within the dataset buffer:

Type	Name	GDE Potential	IDE Likelihood	Geomorphology	Ecosystem Type	Aquifer Geology	Distance	Direction
Aquatic		High potential GDE - from national assessment	6	Upland plains with separating strike-aligned hills, closed lake basins.	River		0m	Onsite
Aquatic		Moderate potential GDE - from national assessment	3	Upland plains with separating strike-aligned hills, closed lake basins.	River		991m	South

Ecological Constraints

Stage 1b, 2c & Hvra, Canberra, ACT 2601

NSW BioNet Atlas

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

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status
Fauna	Amphibia	Litoria aurea	Green and Golden Bell Frog	Endangered, Protected		Vulnerable
Fauna	Amphibia	Litoria raniformis	Southern Bell Frog	Endangered, Protected		Vulnerable
Fauna	Aves	Chthonicola sagittata	Speckled Warbler	Vulnerable, Protected		
Fauna	Aves	Circus assimilis	Spotted Harrier	Vulnerable, Protected		
Fauna	Aves	Haliaeetus leucogaster	White-bellied Sea-Eagle	Vulnerable, Protected		
Fauna	Aves	Hieraaetus morphnoides	Little Eagle	Vulnerable, Protected		
Fauna	Aves	Botaurus poiciloptilus	Australasian Bittern	Endangered, Protected		Endangered
Fauna	Aves	Artamus cyanopterus cyanopterus	Dusky Woodswallow	Vulnerable, Protected		
Fauna	Aves	Callocephalon fimbriatum	Gang-gang Cockatoo	Vulnerable, Protected, Category 3 Sensitive Species	Category 3	
Fauna	Aves	Calyptorhynchus lathami	Glossy Black-Cockatoo	Vulnerable, Protected, Category 2 Sensitive Species	Category 2	
Fauna	Aves	Ephippiorhynchus asiaticus	Black-necked Stork	Endangered, Protected		
Fauna	Aves	Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	Vulnerable, Protected		
Fauna	Aves	Stagonopleura guttata	Diamond Firetail	Vulnerable, Protected		
Fauna	Aves	Falco subniger	Black Falcon	Vulnerable, Protected		
Fauna	Aves	Anthochaera phrygia	Regent Honeyeater	Critically Endangered Species, Protected		Critically Endangered
Fauna	Aves	Epthianura albifrons	White-fronted Chat	Vulnerable, Protected		
Fauna	Aves	Grantiella picta	Painted Honeyeater	Vulnerable, Protected		Vulnerable
Fauna	Aves	Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Vulnerable, Protected		
Fauna	Aves	Daphoenositta chrysoptera	Varied Sittella	Vulnerable, Protected		
Fauna	Aves	Pachycephala olivacea	Olive Whistler	Vulnerable, Protected		
Fauna	Aves	Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	Vulnerable, Protected		
Fauna	Aves	Petroica boodang	Scarlet Robin	Vulnerable, Protected		
Fauna	Aves	Petroica phoenicea	Flame Robin	Vulnerable, Protected		
Fauna	Aves	Glossopsitta pusilla	Little Lorikeet	Vulnerable, Protected		
Fauna	Aves	Lathamus discolor	Swift Parrot	Endangered, Protected, Category 3 Sensitive Species	Category 3	Critically Endangered
Fauna	Aves	Polytelis swainsonii	Superb Parrot	Vulnerable, Protected, Category 3 Sensitive Species	Category 3	Vulnerable
Fauna	Aves	Rostratula australis	Australian Painted Snipe	Endangered, Protected		Endangered

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status
Fauna	Insecta	Synemon plana	Golden Sun Moth	Endangered		Critically Endangered
Fauna	Mammalia	Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable, Protected		Endangered
Fauna	Mammalia	Miniopterus orianae oceanensis	Large Bent-winged Bat	Vulnerable, Protected		
Fauna	Mammalia	Phascolarctos cinereus	Koala	Vulnerable, Protected		Vulnerable
Fauna	Mammalia	Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable, Protected		Vulnerable
Fauna	Mammalia	Falsistrellus tasmaniensis	Eastern False Pipistrelle	Vulnerable, Protected		
Fauna	Mammalia	Myotis macropus	Southern Myotis	Vulnerable, Protected		
Fauna	Reptilia	Tympanocryptis pinguicolla	Grassland Earless Dragon	Endangered, Protected		Endangered
Fauna	Reptilia	Aprasia parapulchella	Pink-tailed Legless Lizard	Vulnerable, Protected		Vulnerable
Fauna	Reptilia	Varanus rosenbergi	Rosenberg's Goanna	Vulnerable, Protected		
Flora	Flora	Rutidosis leptorrhynchoides	Button Wrinklewort	Endangered		Endangered
Flora	Flora	Lepidium pseudopapillosum	Formbe Peppercress	Endangered		Vulnerable
Flora	Flora	Swainsona recta	Small Purple-pea	Endangered		Endangered
Flora	Flora	Eucalyptus macarthurii	Paddys River Box, Camden Woollybutt	Endangered		Endangered
Flora	Flora	Caladenia tessellata	Thick Lip Spider Orchid	Endangered, Protected, Category 2 Sensitive Species	Category 2	Vulnerable

Data does not include NSW category 1 sensitive species.

Location Confidences

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

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

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