REPORT TO

DEPARTMENT OF EDUCATION

ON

SUPPLEMENTARY SURFACE AND GROUNDWATER IMPACT ASSESSMENT

FOR

NORTHERN RIVERS FLOOD RECOVERY – RICHMOND RIVER HIGH CAMPUS REDEVELOPMENT

AT

163-170 ALEXANDRA PARADE, NORTH LISMORE, NSW

Date: 18 July 2025

Ref: E36314PT3rpt4-SupSGIA

JKEnvironments

www.jkenvironments.com.au

T: +61 2 9888 5000

JK Environments Pty Ltd

ABN 90 633 911 403

Report prepared by:

Katrina Taylor
Senior Associate | Environmental Scientist

Report reviewed by:

Vittal Boggaram
Principal | Hydrologist | Environmental Engineer

For and on behalf of
JKE
PO BOX 976
NORTH RYDE BC NSW 1670

DOCUMENT REVISION RECORD

Report Reference	Report Status	Report Date
E36314PT3rpt4-SupSGIA DRAFT	Draft Report	27 June 2025
E36314PT3rpt4-SupSGIA	Final Report	18 July 2025

Table of Contents

1 CLIENT SUPPLIED INTRODUCTION 1

1.1 Client Provided Site Description 1
1.2 Proposed Activity Description 2

2 REPORT INTRODUCTION 3

2.1 Scope of Work 3

3 SITE INFORMATION 5

3.1 Site Identification and Description 5
3.2 Site Location, Topography and Regional Setting 5
3.3 Site Inspection 5
3.4 Surrounding Land Use 6
3.5 Regional Geology and Soil Landscape 6
3.6 Dryland Salinity Potential – National Assessment 6
3.7 Acid Sulfate Soil (ASS) Risk and Planning 6
3.8 Summary of Site History 7
3.9 Summary of JKE Investigation - Soil Contamination 7
3.10 Summary of JKE Investigation – Salinity and ASS Conditions 7

4 CONCEPTUAL SITE MODEL – HYDROLOGICAL CONDITIONS 9

4.1 Surface Water Conditions 9
4.2 Hydrogeology 9
4.3 Registered Groundwater Bores 9
4.4 Other Groundwater Users 10
4.5 Groundwater Dependant Ecosystems (GDE) 10
4.6 Inflow Dependant Ecosystems (IDE) 10
4.7 Ramsar Wetlands 10
4.8 Ecological Sensitive Areas 10
4.9 Groundwater Occurrence 11
4.10 Groundwater Permeability 11

5 SURFACE AND GROUNDWATER QUALITY 12

5.1 Screening Criteria 12
5.2 Groundwater and Surface Water Sampling 12
5.3 Summary of Field Results 13
5.4 Summary of Analytical Results 14

6 DISCUSSION AND RECOMMENDATIONS 16

6.1 Review of Surface Water Conditions 16
6.2 Review of Groundwater Conditions 16
6.3 Groundwater Seepage and Dewatering During Construction 17
6.4 Groundwater Quality and Treatment 18
6.5 Mitigation Measures – REF Requirement 18
6.6 Evaluation of Environmental Impacts – REF Requirement 19

7 LIMITATIONS 20

List of Tables

Table 3-1: Site Identification 5
Table 3-2: Summary of Historical Land Uses / Activities 7
Table 4-1: Standpipe Installation Details 11
Table 5-1: Summary of Groundwater RLs 14
Table 6-1: Mitigation Measures Relating to SGIA Findings 19

Attachments

Appendix A: Report Figures
Appendix B: Lotsearch Environmental Risk and Planning Report
Appendix C: Laboratory Results Summary Tables
Appendix D: Borehole Logs
Appendix E: Laboratory Reports & COC Documents
Appendix F: Fieldwork Documents
Appendix G: Report Explanatory Notes

Abbreviations

Australian Drinking Water Guidelines	**ADWG**
Area of Environmental Concern	**AEC**
Australian Height Datum	**AHD**
Acid Sulfate Soil	**ASS**
Below Ground Level	**BGL**
Benzene, Toluene, Ethylbenzene, Xylene	**BTEX**
Chain of Custody	**COC**
Covered Outdoor Learning Area	**COLA**
Environment Protection Authority	**EPA**
Electric vehicle	**EV**
General Learning Space	**GLS**
International Organisation of Standardisation	**ISO**
JK Environments	**JKE**
JK Geotechnics	**JKG**
Lab Control Spike	**LCS**
Light Non-Aqueous Phase Liquid	**LNAPL**
Map Grid of Australia	**MGA**
National Association of Testing Authorities	**NATA**
National Environmental Protection Measure	**NEPM**
Organochlorine Pesticides	**OCP**
Organophosphate Pesticides	**OPP**
Polycyclic Aromatic Hydrocarbons	**PAH**
Photo-ionisation Detector	**PID**
Protection of the Environment Operations	**POEO**
Practical Quantitation Limit	**PQL**
Quality Assurance	**QA**
Quality Control	**QC**
Review of Environmental Factors	**REF**
Relative Percentage Difference	**RPD**
Richmond River High Campus	**RRHC**
Site Assessment Criteria	**SAC**
Sampling, Analysis and Quality Plan	**SAQP**
Standing Water Level	**SWL**
Standard Sampling Procedure	**SSP**
Surface and Groundwater Impact Assessment	**SGIA**
Trip Blank	**TB**
Total Recoverable Hydrocarbons	**TRH**
Trip Spike	**TS**
United States Environmental Protection Agency	**USEPA**
Volatile Organic Compounds	**VOC**
Work Health and Safety	**WHS**

Units

Litres	**L**
Metres BGL	**mBGL**
Metres	**m**
Micrograms per litre	**µg/L**
Australian Drinking Water Guidelines	**ADWG**
Area of Environmental Concern	**AEC**
Australian Height Datum	**AHD**

1 CLIENT SUPPLIED INTRODUCTION

This Supplementary Surface and Groundwater Impact Assessment (SGIA) has been prepared to support a Review of Environmental Factors (REF) for the rebuild of Richmond River High Campus (the activity) (RRHC). The REF has been prepared to support an approval for the RRHC development under Section 68 of the NSW Reconstruction Authority Act 2022 (RA Act).

The purpose of this report is to make an assessment of the surface and groundwater impacts likely to be disturbed during development.

1.1 Client Provided Site Description

The site is located at Dunoon Road, North Lismore, also known as 163 and 170 Alexandra Parade, North Lismore. The site comprises of three separate lots, located to the north of Alexandra Parade, with Dunoon Road running parallel to the eastern boundary of the site.

The site is legally described as:

- Lot 1 DP 539012;
- Lot 2 DP 539012; and
- Lot 1 DP 376007.

The site area is approximately 33.53 hectares. The proposed activity will be undertaken mainly within the south-eastern portion of the site. The site is outlined in Figure 1 below.

Figure 1 Aerial image of site (Source: Nearmap)

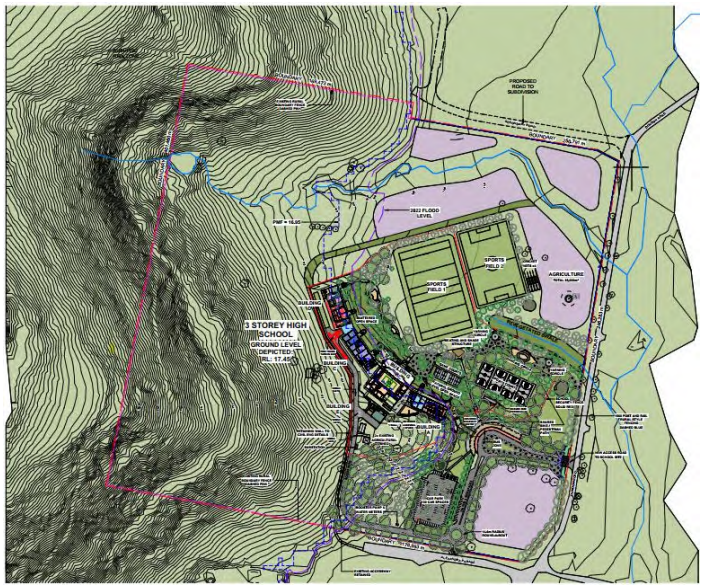
1.2 Proposed Activity Description

The proposed activity comprises the relocation and rebuild of the Richmond River High Campus from its existing temporary location alongside The Rivers Secondary College Lismore High Campus at East Lismore to the site at 163 and 170 Alexandra Parade, North Lismore.

The school will be delivered in one stage. A detailed description of the proposal is as follows:

1. Demolition of existing features including existing buildings, cattle drinking well, cattle sheds, and wire fencing, and removal of trees to accommodate school development.
2. Construction of new 3 storey buildings on the southeastern portion of the site for the proposed public secondary school including:
    a. General and Specialist Learning Spaces, and Workshops.
    b. Administration, and Staff facilities.
    c. Library, Hall, and Movement Studio.
    d. Construction, Hospitality, and Agricultural Learning Facilities.
    e. Amenity, Plant, Circulation, and Storage areas.
    f. Outdoor Learning Spaces and play spaces.
3. Landscaping including tree planting.
4. Public domain works comprising:
    - Access road off Dunoon Road, comprising a separate shared bicycle/pedestrian pathway, and internal access roundabout.
    - Kiss and ride drop-off and pick up zones.
    - Bus transport arrangements with a separate bus zone.
5. Outdoor spaces including assembly zones, agricultural spaces, sports fields, games courts, dancing circles, yarning and dancing circles, seating and shade structures.
6. On-site carparking, including accessible spaces and provision for EV charging spaces.

Figures 2 below shows the scope of works.



2 REPORT INTRODUCTION

Department of Education ('the client') commissioned JK Environments (JKE) to undertake a Supplementary SGIA for the Northern Rivers Flood Recovery – Richmond River High Campus Redevelopment, at 163-170 Alexandra Parade, North Lismore, NSW ('the site'). The site location is shown on Figure 1 and the assessment was confined to the nominated site boundaries as shown on Figure 2 attached in the appendices.

A Supplementary Contamination Investigation was undertaken concurrently by JKE[1], and we have also previously undertaken a Preliminary (Desktop) Site Investigation (PSI) and Detailed Site Investigation (DSI) of a section of the north of the site and the wider property. A summary of relevant information from these investigations is provided in Section 3.9. JKE were also commissioned to prepare a Supplementary Salinity and Acid Sulfate Soils (ASS) Assessment and Salinity Management Plan[2] for the activity. This report should be read in conjunction with the JKE reports. This Supplementary SGIA is required to address data gaps as a result of the proposed site location being relocated within the wider property.

A geotechnical investigation was undertaken in conjunction with this Supplementary SGIA by JK Geotechnics (JKG). The results of the geotechnical investigation are presented in a separate report (Project ref: 36314UOR). This report should be read in conjunction with the JKG report.

2.1 Scope of Work

The assessment was undertaken generally in accordance with the Scope of Services (SI-07798-25) as provided by the client in an email of 2 May 2025, and the agreement dated 15 May 2025. The scope of work included the following:

- Review of current and previous investigation reports prepared for the activity by JKG and JKE;
- Review of groundwater conditions including: hydrology; hydro-geology; receiving water bodies; occurrence of groundwater; groundwater quality; groundwater dependent ecosystems (GDE); inflow dependent ecosystems (IDE);
- Review of surface water bodies, drainage lines, downstream groundwater users and watercourses in the immediate vicinity of the site;
- Review of surface and groundwater conditions at the site including: groundwater flow; groundwater permeability; surface and groundwater quality; groundwater contamination conditions; and other parameters; and
- Preparation of this report identifying the surface and groundwater conditions at the site and potential impacts associated with the activity.

The report has been prepared with reference to the following guidelines:

- NSW Department of Planning and Environment Guidelines for Groundwater Documentation for SSD/SSI Projects – Technical guideline (2022);

[1] JKE, (2025). *Report to Department of Education, on Supplementary Investigation for Richmond River High Campus – Flood Recovery at 163-170 Alexandra Parade, North Lismore, NSW*. (Report ref: E36314PT3rpt2-SI DRAFT, dated 26 June 2025) (referred to as Supplementary Investigation)

[2] JKE, (2024b). *Report to School Infrastructure New South Wales, on Salinity and Acid Sulfate Soil Assessment and Salinity Management Plan for Richmond River High Campus – Flood Recovery at 163-170 Alexandra Parade, North Lismore, NSW*. (Report ref: E36314PTrpt4-SAL DRAFT, dated 20 November 2024) (referred to as SAL)

- Water Management Act 2000;
- NSW Aquifer Interference Policy (NSW Office of Water, 2012);
- NSW DPIE Minimum requirements for building site groundwater investigations and reporting (2022)[3];
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018)[4];
- Australian Drinking Water Guidelines 2011 (updated 2021)[5]; and
- Other guidelines outline in this report.

[3] NSW DPIE, (2022). *Minimum requirements for building site groundwater investigations and reporting.* (Referred to as DPIE 2022).

[4] Australian and New Zealand Governments (ANZG), (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia (referred to as ANZG 2018)

[5] National Health and Medical Research Council (NHMRC), (2021). *National Water Quality Management Strategy, Australian Drinking Water Guidelines 2011* (referred to as ADWG 2011)

3 SITE INFORMATION

3.1 Site Identification and Description

Table 3-1: Site Identification

Site Address:	163-170 Alexandra Parade, North Lismore, NSW
Lot & Deposited Plan:	Part of Lots 1 & 2 in DP539012
Current Land Use:	Rural residential and agricultural (grazing)
Local Government Area:	Lismore City Council
Site Area (m^2) (approx.):	87,200
Geographical Location (decimal degrees) (approx.):	Latitude: -28.7950695 Longitude: 153.2664283
Site Plans:	Appendix A

3.2 Site Location, Topography and Regional Setting

The site is located in a mixed use (rural residential/recreational/commercial) area of North Lismore and the wider property is bound by Dunoon Road to the east and Alexandra Parade to the south. The site is located approximately 830m to the north-west of Wilsons River at its closest point.

The site is located at a transition between undulating topography with rolling hills generally sloping down at approximately 5° to 15°, associated with the North Lismore Plateau, and the relatively level floodplain around Wilsons River and Leycester Creek.

3.3 Site Inspection

A walkover inspection of the site was undertaken by JKE on 29 May 2025. The inspection was limited to accessible areas of the site. Key observations are noted below:

- The main residence and associated outbuildings of the southern property (No.163 Alexandra Parade) was located in the central west of the site. The buildings were generally constructed on grade with timber and/or metal walls, metal rooves, and on concrete slab. The buildings were of an age indicative of housing hazardous building materials. JKE understand that GHD were engaged to undertake hazardous building materials survey of the buildings/structures at the site and wider property;
- A second residence (No. 170 Alexandra Parade) was located to the immediate west of the site boundary and comprised a main residence and several smaller sheds and outbuildings. Both properties within the site and wider property were accessed via an unpaved driveway off Alexandra Parade to the south;
- The site predominantly comprised grassed paddocks with sparse tree cover in the eastern portion;

- The revegetated swale in the north-east corner of the site was dry at the time of the site inspection, however to the north of the site on the wider property two dams were visible along a creek which extended in an east-west direction to the north of the site; and
- All vegetation inspected appeared to be in good condition with no obvious evidence of phyto-toxic stress or die back.

3.4 Surrounding Land Use

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

- North – rural residential and agricultural properties;
- South – Alexandra Parade with residential, agricultural (including cattle/sheep loading areas/yards) and commercial (Boral Concrete and a landscape supplies store) properties beyond;
- East – Dunoon Road with Lismore Showground and kart racing track/club beyond; and
- West – undeveloped scrubland and/or agricultural land.

3.5 Regional Geology and Soil Landscape

Regional geological information previously reviewed indicated that the western section of the site is underlain by Lismore Basalt which typically consists of predominantly tholeiitic with occasional alkaline types of formations. The eastern section of the site is underlain by Quaternary aged alluvial floodplain deposits, which typically consists of silt, very fine- to medium grained lithic to quartz-rich sand, and clay. A sliver through the central section of the site is underlain by Quaternary aged alluvial fan deposits, which typically consists of fluvially-deposited quartz-lithic sand, silt, gravel, and clay.

Soil Landscapes of Central and Eastern NSW information previously reviewed indicated that the site is located within the Coolamon, Disputed Plain and Leycester soil landscapes. Coolamon soils are generally characterised by moderate erodibility, and high to very high shrink-swell capacity. Disputed Plains soils are generally characterised by high erodibility. Leycester soils are generally characterised by moderate erodibility with some higher local occurrences, and high dispersivity.

3.6 Dryland Salinity Potential – National Assessment

There was no dryland salinity national assessment data for the site. Reference should be made to the JKE Salinity assessment report for more information.

3.7 Acid Sulfate Soil (ASS) Risk and Planning

ASS related information previously reviewed indicated that the site is not located in an ASS risk area.

A review of the Lismore Local Environmental Plan (LEP) 2012 indicates that the site is not mapped as being within an ASS risk area. Reference should be made to the JKE ASS assessment report for more information.

3.8 Summary of Site History

A time line summary of the historical land uses and activities is presented in the table below. The information presented in the table is based on a weight of evidence assessment of the site history documentation and observations made by JKE during the previous investigation.

Table 3-2: Summary of Historical Land Uses / Activities

Year(s)	Potential Land Use / Activities
1918 to present	*On-site* • Agricultural (grazing and farming), and rural residential; • Construction/demolition of structures; • Localised filling/earthworks for levelling purposes and installation of services in general areas of buildings/structures. Although there was no obvious evidence of this in the aerial photographs, localised waste burial may have occurred as this is relatively common on large rural properties in our experience; • Use of pesticides around site and beneath building/s; and • Use and impacts from hazardous building materials in former/existing structures. *Off-site* • Agricultural (grazing and farming), and rural residential, commercial (cattle yards and concrete works), and recreational (showground and cattle dips).

3.9 Summary of JKE Investigation - Soil Contamination

The JKE Supplementary Contamination Investigation was completed in May 2025. Elevated concentrations of the contaminants of potential concern were not encountered above the adopted SAC in fill/soil or surface and groundwater. One surficial fragment of asbestos containing material (ACM) was identified in the vicinity of the existing northern residence on the wider property. This ACM was identified in the Hazardous Building Materials Assessment for the wider property and was to be removed and managed under the purview of the Hazardous Building Materials Assessment. The report concluded that potential site contamination risks associated with the contaminants of concern at the site are low and the data collected during the investigation suggested that significant and widespread contamination issues are unlikely to be encountered. We note that Figure 2 and 3 shows all locations drilled for the geotechnical investigation and the Supplementary Contamination Investigation.

Further investigation and/or remediation was not considered necessary and the site was considered to be suitable for the activity outlined in the report, from a contamination viewpoint. Due to archaeological constraints which prevented sampling in some areas, a robust unexpected finds protocol was recommended to be prepared by a suitably qualified environmental consultant, and the protocol implemented during the development/construction phase of the project.

3.10 Summary of JKE Investigation – Salinity and ASS Conditions

A review of the salinity and ASS conditions encountered at the site indicates the following:

- There is a relatively low potential for ASS materials to be disturbed during the activity. An ASS management plan (ASSMP) is not considered necessary for the activity;

- The groundwater ranges between non-saline and saline, with MW206 within the ‘freshwater rivers’ water type, MW62 and MW212 within the ‘marginal river waters’ water type and MW214 within the ‘brackish water’ water type;
- The surface water in the creek is not saline and within the ‘freshwater rivers’ water type;
- The groundwater is non-aggressive towards buried concrete and buried steel; and
- The surface water is non-aggressive towards buried concrete and buried steel.

4 CONCEPTUAL SITE MODEL – HYDROLOGICAL CONDITIONS

4.1 Surface Water Conditions

An unnamed tributary of Leycester Creek usually flows through the north-east corner of the site in an east-west orientation, commencing onsite. This on-site water body was dry at the time of the fieldwork, however would be considered to be a potential receptor when flowing.

Surface water drainage across the site is expected to flow in sympathy with the overall topography of the site to the east. The surface water flows would occur along the creek line extending through the north-east corner of the site. The on-site creek was dry at the time of the fieldwork for the SGIA.

JKE understand that the site is subject to flooding and flood related controls. The activity should be designed to adopt best practice flood mitigation measures outlined in the TTW Flood Impact and Risk Assessment report and the Flood Emergency Response Plan.

4.2 Hydrogeology

Information reviewed for the previous investigations indicated that the regional aquifer on-site and in the areas immediately surrounding the site includes porous, extensive highly productive aquifers.

Subsurface conditions at the site are expected to consist of variable soils, including alluvial soils. Abstraction and use of groundwater at the site or in the immediate surrounds may be viable under these conditions. However, the use of groundwater is not proposed as part of the development and there were no registered groundwater bores in close proximity. We assume there is a reticulated water supply in the area and consumption of groundwater is not expected to occur, although it cannot be ruled out given that some registered groundwater bores in the region are listed as water supply bores.

Considering the local topography and surrounding land features, JKE anticipate groundwater to generally flow towards the south-east overall. However, groundwater flows locally in the vicinity of the hillside (western part of the site) are expected to be in sympathy with the topography.

4.3 Registered Groundwater Bores

A review of the registered groundwater bores records presented in the Lotsearch report was undertaken. A copy of the report is attached in the appendices. There was a total of 38 registered bores within the report buffer of 2,000m. In summary:

- The nearest registered bore was located approximately 630m to the south and down-gradient of the site and was registered for irrigation purposes;
- A number of the bores were registered for irrigation, water supply, and stock and domestic purposes; and
- The drillers log information from the closest registered bores typically identified fill and/or clay soil to depths of 1m-11.3m, underlain by basalt bedrock. Standing water level (SWL) in the bores ranged from approximately 0.6m below ground level (BGL) to 45mBGL.

The activity may include excavations which will require temporary construction phase dewatering. However, given the distance, this is considered unlikely to impact the bore located approximately 630m to the south of the site.

4.4 Other Groundwater Users

A review of information pertaining to other groundwater users presented in the Lotsearch report was undertaken. The review did not identify any tanks points or tank areas at the site or within the immediate vicinity of the site.

4.5 Groundwater Dependant Ecosystems (GDE)

The Baslatic plateau terminating southeast in dissected volcanic pile (Mount warning) was identified as a moderate to high potential Groundwater Dependant Ecosystems (GDE) at three locations within approximately 760m to 820m of the site. These GDE included rivers and wetlands.

GDE were not identified at the site or within approximately 500m radius of the site. The activity is not considered to have an impact on the off-site GDE.

4.6 Inflow Dependant Ecosystems (IDE)

The Baslatic plateau terminating southeast in dissected volcanic pile (Mount warning) was identified as an Inflow Dependant Ecosystems (IDE) at seven locations between approximately 760m and 820m of the site. These IDE included rivers and wetlands.

IDE were not identified at the site or within approximately 500m radius of the site. The activity is not considered to have an impact on the off-site IDE.

4.7 Ramsar Wetlands

The site and/or immediate surrounds are not listed under the Ramsar Wetlands register.

4.8 Ecological Sensitive Areas

A review of the ecological information included in the Lotsearch report indicates that the site may contain Far North Hoop Pine Dry Rainforests, Far North Hoop Gully Dry Rainforests, Far North Swamp Oak-Tuckeroo Swamp Fringe Forest, Northern Hinterland Grey Gum-Turpentine Mesic Forest, Northern Lowland Basalt Grassy Forest, and Norther Lowland Swamp Turpentine-Red Gum Forest. These vegetation formations are identified as threatened ecological communities under the NSW and Environment Protection and Biodiversity Conservation (EPBC) Act. JKE has been issued with a Biodiversity Assessment Report prepared for the proposed development by GeoLink. The mitigation measures outlined in the report should be implemented.

4.9 Groundwater Occurrence

As part of the assessment, a total of one existing and three new groundwater monitoring standpipe piezometers were installed in boreholes BH62 (existing) and BH206, BH212, and BH214 (new) for the purpose of monitoring groundwater levels and for sampling groundwater. The monitoring well (MW) locations are shown on Figure 2.

Typically, the standpipe piezometers were installed as per the following methodology:

- 50mm diameter Class 18 PVC (machine slotted screen) was installed in the lower section of the well to intersect groundwater;
- 50mm diameter Class 18 PVC casing was installed in the upper section of the well (screw fixed);
- A 2mm sand filter pack was used around the screen section for groundwater infiltration;
- A hydrated bentonite seal/plug was used on top of the sand pack to seal the well;
- The void around the casing was backfilled with spoil as required; and
- The wells were finished with a 1m stick up, with metal monument surrounds and concrete plug at surface level to limit the inflow of surface water, and the wells were sealed with an envirocap.

The MW installation details are summarised in the table below. The installation details are also presented on the borehole logs attached in the appendices. The monitoring well heads were surveyed by JKE on 28 May 2025 using a hand-held differential GPS unit (with an accuracy of ±0.01m). The RLs in AHD are provided in the table below.

Table 4-1: Standpipe Installation Details

Borehole / Well Number	Reduced Level (mAHD)[1]	Installation Depth (mBGL)[2]	Slotted Screen Interval (mBGL)	Material in screened section (refer to logs for detailed description)	Sample collected for Testing
BH62/MW62	18.61	11.29	7.0-11.29	Refer to the borehole logs for details.	Yes
BH206/MW206	17.80	5.7	1.5-5.7		Yes
BH212/MW212	22.22	6.0	1.0-6.0		Yes
BH214/MW214	14.58	6.3	1.3-6.3		Yes

Notes:

1 – mAHD obtained from client provided survey plan

2 – mBGL: meter below ground level

4.10 Groundwater Permeability

Permeability testing was outside the scope of the SGIA. JKE note that the activity may include excavations that may intercept the groundwater table.

5 SURFACE AND GROUNDWATER QUALITY

An assessment of surface and groundwater quality has been undertaken by JKE for the purpose of the SGIA. Only one round of sampling and analysis has been completed to establish baseline conditions at the site.

5.1 Screening Criteria

For the purpose of the assessment, the surface and groundwater samples were screened against the following criteria:

- Groundwater Investigation Levels for 95% protection of freshwater species were adopted based on the Default Guideline Values in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2018)[6]. The 99% trigger values were adopted where required to account for bioaccumulation. Low and moderate reliability trigger values were also adopted for some contaminants where high-reliability trigger values don't exist;
- The Australian Drinking Water Guidelines 2011 (updated 2021)[7] were used to assess potential risks associated with consumption of groundwater; and
- The ADWG 2011 were multiplied by a factor of 10 to assess potential risks associated with incidental/recreational-type exposure to groundwater and surface water (e.g. within down-gradient water bodies, or with bore water used for irrigation, water supply and/or stock and domestic purposes). These have been deemed as 'recreational' SAC.

The screening criteria are referred to as Site Assessment Criteria (SAC). Reference should be made to the results summary tables Table G1 attached in the appendices for the specific criteria.

5.2 Groundwater and Surface Water Sampling

5.2.1 Groundwater Monitoring Well Development, Surface Water and Groundwater Sampling

Groundwater monitoring wells MW62, MW206, MW212 and MW214 were developed between 28 and 30 May 2025. All wells were developed (i.e. water was pumped out) until they were effectively dry using a submersible electrical pump.

The monitoring wells were allowed to recharge for between 24 and 72 hours after development. Groundwater samples for the assessment were obtained on 30 to 31 May 2025 from all monitoring wells. A surface water grab sample was obtained from the creek to the north of the site on the wider property using a single use polythene bailer on 29 May 2025.

The pH, temperature, electrical conductivity (EC), dissolved oxygen (DO) and redox potential (Eh) were monitored during sampling of the wells using calibrated field instruments.

[6] Australian and New Zealand Governments (ANZG), (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia (referred to as ANZG 2018)

[7] National Health and Medical Research Council (NHMRC), (2021). *National Water Quality Management Strategy, Australian Drinking Water Guidelines 2011* (referred to as ADWG 2011)

The sampling data sheets and field calibration information are attached in the appendices. The samples were preserved in accordance with the requirements detailed in AS/NZS 5667.1-1998[8] and placed in an insulated container with ice.

On completion of the fieldwork, the samples were delivered in an insulated sample container to a NATA registered laboratory for analysis under standard chain of custody procedures.

5.2.2 Analysis of Groundwater and Surface Water Samples

Groundwater and surface water samples were analysed for the following:

- Alkalinity (bicarbonate, carbonate, hydroxide and total), acidity, electrical conductivity (EC), pH, redox potential (Eh) and dissolved oxygen (DO);
- Turbidity, total dissolved solids (TDS), total suspended solids (TSS), total organic carbon (TOC) and sodium absorption ratio (SAR);
- Ionic balance, which includes major anions and the cation suite (including hardness);
- Metals including Aluminium (Al), antimony (Sb), arsenic (As), barium (Ba), beryllium (Be), boron (B), cadmium (Cd), chromium (Cr), cobalt (Co), copper (Cu), iron (Fe), lead (Pb), lithium (Li), manganese (Mn), mercury (Hg), molybdenum (Mo), nickel (Ni), selenium (Se), silica (dissolved SiO2), silver (Ag), strontium (Sr), uranium (U), vanadium (V), zinc (Zn);
- Nutrient suite, including Ammonia (NH3), nitrate (NO3), total nitrogen (N), oxidised nitrogen (N), total phosphorus (P) and reactive phosphorus (P);
- Faecal coliforms and Escherichia (E) coli; and
- Polycyclic aromatic hydrocarbons (PAHs); total recoverable hydrocarbons (TRH); and monocyclic aromatic hydrocarbons (BTEX).

Quality analysis/quality control (QA/QC) samples (including an intra-laboratory duplicate, trip spike, trip blank and field rinsate samples) were also obtained.

Samples were analysed by Envirolab Services (NATA Accreditation Number – 2901. Reference should be made to the laboratory report (Ref: 382346 and 382346-A) attached in the appendices for further information regarding the laboratory methods and practical quantitation limits (PQLs) for each analyte.

5.3 Summary of Field Results

The relative heights for all monitoring wells were surveyed using a differential GPS unit on 28 May 2025. Standing water level (SWL) measured in the monitoring wells between 30 and 31 May 2025 and ranged from approximately 2.37mBGL to 6.78mBGL. Groundwater RLs calculated on these measurements ranged from approximately 11.29mAHD to 17.29mAHD as summarised below.

[8] Standards Australia, (1998). *Water Quality – Part 1: Sampling, Guidance on the Design of Sampling Programs, Sampling Techniques and the Preservation and Handling of Samples,* (AS/NZS 5667.1:1998)

Table 5-1: Summary of Groundwater RLs

MW reference	Reduced Level (mAHD)	SWLs (mBGL) (recorded 30-31 May 2025)	GW RL (mAHD)
MW62	18.61	6.78	11.83
MW206	17.80	2.37	15.43
MW212	22.22	4.93	17.29
MW214	14.58	3.29	11.29

The groundwater RLs are considered to be indicative only as long-term monitoring of levels for a minimum of 3 months has not been undertaken. Based on the groundwater RLs, however given the depth of groundwater was measured between approximately 2.37mBGL to 6.78mBGL, excavation for the activity is likely to intercept groundwater in some areas of the site. However, this should be reviewed during detailed design stage of the project.

A contour plot was prepared for the groundwater levels as shown on Figure 3 in Appendix A. Groundwater flow generally occurs in a down gradient direction perpendicular to the groundwater elevation contours. The contour plot indicates that groundwater generally flows towards the north-east which is generally in sympathy with the topography (in the vicinity of the monitoring wells) and expectations.

Field measurements recorded during sampling were as follows:

- pH ranged from 7.0 to 7.67;
- EC ranged from 321.7µS/cm to 3,661µS/cm;
- Eh ranged from -98.9mV to 107.1mV;
- DO ranged from 1.23mg/L to 5.28mg/L; and
- Phase separated product (i.e. LNAPL) were not detected using the interphase probe during groundwater sampling.

5.4 Summary of Analytical Results

5.4.1 Laboratory Results

Reference should be made to the attached Table G1 for a summary of the laboratory results compared to the screening criteria presented in Section 5.1. The following results were above the SAC:

- The manganese concentration reported in the sample from the creek of 840µg/L, exceeded the drinking water SAC of 500µg/L;
- The selenium concentration reported in MW212, of 11µg/L, exceeded the freshwater ecological SAC of 5µg/L and the drinking water SAC of 10µg/L;
- The reported turbidity concentrations in MW206, MW212, and the creek samples, exceeded the drinking water SAC of 5NTU; and
- Detectable concentrations of faecal coliforms and E Coli were encountered in MW206, MW214 and the creek samples.

5.4.2 Assessment of Data Quality

JKE have undertaken a preliminary assessment of the data quality against the following Data Quality Indicators (DQIs): precision, accuracy, representativeness, completeness and comparability. In this regard, we are of the opinion that the data quality is suitable for the purpose of the screening based on the following:

- Standard sampling procedures (SSP) were complied with. The SSP is attached in the appendices;
- Representative groundwater samples were analysed for a broad range of potential contaminants;
- Field indicators were used as a screening tool;
- Samples were analysed by a NATA registered laboratory. Laboratory quality control/quality assurance (QA/QC) samples were analysed and were generally within the acceptance criteria adopted by the laboratory;
- During the investigation, one field blank TB was placed in the esky during sampling and transported back to the laboratory. The results were all less than the PQLs, therefore cross contamination between samples that may have significance for data validity did not occur;
- The results for the trip spike TS sample ranged from 102% to 110% and indicated that field preservation methods were appropriate;
- With the exception of light fraction TRH (TRH F1), copper, nickel and zinc in the rinsate sample, all results were below the PQL. As noted in the comments section of Envirolab report 382346, the detectable concentration of light fraction TRH is attributed to trihalomethanes. These compounds are breakdown products from the chlorination process and are common in potable water at the concentration reported (the Australian drinking water guideline for total trihalomethanes is 250µg/L). Similarly, the low-level metals concentrations (i.e. nickel and zinc) are typical in potable water which is utilised as blank material. In JKE's experience, the concentrations reported were consistent with background concentrations in potable water and were not indicative of cross-contamination. The copper concentration of 310µg/L was considered to be anomalous, and does not affect the quality of the dataset, noting copper is also common in potable water; and
- One intra- (GWDUP301) and one inter-laboratory (GWDUP302) duplicate sample were analysed. An elevated relative percentage difference (RPD) was reported for nickel in GWDUP1/MW60. All calculated RPD were within the accepted range.

6 DISCUSSION AND RECOMMENDATIONS

6.1 Review of Surface Water Conditions

The SGIA included a review of the surface water conditions for the REF. An unnamed tributary of Leycester Creek usually flows through the north-east corner of the site in an east-west orientation, commencing onsite, however this on-site water body was dry at the time of the fieldwork. A creek sample was obtained from the creek on the wider property (off-site) to the north of the site. A review of the site and regional topography indicates that the site is located at a transition between undulating topography with rolling hills generally sloping down at approximately 5° to 15°, associated with the North Lismore Plateau, and the relatively level floodplain around Wilsons River and Leycester Creek. The site is located approximately 830m to the north-west of Wilsons River at its closest point.

A creek sample analysed for the SGIA indicated elevations of manganese above the SAC. The sample also contained high turbidity and microorganisms. The source of manganese could be from agricultural run-off. Rural properties often use manganese containing fungicides and/or fertilizers which can runoff into surface water bodies. High turbidity is relatively common in surface water bodies associated with high silt load. The presence of microorganisms could be due to the former cattle located on the rural property. These elevations are not considered to pose a major impact on the future development of the site.

Considering the majority of the site is unpaved, there is potential for surface water infiltration to occur at the site which may impact on the groundwater levels. Also considering the site topography, and previous observations/flooding, the conditions indicate that surface water drainage at the site is relatively poor and care should be taken during the development to ensure adequate drainage is provided and to retain the existing surface water features.

JKE understand that the site is subject to flooding and flood related controls. The activity should be designed to adopt best practice flood mitigation measures. JKE assumes that a detailed assessment of flooding and surface water conditions/hydraulics will be addressed by the civil and hydraulics consultants in a separate report as part of the detailed design. JKE should be issued a copy of the report and the recommendations outlined in this report should be reviewed when additional information becomes available.

A Construction and Environmental Management Plan (CEMP) should be prepared for the proposed development with details of stormwater control and discharge, erosion and sediment controls to be implemented during development works.

6.2 Review of Groundwater Conditions

The assessment has identified the following conditions which require addressing during the activity:

- The activity is likely to include deeper excavations in the southern, western and northern areas of the site for construction of the road and the new school buildings. The groundwater RLs recorded during the fieldwork indicate that excavations may intercept groundwater. This should be reviewed during detailed design stage of the project;

- The groundwater at the site are generally non-aggressive towards buried concrete and buried steel. However, management measures outlined in the JKE Salinity Management Plan (SMP) should be implemented including design of the earthworks to minimise disturbance to the existing drainage patterns, installation of subsoil drains in areas where seepage discharge from the underlying natural soils may occur, appropriate management of stormwater in order to reduce infiltration, and direction of surface water around stockpiles and work areas during construction;
- The assessment identified GDE and IDE located approximately 765m to the south and south-east of the site. No GDE or IDE were identified within 500m of the site. The activity is not likely to have an impact on the GDE and/or IDE identified beyond 500m from the site;
- A review of the ecological information indicated that the site contains Far North Hoop Pine Dry Rainforests, Far North Hoop Gully Dry Rainforests, Far North Swamp Oak-Tuckeroo Swamp Fringe Forest, Northern Hinterland Grey Gum-Turpentine Mesic Forest, Northern Lowland Basalt Grassy Forest, and Norther Lowland Swamp Turpentine-Red Gum Forest identified as threatened ecological community under the NSW and EPBC Act. JKE recommend engaging an ecologist to assess the impacts of the activity on these communities;
- Review of the groundwater levels recorded generally appear to grade down towards the east which is anticipated based on the location of the site and the overall site topography;
- The assessment indicated that groundwater was impacted by the following:
    - Selenium was detected in groundwater sample MW212. A likely source for this metal could be associated with agricultural runoff and/or irrigation drainage. Some agricultural fertilizers and pesticides can contain traces of selenium. Changes in the natural occurrence of the heavy metals in the bedrock may also be influencing the results. It is also possible that the heavy metal concentration may reduce further over time as the groundwater in the wells stabilises. In our opinion, the elevated heavy metal does not pose an unacceptable risk to on-site receptors in the context of the activity, and we are of the opinion that the risk posed to off-site receptors are low considering the proximity of the nearest receiving water body and downgradient bore. However, treatment of the groundwater will be required prior to discharge to stormwater during the construction phase. Council approval must be obtained prior to stormwater discharge;
    - The detections of Faecal Coliforms and E. Coli in the samples are likely associate with the former cattle onsite (removed from site in 2024), noting the higher results were reported in the creek sample;
    - The turbidity of MW206, MW212, and the creek samples were also outside the acceptable range for freshwater ecosystems. These results are considered likely to be associated with sediment load in the samples; and
- Once the detailed design is confirmed, an additional assessment and analysis of likely groundwater inflows into excavations will need to be undertaken prior to and during construction works as excavations are likely to intersect the groundwater table.

6.3 Groundwater Seepage and Dewatering During Construction

Based on the excavation requirements for the activity, JKE understand that dewatering during construction will be required.

The requirements outlined in the DPE's document, "*Minimum Requirements for Building Site Groundwater Investigations and Reporting*", dated January 2021 must be implemented and appropriate licences obtained from WaterNSW or NRAR.

6.4 Groundwater Quality and Treatment

The SGIA has identified that the groundwater at the site is impacted by heavy metals, turbidity and microbial organisms. Given the activity includes excavation that is likely to intersect the groundwater table, additional testing of groundwater is recommended to assess the quality and provide recommendations for treatment of groundwater during construction works.

A specialist contractor must be contacted to design an appropriate water treatment system to facilitate the disposal of groundwater during temporary construction dewatering, should off-site disposal of groundwater to stormwater be required. Use of a 'WETSEP' system or equivalent to hold and treat water prior to discharge could be considered to achieve the water quality standards imposed by the authority (e.g. Council) permitting the discharge of groundwater. The 'WETSEP' system combines treatment processes including flocculation which may reduce concentrations of heavy metals which are likely to be at least partly associated with sediment particles in the groundwater. The client will need to consider this site-specific factor, in addition to the potential volume of water being extracted, in consultation with the dewatering contractor and the manufacturers of any treatment system to be utilised for the project.

Turbidity and pH are parameters that can fluctuate depending on site conditions and activities such as excavation during construction/enabling works. JKE recommend that the extracted groundwater be held in a settlement tank or lined sump pit so that the turbidity and pH can be measured. If required (i.e. if the turbidity is greater than 50NTU or the pH is outside the range of 6.5 and 8.5) the pH can be adjusted by passing through a dosing unit and the turbidity can be adjusted by use of a flocculent.

The relevant consent authorities should be contacted to clarify the requirements to obtain disposal approval to stormwater. In addition, a license from NSW Water may be required for temporary construction dewatering. The information required to support the license application can be onerous and JKE recommend that the client contact NSW Water well before the start of construction in order to commence the application process.

In the event unexpected conditions are encountered during construction works that may pose a contamination risk, all works should stop and an environmental consultant should be engaged to inspect the site and address the issue.

6.5 Mitigation Measures – REF Requirement

JKE was requested by the client to include a table to support the surface and groundwater related risk mitigation measures to be included in the REF. Mitigation measures are outlined in the table below:

Table 6-1: Mitigation Measures Relating to SGIA Findings

Mitigation Number / Name	Aspect / Section	Mitigation Measure	Reason for Mitigation Measure
Construction and Environmental Management Plan (CEMP)	Pre-construction and during construction	Preparation and implementation of CEMP	Prior to the commencement of any construction work, a CEMP is to be prepared and must include: - Details of stormwater control and discharge; - Any other specific environmental construction; - Terms of Approval/mitigation measures detailed in the REF; - Technical document and management plans relevant to construction soil and water management; and - Erosion and Sediment Control Plan. The site and all construction works are to be managed and carried out in accordance with: the CEMP and all of its associated plans, protocols and procedures, which are required to the satisfaction of the terms of approval /mitigation measures and any other licences, permits, approvals and land owners consents as required under any other legislation.
Groundwater Treatment prior to off-site disposal	During construction	Design and implementation of a Treatment Plan	The SGIA has identified that the groundwater has been impacted by selected metals, turbidity and microorganisms. Treatment of groundwater is required prior to the off-site disposal into stormwater during the construction phase. Refer should be made to the WaterNSW approval requirements below. Council approval is required for disposal of treated groundwater into the stormwater system.
Water NSW permits	Pre-construction and during construction	DMP	A DMP is required to address Water NSW "*Minimum Requirements for Building Site Groundwater Investigations and Reporting*" and to assess if the development requires a Water Supply Works (WSW) and/or a Water Access Licence (WAL).

6.6 Evaluation of Environmental Impacts – REF Requirement

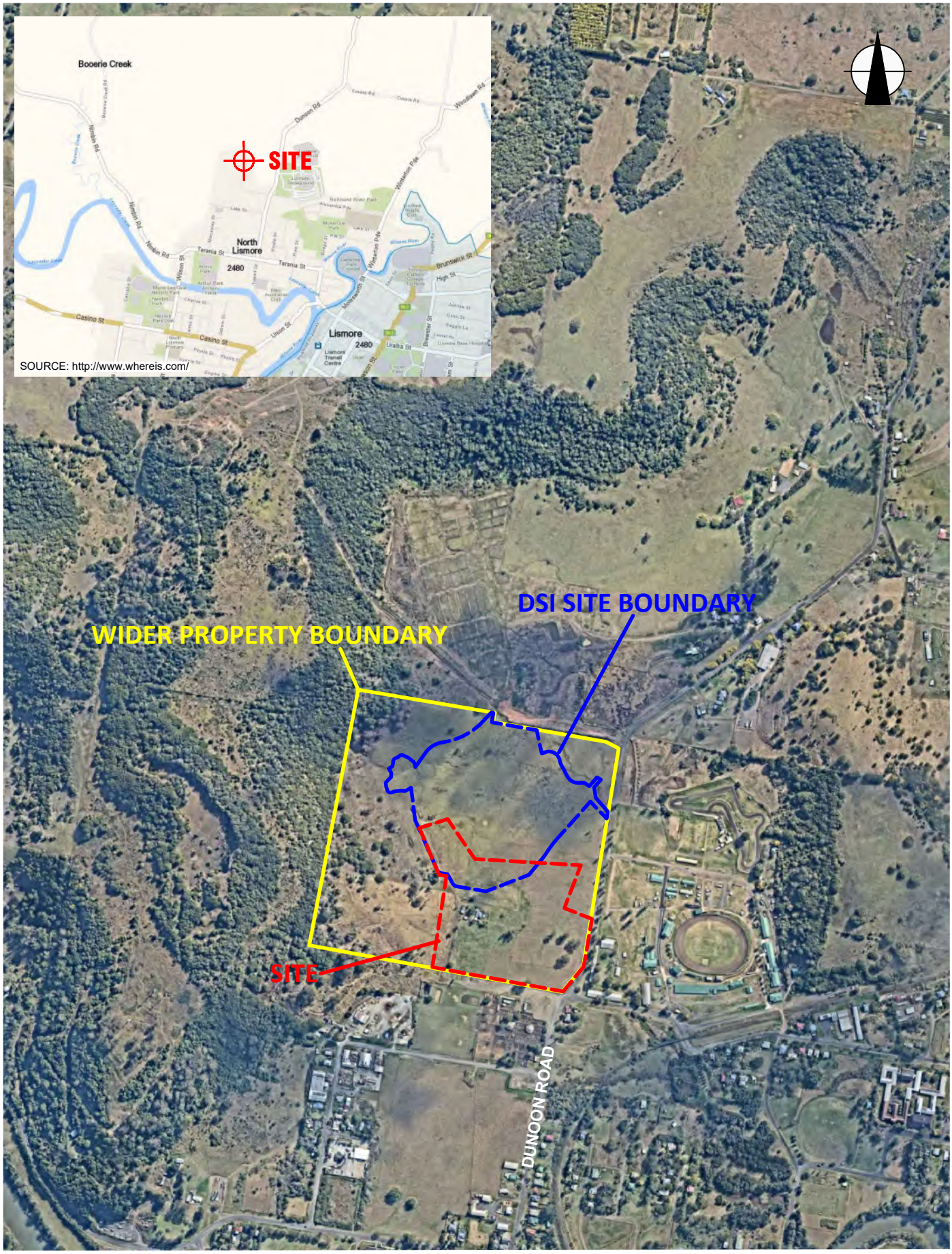
It is considered that potential risks associated with the surface and groundwater at the site can be adequately managed through the above recommend measures.

7 LIMITATIONS

The report limitations are outlined below:

- JKE accepts no responsibility for any unidentified contamination issues at the site. Any unexpected problems/subsurface features that may be encountered during development works should be inspected by an environmental consultant as soon as possible;
- This report has been prepared based on site conditions which existed at the time of the investigation; scope of work and limitation outlined in the JKE proposal; and terms of contract between JKE and the client (as applicable);
- The conclusions presented in this report are based on investigation of conditions at specific locations, chosen to be as representative as possible under the given circumstances, visual observations of the site and immediate surrounds and documents reviewed as described in the report;
- Groundwater conditions may vary, especially after climatic changes and wet/dry periods;
- The investigation and preparation of this report have been undertaken in accordance with accepted practice for environmental consultants, with reference to applicable environmental regulatory authority and industry standards, guidelines and the assessment criteria outlined in the report;
- Where information has been provided by third parties, JKE has not undertaken any verification process, except where specifically stated in the report;
- JKE has not undertaken any assessment of off-site areas that may be potential contamination sources or may have been impacted by site contamination, except where specifically stated in the report;
- JKE have not and will not make any determination regarding finances associated with the site;
- Additional investigation work may be required in the event of changes to the proposed development or landuse. JKE should be contacted immediately in such circumstances;
- This report has been prepared for the particular project described and no responsibility is accepted for the use of any part of this report in any other context or for any other purpose;
- Copyright in this report is the property of JKE. JKE has used a degree of care, skill and diligence normally exercised by consulting professionals in similar circumstances and locality. No other warranty expressed or implied is made or intended. Subject to payment of all fees due for the investigation, the client alone shall have a licence to use this report;
- If the client, or any person, provides a copy of this report to any third party, such third party must not rely on this report except with the express written consent of JKE; and
- Any third party who seeks to rely on this report without the express written consent of JKE does so entirely at their own risk and to the fullest extent permitted by law, JKE accepts no liability whatsoever, in respect of any loss or damage suffered by any such third party.

Appendix A: Report Figures



AERIAL IMAGE SOURCE: MAPS.AU.NEARMAP.COM

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

Title: **SITE LOCATION PLAN**

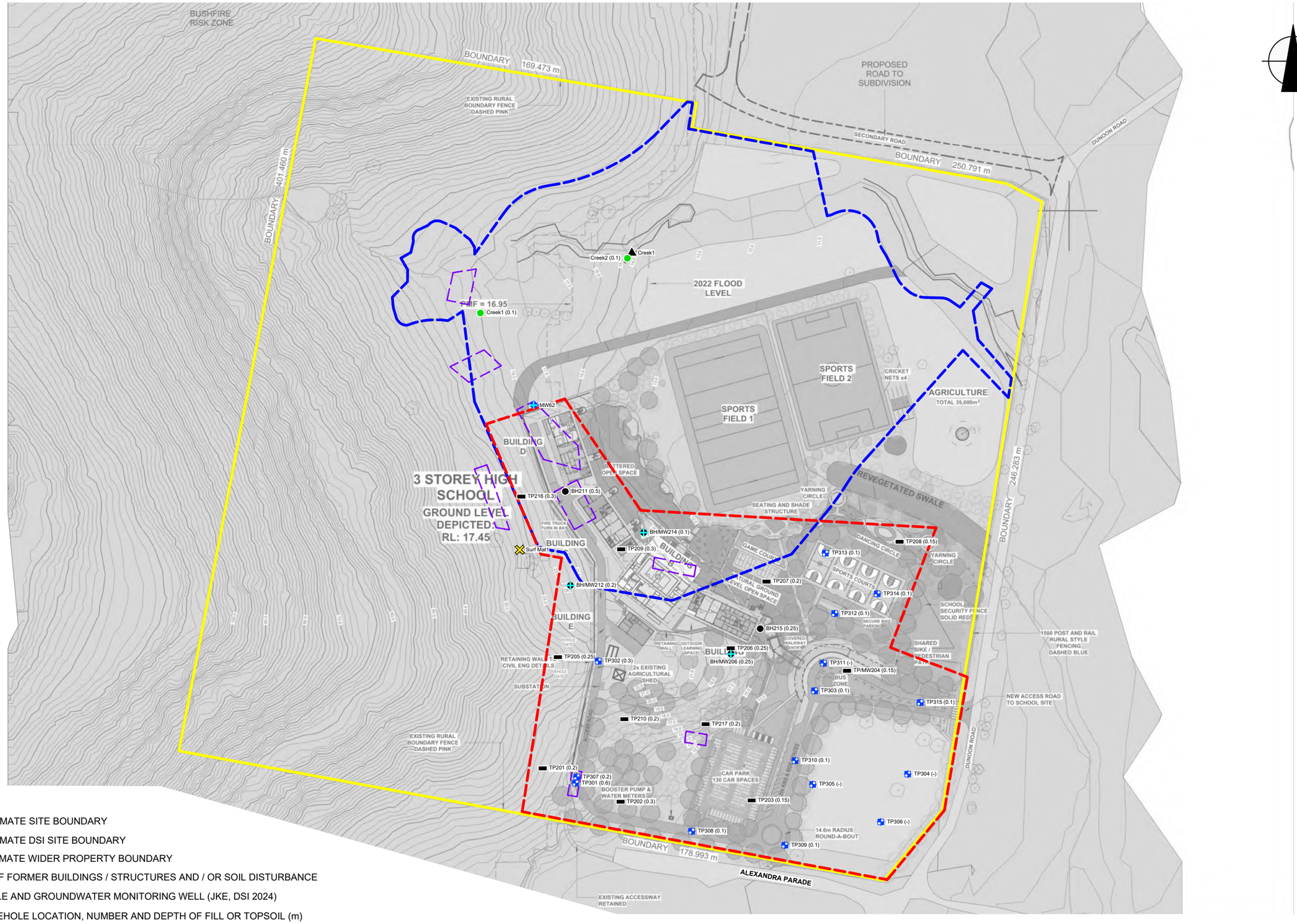
Location: 163 &170 ALEXANDRA PARADE, NORTH LISMORE, NSW

Report Ref: E36314PT3

Figure No: 1

JKEnvironments

PLOT DATE: 25/06/2025 10:59:35 AM DWG FILE: K:\SC EIS JOBS\36000'S\E36314PT LISMORE (SHOWGROUND)\CAD\E36314PT3.DWG



LEGEND

	APPROXIMATE SITE BOUNDARY
	APPROXIMATE DSI SITE BOUNDARY
	APPROXIMATE WIDER PROPERTY BOUNDARY
	AREAS OF FORMER BUILDINGS / STRUCTURES AND / OR SOIL DISTURBANCE
MW62	BOREHOLE AND GROUNDWATER MONITORING WELL (JKE, DSI 2024)
BH211	JKG BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL OR TOPSOIL (m)
BH/MW212	JKG BOREHOLE AND GROUNDWATER MONITORING WELL (m)
TP201	JKG TEST PIT LOCATION, NUMBER AND DEPTH OF FILL OR TOPSOIL (m)
TP301	JKE TEST PIT LOCATION, NUMBER AND DEPTH OF FILL OR TOPSOIL (m)
	SURFACE WATER SAMPLE LOCATION
Surf Mat1 (SURFACE)	FIBRE CEMENT SHEETING LOCATION, NUMBER AND DEPTH
Creek1	SEDIMENT SAMPLE LOCATION (m)

0 30 60 90 120 150

SCALE 1:3000 @A3 METRES

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

Title: **SAMPLE LOCATION PLAN**

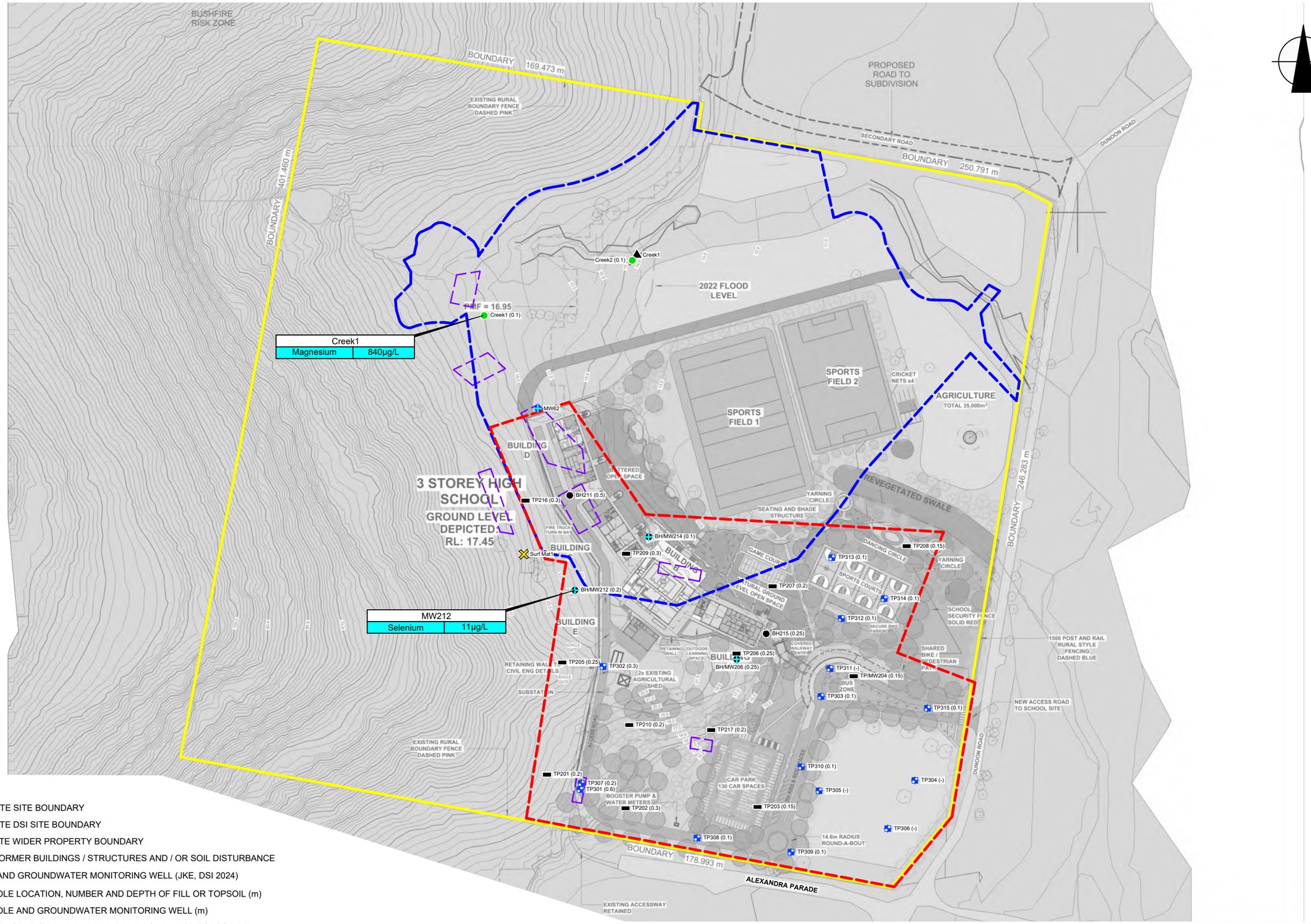
Location: 163 &170 ALEXANDRA PARADE, NORTH LISMORE, NSW

Report Ref: E36314PT3

Figure No: 2

JKEnvironments

PLOT DATE: 16/07/2025 9:04:49 AM DWG FILE: K:\5C EIS JOBS\36000\SIE36314PT LISMORE (SHOWGROUND)\CADIE36314PT3.DWG



LEGEND

	APPROXIMATE SITE BOUNDARY
	APPROXIMATE DSI SITE BOUNDARY
	APPROXIMATE WIDER PROPERTY BOUNDARY
	AREAS OF FORMER BUILDINGS / STRUCTURES AND / OR SOIL DISTURBANCE
MW62	BOREHOLE AND GROUNDWATER MONITORING WELL (JKE, DSI 2024)
BH211	JKG BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL OR TOPSOIL (m)
BH/MW212	JKG BOREHOLE AND GROUNDWATER MONITORING WELL (m)
TP201	JKG TEST PIT LOCATION, NUMBER AND DEPTH OF FILL OR TOPSOIL (m)
TP301	JKE TEST PIT LOCATION, NUMBER AND DEPTH OF FILL OR TOPSOIL (m)
	SURFACE WATER SAMPLE LOCATION
Surf Mat1 (SURFACE)	FIBRE CEMENT SHEETING LOCATION, NUMBER AND DEPTH
Creek1	SEDIMENT SAMPLE LOCATION (m)

SAMPLE ID	-
CHEMICAL	CONCENTRATION (µg/L)

GROUNDWATER SAMPLE EXCEEDANCE

GROUNDWATER CONTAMINATION ABOVE SAC

0 30 60 90 120 150

SCALE 1:3000 @A3 METRES

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

Title: **SAC EXCEEDANCE PLAN**

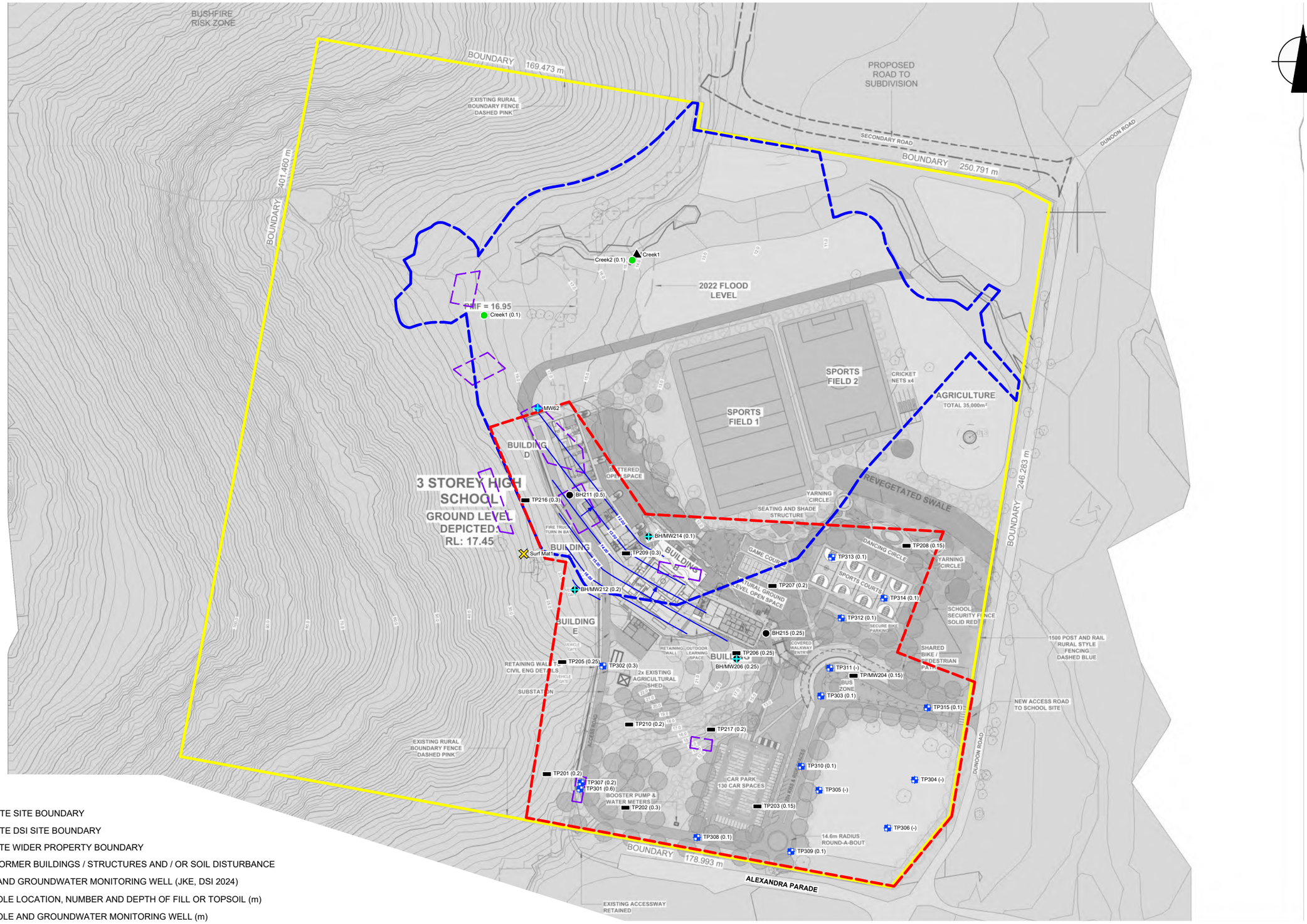
Location: 163 &170 ALEXANDRA PARADE, NORTH LISMORE, NSW

Report Ref: E36314PT3

Figure No: 3

JKEnvironments

PLOT DATE: 16/07/2025 9:04:08 AM DWG FILE: K:\5C EIS JOBS\36000\SIE36314PT LISMORE (SHOWGROUND)\CAD\E36314PT3.DWG



LEGEND

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE DSI SITE BOUNDARY
- APPROXIMATE WIDER PROPERTY BOUNDARY
- AREAS OF FORMER BUILDINGS / STRUCTURES AND / OR SOIL DISTURBANCE
- MW62 — BOREHOLE AND GROUNDWATER MONITORING WELL (JKE, DSI 2024)
- BH211 — JKG BOREHOLE LOCATION, NUMBER AND DEPTH OF FILL OR TOPSOIL (m)
- BH/MW212 — JKG BOREHOLE AND GROUNDWATER MONITORING WELL (m)
- TP201 — JKG TEST PIT LOCATION, NUMBER AND DEPTH OF FILL OR TOPSOIL (m)
- TP301 — JKE TEST PIT LOCATION, NUMBER AND DEPTH OF FILL OR TOPSOIL (m)
- SURFACE WATER SAMPLE LOCATION
- Surf Mat1 (SURFACE) — FIBRE CEMENT SHEETING LOCATION, NUMBER AND DEPTH
- Creek1 — SEDIMENT SAMPLE LOCATION (m)
- 14.00 — GROUNDWATER CONTOUR INTERVALS (m)
- INFERRED GROUNDWATER FLOW DIRECTION

0 30 60 90 120 150

SCALE 1:3000 @A3 METRES

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

Title: **GROUNDWATER CONTOUR PLOT**

Location: 163 &170 ALEXANDRA PARADE, NORTH LISMORE, NSW

Report Ref: E36314PT3

Figure No: 4

JKEnvironments

PLOT DATE: 16/07/2025 9:03:00 AM DWG FILE: K:\5C EIS JOBS\36000\SIE36314PT LISMORE (SHOWGROUND)\CADIE\36314PT3.DWG

Appendix B: Lotsearch Environmental Risk and Planning Report

LOTSEARCH

LOTSEARCH ENVIRO PROFESSIONAL

Date: 06 Oct 2023 17:18:39

Reference: LS048841 EP

Address: 163-170 Alexandra Parade, North Lismore, NSW 2480

Dataset Listing

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

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	Dataset Buffer (m)	No. Features On-site	No. Features within 100m	No. Features within Buffer
Cadastre Boundaries	NSW Department of Customer Service - Spatial Services	14/09/2023	14/09/2023	Quarterly	-	-	-	-
Topographic Data	NSW Department of Customer Service - Spatial Services	22/08/2022	22/08/2022	Annually	-	-	-	-
List of NSW contaminated sites notified to EPA	Environment Protection Authority	11/09/2023	08/09/2023	Monthly	1000m	0	0	0
Contaminated Land Records of Notice	Environment Protection Authority	06/10/2023	06/10/2023	Monthly	1000m	0	0	0
Former Gasworks	Environment Protection Authority	10/05/2023	14/07/2021	Quarterly	1000m	0	0	0
Notices under the POEO Act 1997	Environment Protection Authority	26/07/2023	26/07/2023	Monthly	1000m	0	0	0
National Waste Management Facilities Database	Geoscience Australia	26/05/2022	07/03/2017	Annually	1000m	0	0	0
National Liquid Fuel Facilities	Geoscience Australia	20/09/2023	07/09/2020	Annually	1000m	0	0	4
EPA PFAS Investigation Program	Environment Protection Authority	22/09/2023	23/09/2022	Monthly	2000m	0	0	0
Defence PFAS Investigation & Management Program - Investigation Sites	Department of Defence	16/08/2023	16/08/2023	Monthly	2000m	0	0	0
Defence PFAS Investigation & Management Program - Management Sites	Department of Defence	16/08/2023	16/08/2023	Monthly	2000m	0	0	0
Airservices Australia National PFAS Management Program	Airservices Australia	18/08/2023	18/08/2023	Monthly	2000m	0	0	0
Defence Controlled Areas	Department of Defence	08/06/2023	08/06/2023	Quarterly	2000m	0	0	0
Defence 3 Year Regional Contamination Investigation Program	Department of Defence	16/06/2023	02/09/2022	Quarterly	2000m	0	0	0
National Unexploded Ordnance (UXO)	Department of Defence	08/06/2023	08/06/2023	Quarterly	2000m	0	0	0
EPA Other Sites with Contamination Issues	Environment Protection Authority	16/02/2022	13/12/2018	Annually	1000m	0	0	0
Licensed Activities under the POEO Act 1997	Environment Protection Authority	20/09/2023	20/09/2023	Monthly	1000m	0	0	1
Delicensed POEO Activities still regulated by the EPA	Environment Protection Authority	20/09/2023	20/09/2023	Monthly	1000m	0	0	1
Former POEO Licensed Activities now revoked or surrendered	Environment Protection Authority	20/09/2023	20/09/2023	Monthly	1000m	4	4	4
UBD Business Directories (Premise & Intersection Matches)	Hardie Grant			Not required	150m	0	0	0
UBD Business Directories (Road & Area Matches)	Hardie Grant			Not required	150m	-	11	11
UBD Business Directory Dry Cleaners & Motor Garages/Service Stations (Premise & Intersection Matches)	Hardie Grant			Not required	500m	0	0	0
UBD Business Directory Dry Cleaners & Motor Garages/Service Stations (Road & Area Matches)	Hardie Grant			Not required	500m	-	1	1
Cattle dips of the Northern Rivers region	NSW Dept. of Primary Industries	09/08/2022	09/08/2022	Annually	1000m	0	2	2
Points of Interest	NSW Department of Customer Service - Spatial Services	19/10/2022	19/10/2022	Quarterly	1000m	0	0	16
Tanks (Areas)	NSW Department of Customer Service - Spatial Services	19/10/2022	19/10/2022	Quarterly	1000m	0	0	0
Tanks (Points)	NSW Department of Customer Service - Spatial Services	19/10/2022	19/10/2022	Quarterly	1000m	0	0	0
Major Easements	NSW Department of Customer Service - Spatial Services	23/05/2023	23/05/2023	Quarterly	1000m	0	0	1
State Forest	Forestry Corporation of NSW	16/08/2022	14/08/2022	Annually	1000m	0	0	0
NSW National Parks and Wildlife Service Reserves	NSW Office of Environment & Heritage	16/02/2023	31/12/2022	Annually	1000m	0	0	0

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	Dataset Buffer (m)	No. Features On-site	No. Features within 100m	No. Features within Buffer
Hydrogeology Map of Australia	Commonwealth of Australia (Geoscience Australia)	29/08/2022	19/08/2019	As required	1000m	1	1	1
Temporary Water Restriction (Botany Sands Groundwater Source) Order 2018	NSW Department of Planning, Industry and Environment	09/05/2023	23/02/2018	Annually	1000m	0	0	0
National Groundwater Information System (NGIS) Boreholes	Bureau of Meteorology; Water NSW	18/04/2023	13/07/2022	Annually	2000m	0	0	38
NSW Seamless Geology Single Layer: Rock Units	Department of Regional NSW	17/02/2022	01/05/2021	Annually	1000m	3	3	4
NSW Seamless Geology – Single Layer: Trendlines	Department of Regional NSW	17/02/2022	01/05/2021	Annually	1000m	0	0	0
NSW Seamless Geology – Single Layer: Geological Boundaries and Faults	Department of Regional NSW	17/02/2022	01/05/2021	Annually	1000m	0	0	0
Naturally Occurring Asbestos Potential	NSW Dept. of Industry, Resources & Energy	04/12/2015	24/09/2015	Unknown	1000m	0	0	0
Atlas of Australian Soils	Australian Bureau of Agriculture and Resource Economics and Sciences (ABARES)	19/05/2017	17/02/2011	As required	1000m	1	1	2
Soil Landscapes of Central and Eastern NSW	NSW Department of Planning, Industry and Environment	18/08/2022	27/07/2020	Annually	1000m	3	3	5
Environmental Planning Instrument Acid Sulfate Soils	NSW Department of Planning, Industry and Environment	31/08/2023	30/06/2023	Monthly	500m	0	-	-
Atlas of Australian Acid Sulfate Soils	CSIRO	19/01/2017	21/02/2013	As required	1000m	1	1	2
Dryland Salinity - National Assessment	National Land and Water Resources Audit	18/07/2014	12/05/2013	None planned	1000m	0	0	0
Mining Subsidence Districts	NSW Department of Customer Service - Subsidence Advisory NSW	15/05/2023	15/05/2023	Quarterly	1000m	0	0	0
Current Mining Titles	NSW Department of Industry	25/08/2023	25/08/2023	Monthly	1000m	0	0	0
Mining Title Applications	NSW Department of Industry	25/08/2023	25/08/2023	Monthly	1000m	0	0	0
Historic Mining Titles	NSW Department of Industry	25/08/2023	25/08/2023	Monthly	1000m	11	11	11
Environmental Planning Instrument SEPP State Significant Precincts	NSW Department of Planning, Industry and Environment	31/08/2023		Monthly	1000m	0	0	0
Environmental Planning Instrument Land Zoning	NSW Department of Planning, Industry and Environment	31/08/2023	25/08/2023	Monthly	1000m	1	12	58
Commonwealth Heritage List	Australian Government Department of the Agriculture, Water and the Environment	03/06/2022	13/04/2022	Annually	1000m	0	0	0
National Heritage List	Australian Government Department of the Agriculture, Water and the Environment	03/06/2022	13/04/2022	Annually	1000m	0	0	0
State Heritage Register - Curtilages	NSW Department of Planning, Industry and Environment	06/09/2023	03/03/2023	Quarterly	1000m	0	0	3
Environmental Planning Instrument Local Heritage	NSW Department of Planning, Industry and Environment	31/08/2023	25/08/2023	Monthly	1000m	0	0	6
Bush Fire Prone Land	NSW Rural Fire Service	28/09/2023	15/08/2023	Monthly	1000m	3	3	3
NSW Native Vegetation Type Map	NSW Department of Planning and Environment	26/05/2023	12/12/2022	Quarterly	1000m	6	8	16
Ramsar Wetlands of Australia	Australian Government Department of Agriculture, Water and the Environment	09/05/2023	01/11/2022	Annually	1000m	0	0	0
Groundwater Dependent Ecosystems	Bureau of Meteorology	28/10/2022	26/10/2022	Annually	1000m	0	0	3
Inflow Dependent Ecosystems Likelihood	Bureau of Meteorology	28/10/2022	26/10/2022	Annually	1000m	0	0	7
NSW BioNet Species Sightings	NSW Office of Environment & Heritage	13/09/2023	13/09/2023	Weekly	10000m	-	-	-

Site Diagram

163-170 Alexandra Parade, North Lismore, NSW 2480

Legend

- Site Boundary
- Internal Parcel Boundaries

Total Area: 335336m²

Total Perimeter: 2.31km

Scale: 0 25 50 100 150 200 Meters

Data Source Aerial Imagery:
© Aerometrex Pty Ltd

Disclaimers:

Measurements are approximate only and may have been simplified or smaller lengths removed for readability.

Parcels that make up a small percentage of the total site area have not been labelled for increased legibility.

Coordinate System:
GDA 1994 MGA Zone 56

Date: 06 October 2023

Contaminated Land

163-170 Alexandra Parade, North Lismore, NSW 2480

List of NSW contaminated sites notified to EPA

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

Map Id	Site	Address	Suburb	Activity	Management Class	Status	Location Confidence	Dist	Direction
N/A	No records in buffer								

The values within the EPA site management class in the table above, are given more detailed explanations in the table below:

EPA site management class	Explanation
Contamination being managed via the planning process (EP&A Act)	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. The contamination of this site is managed by the consent authority under the Environmental Planning and Assessment Act 1979 (EP&A Act) planning approval process, with EPA involvement as necessary to ensure significant contamination is adequately addressed. The consent authority is typically a local council or the Department of Planning and Environment.
Contamination currently regulated under CLM Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the Contaminated Land Management Act 1997 (CLM Act). Management of the contamination is regulated by the EPA under the CLM Act. Regulatory notices are available on the EPA's Contaminated Land Public Record of Notices.
Contamination currently regulated under POEO Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. Management of the contamination is regulated under the Protection of the Environment Operations Act 1997 (POEO Act). The EPA's regulatory actions under the POEO Act are available on the POEO public register.
Contamination formerly regulated under the CLM Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation under the Contaminated Land Management Act 1997 (CLM Act). The contamination was addressed under the CLM Act.
Contamination formerly regulated under the POEO Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed under the Protection of the Environment Operations Act 1997 (POEO Act).
Contamination was addressed via the planning process (EP&A Act)	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed by the appropriate consent authority via the planning process under the Environmental Planning and Assessment Act 1979 (EP&A Act).
Ongoing maintenance required to manage residual contamination (CLM Act)	The EPA has determined that ongoing maintenance, under the Contaminated Land Management Act 1997 (CLM Act), is required to manage the residual contamination. Regulatory notices under the CLM Act are available on the EPA's Contaminated Land Public Record of Notices.
Regulation being finalised	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the Contaminated Land Management Act 1997. A regulatory approach is being finalised.
Regulation under the CLM Act not required	The EPA has completed an assessment of the contamination and decided that regulation under the Contaminated Land Management Act 1997 is not required.
Under assessment	The contamination is being assessed by the EPA to determine whether regulation is required. The EPA may require further information to complete the assessment. For example, the completion of management actions regulated under the planning process or Protection of the Environment Operations Act 1997. Alternatively, the EPA may require information via a notice issued under s77 of the Contaminated Land Management Act 1997 or issue a Preliminary Investigation Order.

NSW EPA Contaminated Land List Data Source: Environment Protection Authority

Contaminated Land

163-170 Alexandra Parade, North Lismore, NSW 2480

Contaminated Land: Records of Notice

Record of Notices within the dataset buffer:

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

Contaminated Land Records of Notice Data Source: Environment Protection Authority

Terms of use and disclaimer for Contaminated Land: Record of Notices, please visit http://www.epa.nsw.gov.au/clm/clmdisclaimer.htm

Former Gasworks

Former Gasworks within the dataset buffer:

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

Former Gasworks Data Source: Environment Protection Authority

Contaminated Land

163-170 Alexandra Parade, North Lismore, NSW 2480

EPA Notices

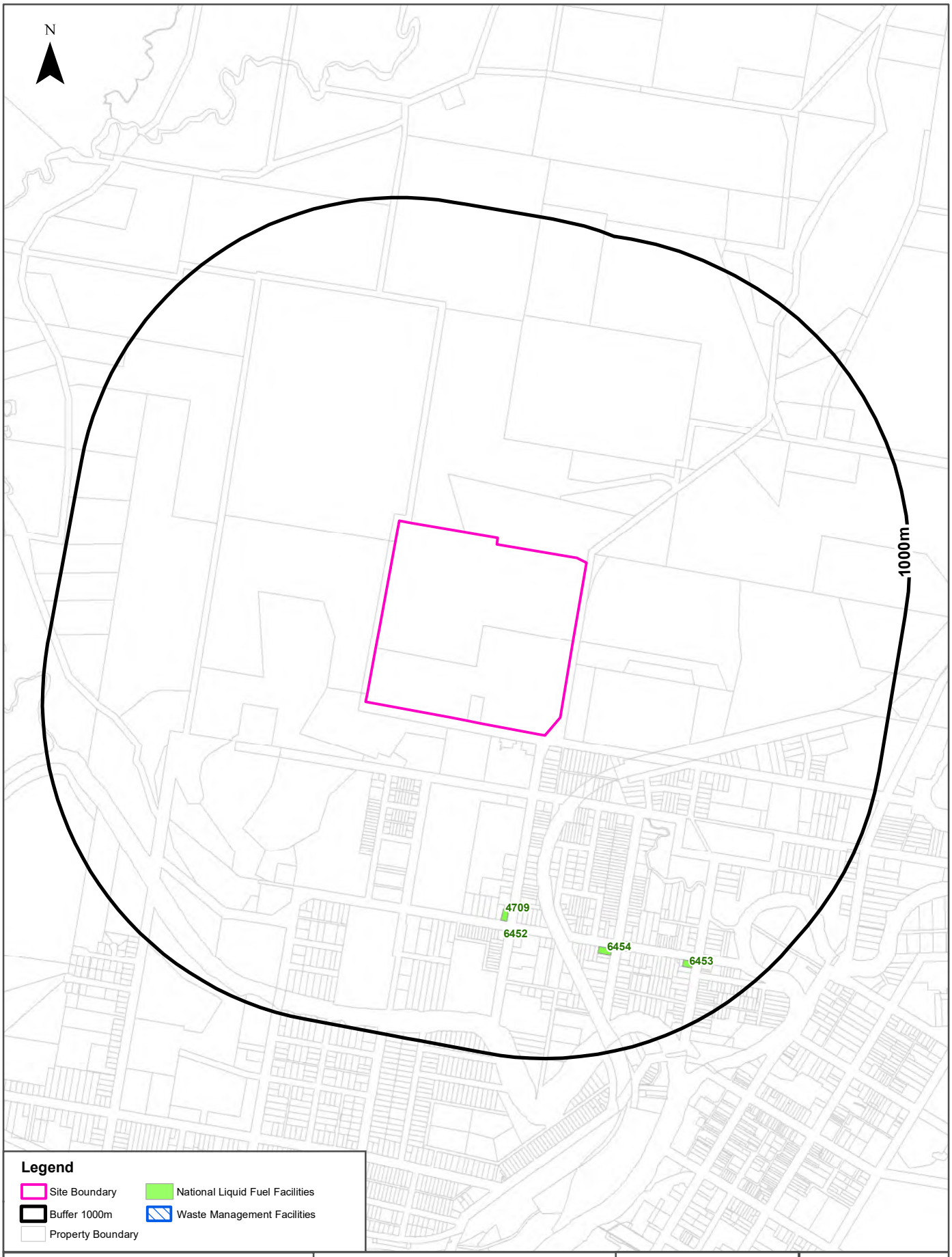
Penalty Notices, s.91 & s.92 Clean up Notices and s.96 Prevention Notices within the dataset buffer:

Number	Type	Name	Address	Status	Issued Date	Act	Offence	Offence Date	Loc Conf	Dist	Dir
N/A	No records in buffer										

NSW EPA Notice Data Source: Environment Protection Authority

Waste Management & Liquid Fuel Facilities

163-170 Alexandra Parade, North Lismore, NSW 2480



Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2023

Coordinate System: GDA 1994 MGA Zone 56

Date: 06 October 2023

Waste Management & Liquid Fuel Facilities

163-170 Alexandra Parade, North Lismore, NSW 2480

National Waste Management Site Database

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

Site Id	Owner	Name	Address	Suburb	Class	Landfill	Reprocess	Transfer	Comments	Loc Conf	Dist	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	Direction
4709	Neumann Petroleum	North Lismore	111 Terania Street	North Lismore	Petrol Station	Operational		25/07/2011	Premise Match	551m	South
6452	INDEPENDENT	INDEPENDENT NORTH LISMORE	111 TERANIA STREET	NORTH LISMORE	PETROL STATION	OPERATIONAL			Premise Match	551m	South
6454	INDEPENDENT	INDEPENDENT NORTH LISMORE	NORTHSIDE LIBERTY 78 TERANIA STREET	NORTH LISMORE	PETROL STATION	OPERATIONAL			Premise Match	672m	South
6453	INDEPENDENT	INDEPENDENT NORTH LISMORE	NORTHSIDE LIBERTY 62 BRIDGE STREET	NORTH LISMORE	PETROL STATION	OPERATIONAL			Premise Match	816m	South East

PFAS Investigation & Management Programs

163-170 Alexandra Parade, North Lismore, NSW 2480

EPA PFAS Investigation Program

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

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

EPA PFAS Investigation Program: Environment Protection Authority

Defence PFAS Investigation Program

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

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

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

Defence PFAS Management Program

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

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

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

Airservices Australia National PFAS Management Program

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

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

Airservices Australia National PFAS Management Program Data Custodian: Airservices Australia

Defence Sites and Unexploded Ordnance

163-170 Alexandra Parade, North Lismore, NSW 2480

Defence Controlled Areas (DCA)

Defence Controlled Areas provided by the Department of Defence within the dataset buffer:

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

Defence Controlled Areas, Data Custodian: Department of Defence, Australian Government

Defence 3 Year Regional Contamination Investigation Program (RCIP)

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

National Unexploded Ordnance (UXO)

Sites which have been assessed by the Department of Defence for the potential presence of unexploded ordnance within the dataset buffer:

Site ID	Location Name	Category	Area Description	Additional Information	Commonwealth	Loc Conf	Dist	Dir
N/A	No records in buffer							

National Unexploded Ordnance (UXO), Data Custodian: Department of Defence, Australian Government

EPA Other Sites with Contamination Issues

163-170 Alexandra Parade, North Lismore, NSW 2480

EPA Other Sites with Contamination Issues

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

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

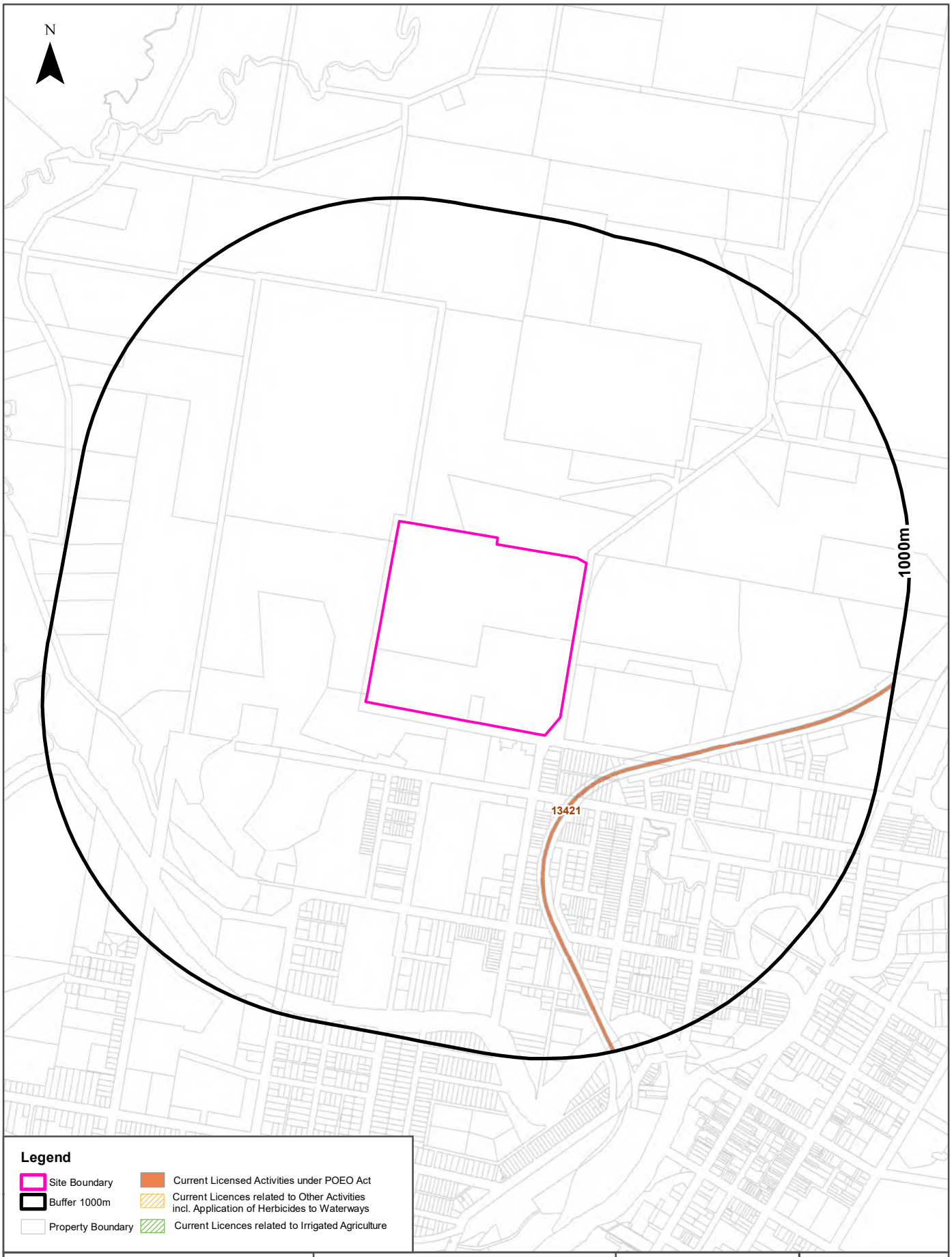
Sites within the dataset buffer:

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

EPA Other Sites with Contamination Issues: Environment Protection Authority

Current EPA Licensed Activities

163-170 Alexandra Parade, North Lismore, NSW 2480



EPA Activities

163-170 Alexandra Parade, North Lismore, NSW 2480

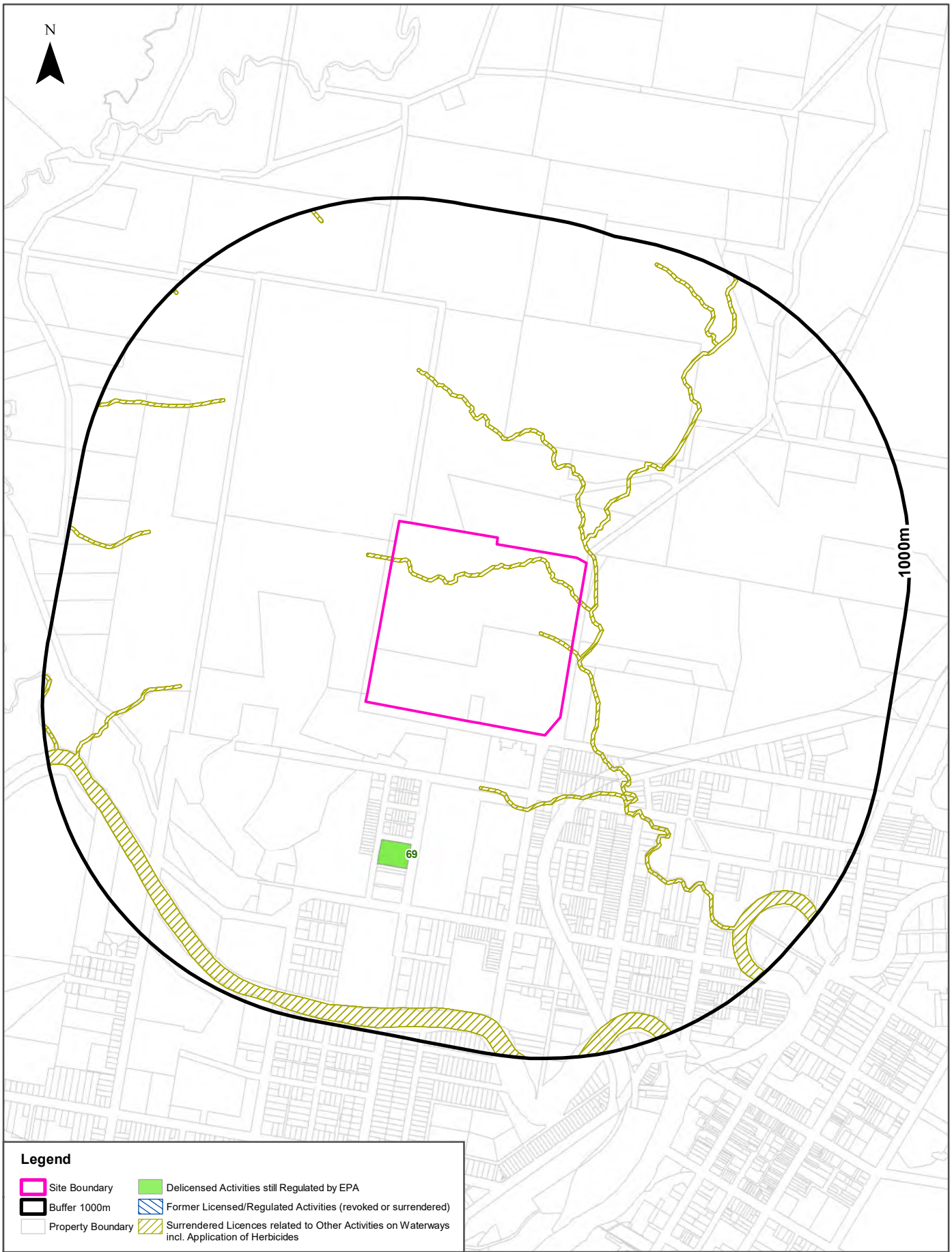
Licensed Activities under the POEO Act 1997

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

EPL	Organisation	Name	Address	Suburb	Activity	Loc Conf	Distance	Direction
13421	UGL REGIONAL LINX PTY LTD		COUNTRY REGIONAL NETWORK, ORANGE, NSW 2800		Railway systems activities	Network of Features	203m	South East

Delicensed & Former Licensed EPA Activities

163-170 Alexandra Parade, North Lismore, NSW 2480



EPA Activities

163-170 Alexandra Parade, North Lismore, NSW 2480

Delicensed Activities still regulated by the EPA

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

Licence No	Organisation	Name	Address	Suburb	Activity	Loc Conf	Distance	Direction
69	HOLCIM (AUSTRALIA) PTY LTD	LISMORE CONCRETE	MACAULEY STREET	NORTH LISMORE	Concrete works	Premise Match	406m	South

Delicensed Activities Data Source: Environment Protection Authority

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

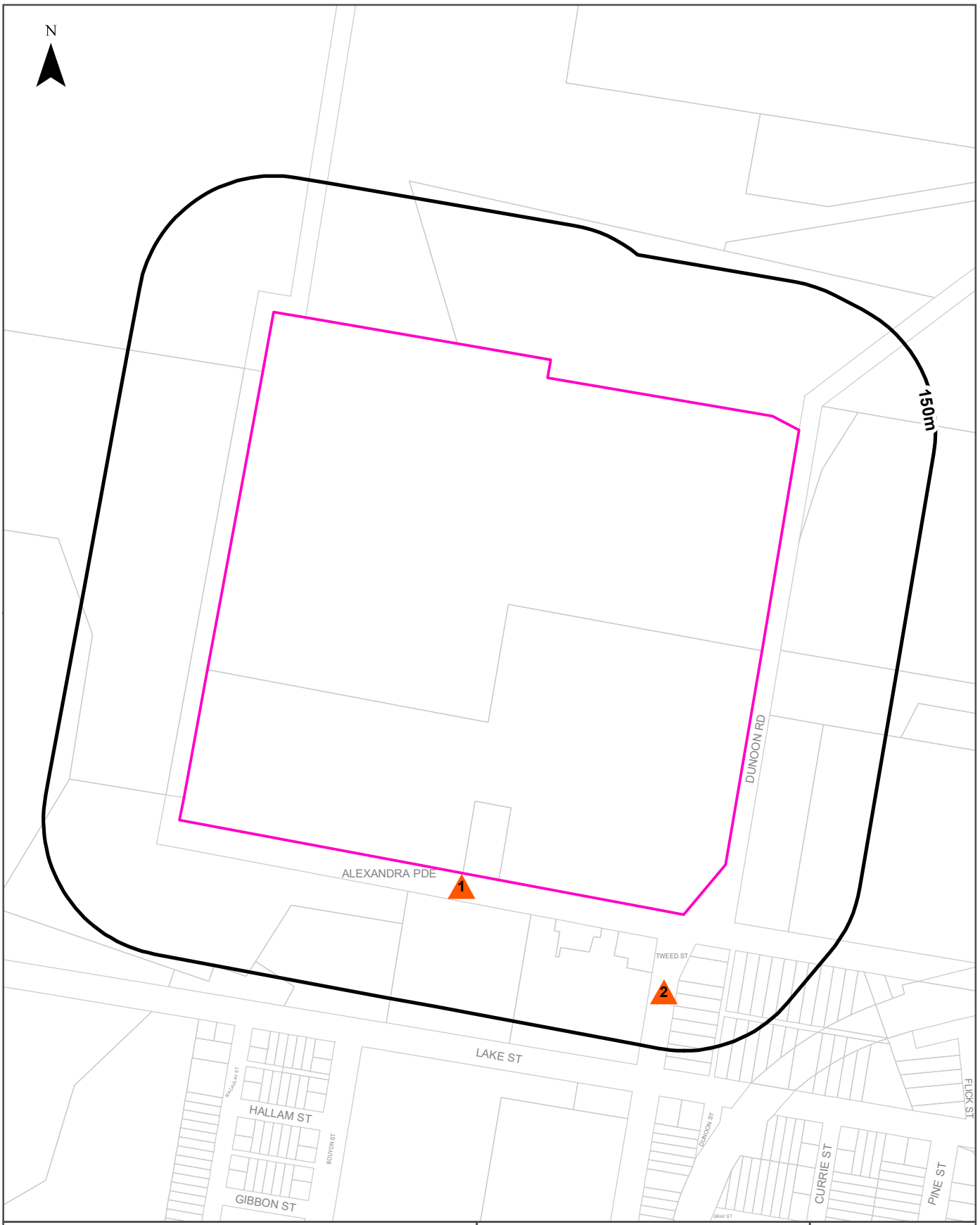
Former Licensed activities under the Protection of the Environment Operations Act 1997, now revoked or surrendered, within the dataset buffer:

Licence No	Organisation	Location	Status	Issued Date	Activity	Loc Conf	Distance	Direction
4292	FAR NORTH COAST COUNTY COUNCIL	COUNTY DISTRICT - LISMORE NSW 2480	Surrendered	06/09/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	0m	On-site
4653	LUHRMANN ENVIRONMENT MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW	Surrendered	06/09/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	0m	On-site
4838	Robert Orchard	Various Waterways throughout New South Wales - SYDNEY NSW 2000	Surrendered	07/09/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	0m	On-site
6630	SYDNEY WEED & PEST MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW - PROSPECT, NSW, 2148	Surrendered	09/11/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	0m	On-site

Former Licensed Activities Data Source: Environment Protection Authority

Historical Business Directories

163-170 Alexandra Parade, North Lismore, NSW 2480



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 80 160 240 320 Meters

Coordinate System: GDA 1994 MGA Zone 56

Date: 06 October 2023

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

Historical Business Directories

163-170 Alexandra Parade, North Lismore, NSW 2480

Business Directory Records 1950-1991
Premise or Road Intersection Matches

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

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

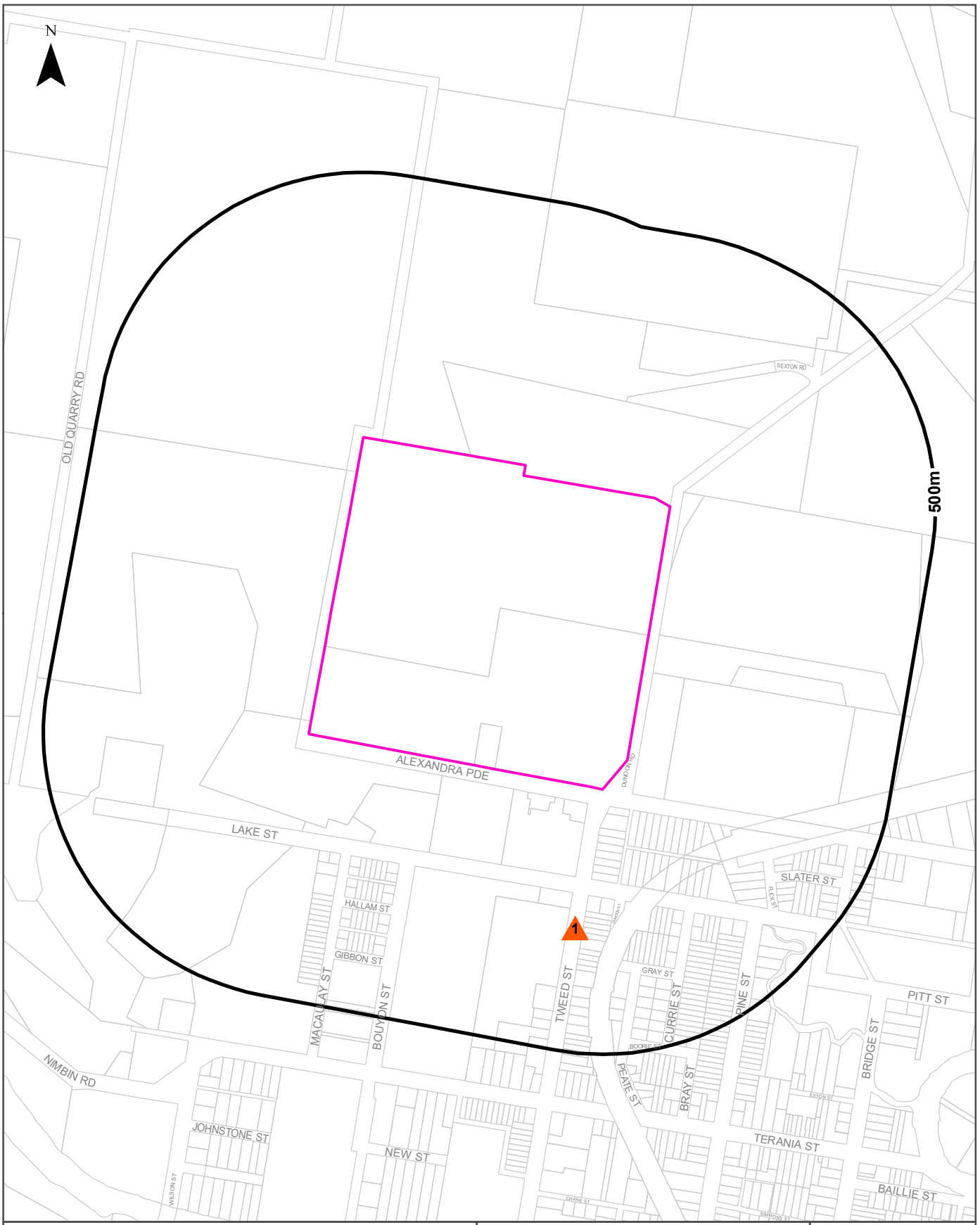
Business Directory Records 1950-1991
Road or Area Matches

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

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
1	Carriers &/Or Cartage Contractors	Mcmullen Transport., Alexandra Pde. North Lismore. 2480	195480	1991	Road Match	0m
	Haulage Contractors	Mcmullen Transport., Alexandra Pde. North Lismore. 2480	198101	1991	Road Match	0m
	VETERINARY SURGEONS & SUPPLIES	Churchward, R. E., Alexandra Pde. Lismore	121129	1950	Road Match	0m
	PIPE MANUFACTURERS	Monier Pipe Co. Pty. Ltd., Alexandra Pde., North Lismore	120869	1950	Road Match	0m
2	Schools &/Or Colleges - Private &/Or Public	Lismore Holy Family School., Tweed St. North Lismore. 2480	201437	1991	Road Match	30m
	SCHOOLS &/OR COLLEGES - PRIVATE &/OR PUBLIC.	Lismore Holy Family School, Tweed St., North Lismore 2480	93100	1982	Road Match	30m
	CAFES, TEA ROOMS & COFFEE LOUNGES	Eddies Quick Service Food Centre, Tweed St., North Lismore 2480	609019	1970	Road Match	30m
	SCHOOLS & COLLEGES-PRIVATE & PUBLIC	Holy Family School, Tweed St., North Lismore 2480	610268	1970	Road Match	30m
	MOTOR CAR & TRUCK DEALERS-NEW & USED	Leu, J. A. & Son, Tweed St., North Lismore , 2480	609938	1970	Road Match	30m
	MOTOR GARAGES & ENGINEERS	Leu, J. A. & Son, Tweed St., North Lismore , 2480	609991	1970	Road Match	30m
	FURNITURE-GENERAL-MFRS. & WHOLESALERS	Allen, P. C., Tweed St., Lismore, Lismore	158591	1961	Road Match	30m

Dry Cleaners, Motor Garages & Service Stations

163-170 Alexandra Parade, North Lismore, NSW 2480



Legend

- Site Boundary
- Buffer 500m
- 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: 0 140 280 420 560 Meters

Coordinate System: GDA 1994 MGA Zone 56

Date: 06 October 2023

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

Historical Business Directories

163-170 Alexandra Parade, North Lismore, NSW 2480

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

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

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

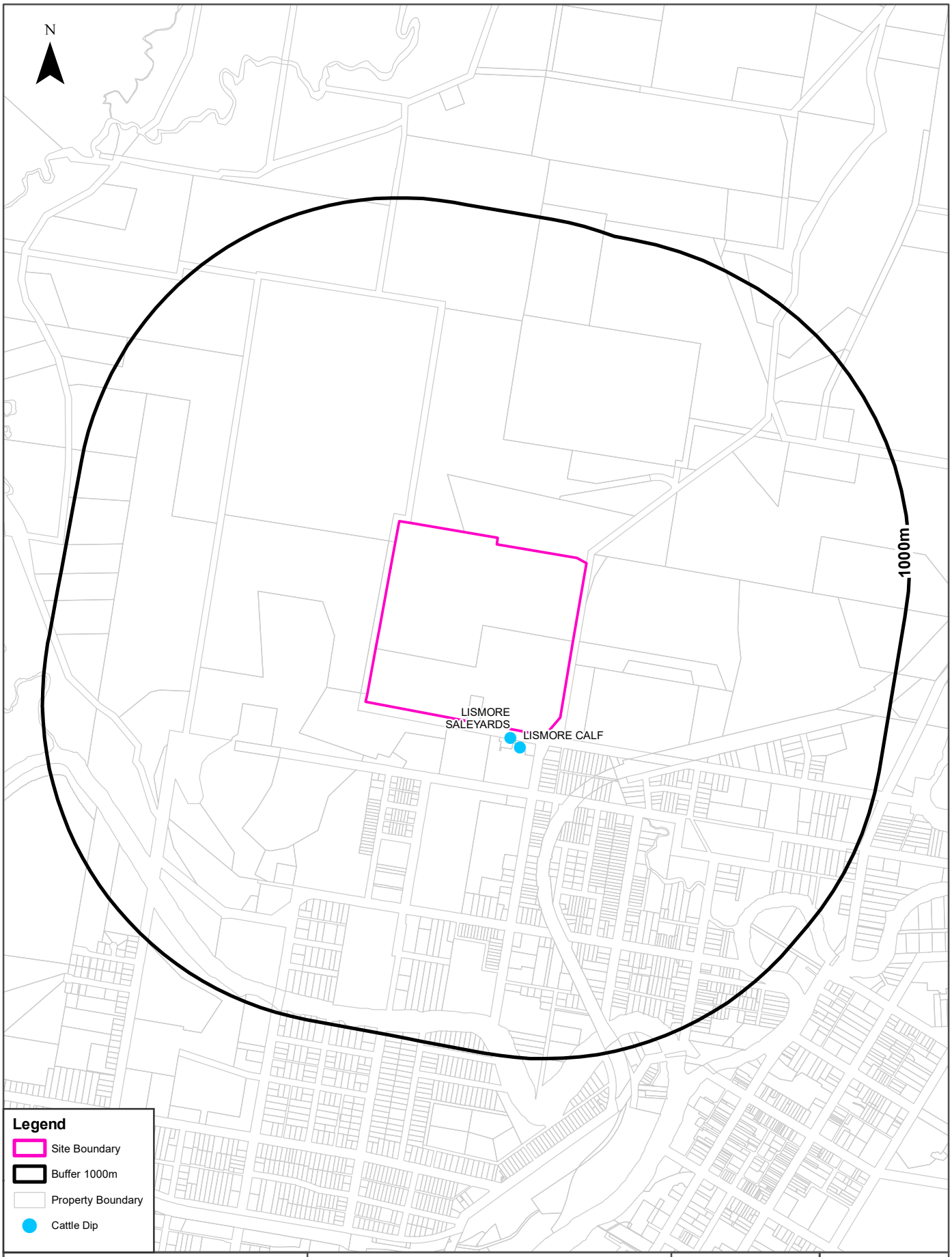
Dry Cleaners, Motor Garages & Service Stations
Road or Area Matches

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

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
1	MOTOR GARAGES & ENGINEERS	Leu, J. A. & Son, Tweed St., North Lismore , 2480	609991	1970	Road Match	30m

Cattle Dips of the Northern Rivers Region

163-170 Alexandra Parade, North Lismore, NSW 2480



Cattle Dips

163-170 Alexandra Parade, North Lismore, NSW 2480

Cattle Dips of the Northern Rivers Region

Cattle dip sites within the dataset buffer:

Dip Name	Road	Town	Dip Status	Licence / Lease Status	Licence / Lease Expiry Date	Distance	Direction
LISMORE SALEYARDS	CNR TWEED & ALEXANDRA RDS	NORTH LISMORE	ACTIVE	ACTIVE	31/01/2019	28m	South
LISMORE CALF	CNR TWEED & ALEXANDRA RDS	NORTH LISMORE, LISMORE SALEYARDS	DECOMM BATH	LAPSED		52m	South

Cattle dip site data provided by the NSW Department of Primary Industries.

Aerial Imagery 2023

163-170 Alexandra Parade, North Lismore, NSW 2480

Scale:	Data Source Aerial Imagery:	Coordinate System:	Date: 06 October 2023
0 60 120 180 240 Meters	© Aerometrex Pty Ltd	GDA 1994 MGA Zone 56	

Aerial Imagery 2020

163-170 Alexandra Parade, North Lismore, NSW 2480

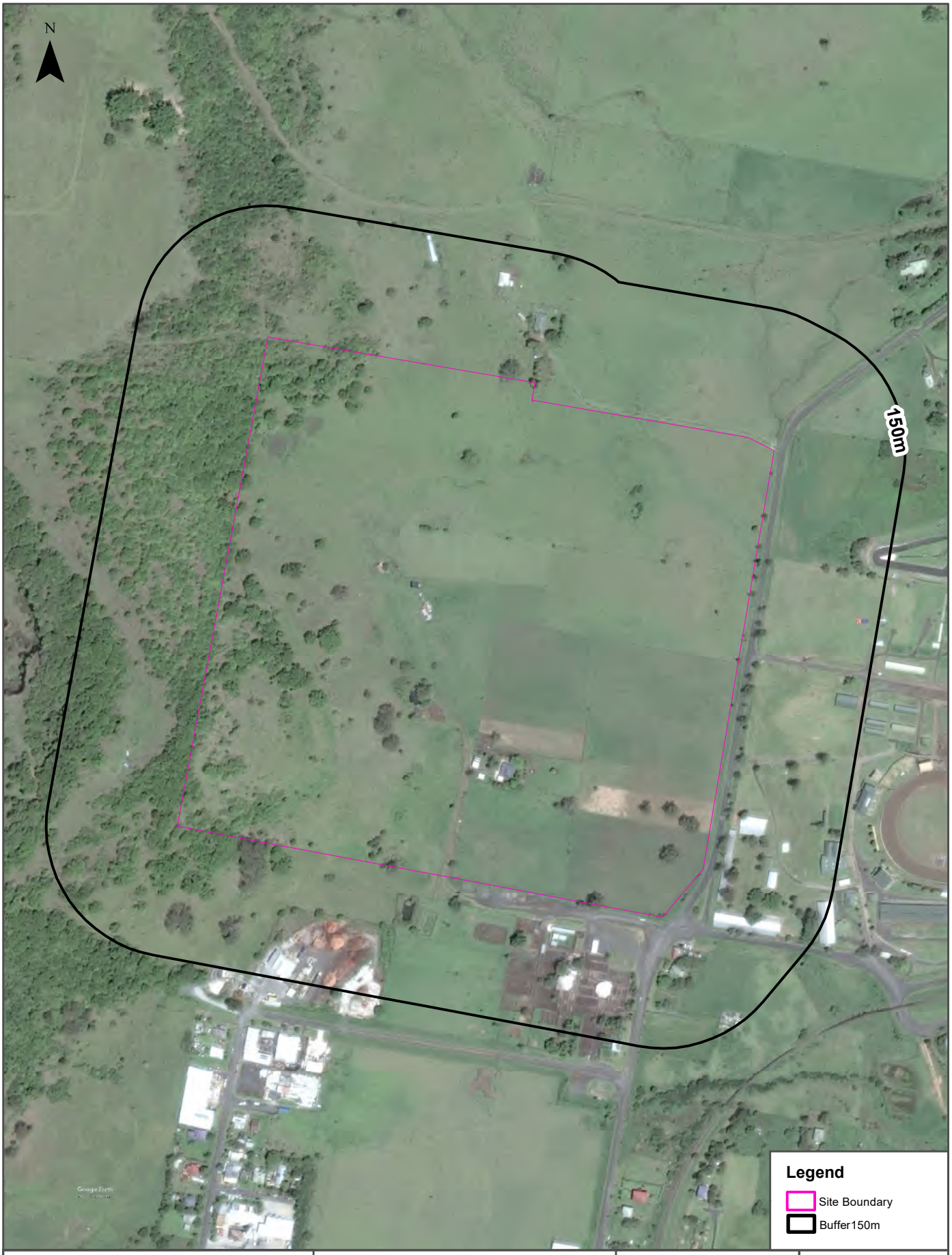
Aerial Imagery 2018

163-170 Alexandra Parade, North Lismore, NSW 2480

Scale:	Data Source Aerial Imagery:	Coordinate System:	Date: 06 October 2023
0 60 120 180 240 Meters	© Aerometrex Pty Ltd	GDA 1994 MGA Zone 56	

Aerial Imagery 2014

163-170 Alexandra Parade, North Lismore, NSW 2480

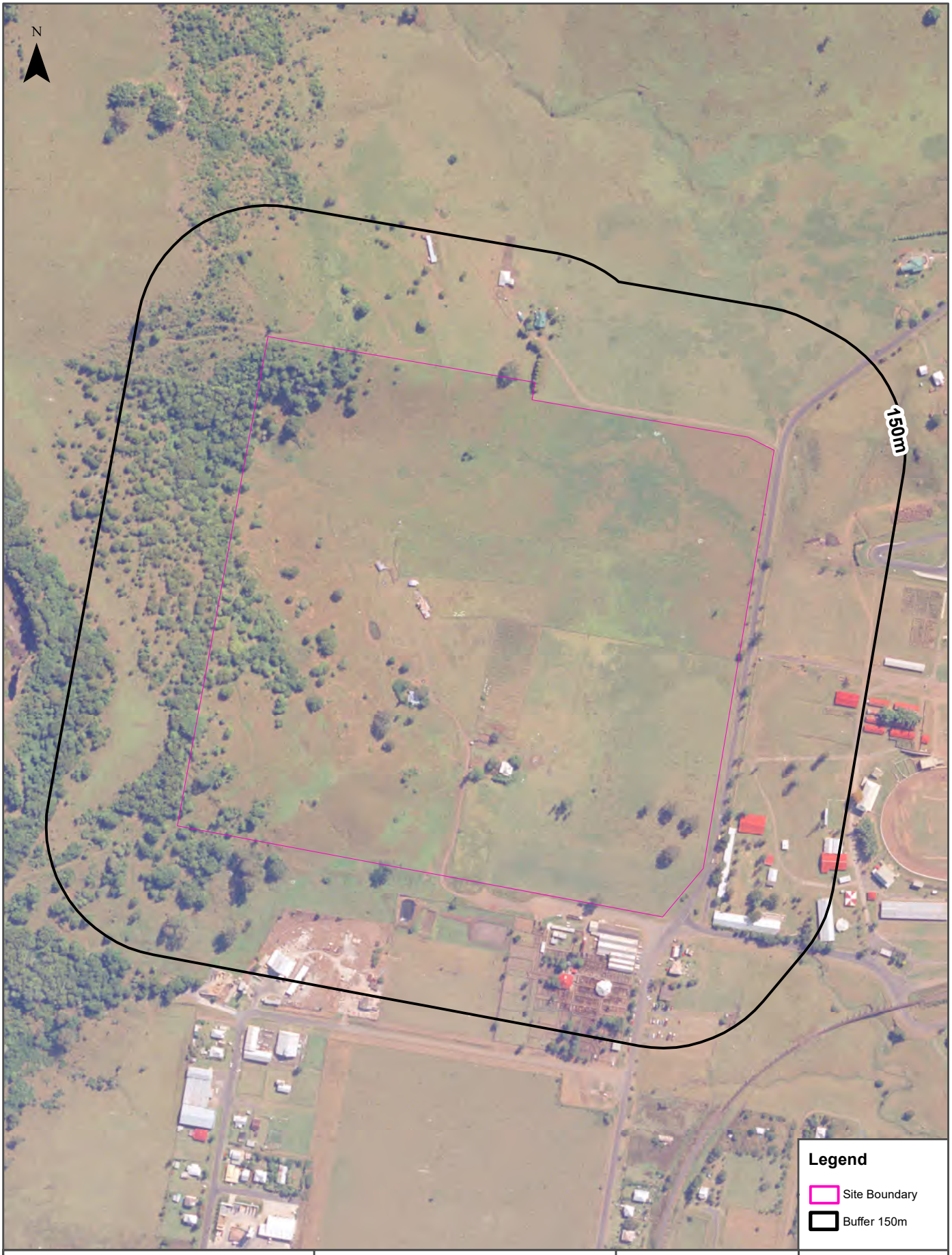


Aerial Imagery 2011

163-170 Alexandra Parade, North Lismore, NSW 2480

Aerial Imagery 1997

163-170 Alexandra Parade, North Lismore, NSW 2480



Aerial Imagery 1991

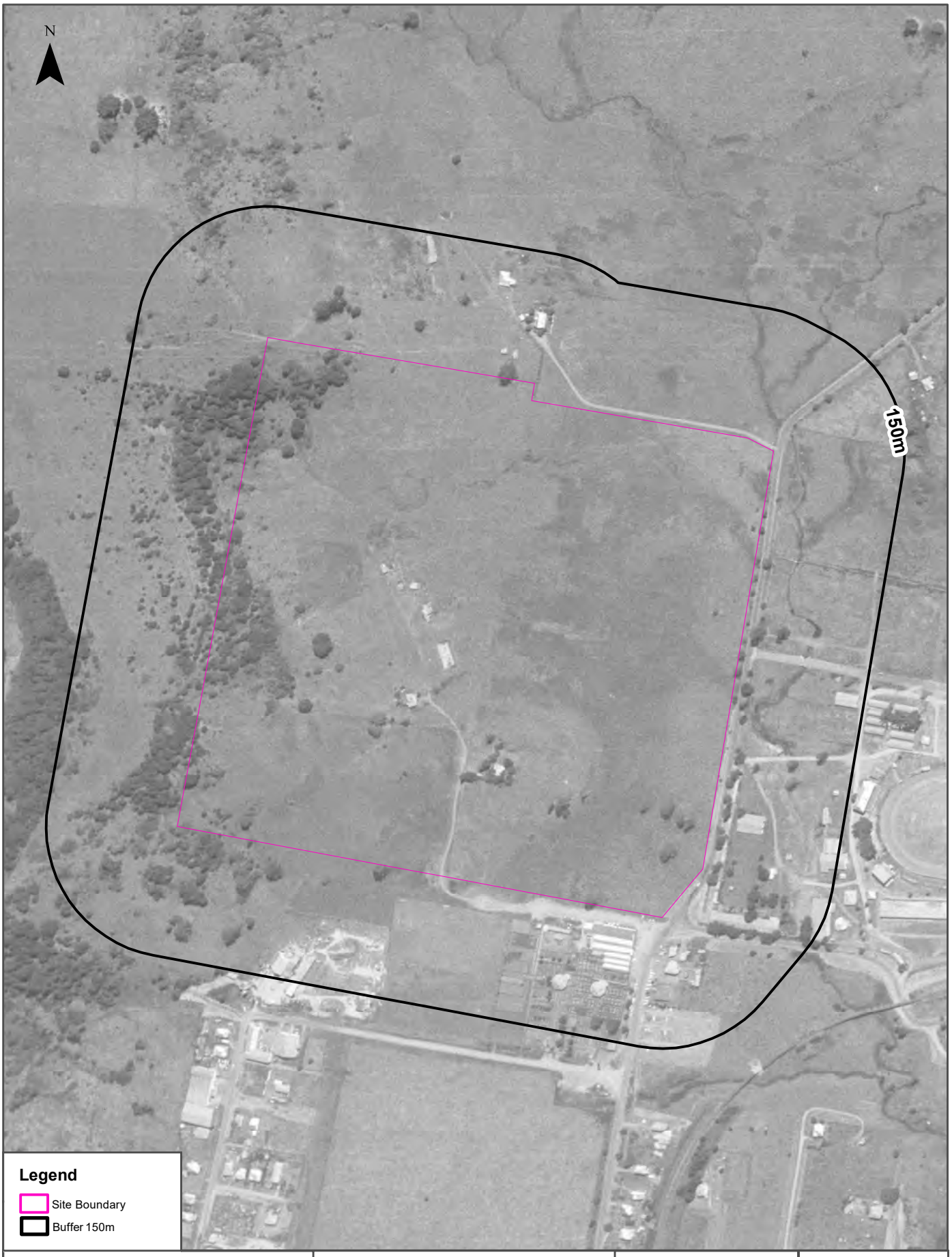
163-170 Alexandra Parade, North Lismore, NSW 2480

Aerial Imagery 1987

163-170 Alexandra Parade, North Lismore, NSW 2480

Aerial Imagery 1979

163-170 Alexandra Parade, North Lismore, NSW 2480

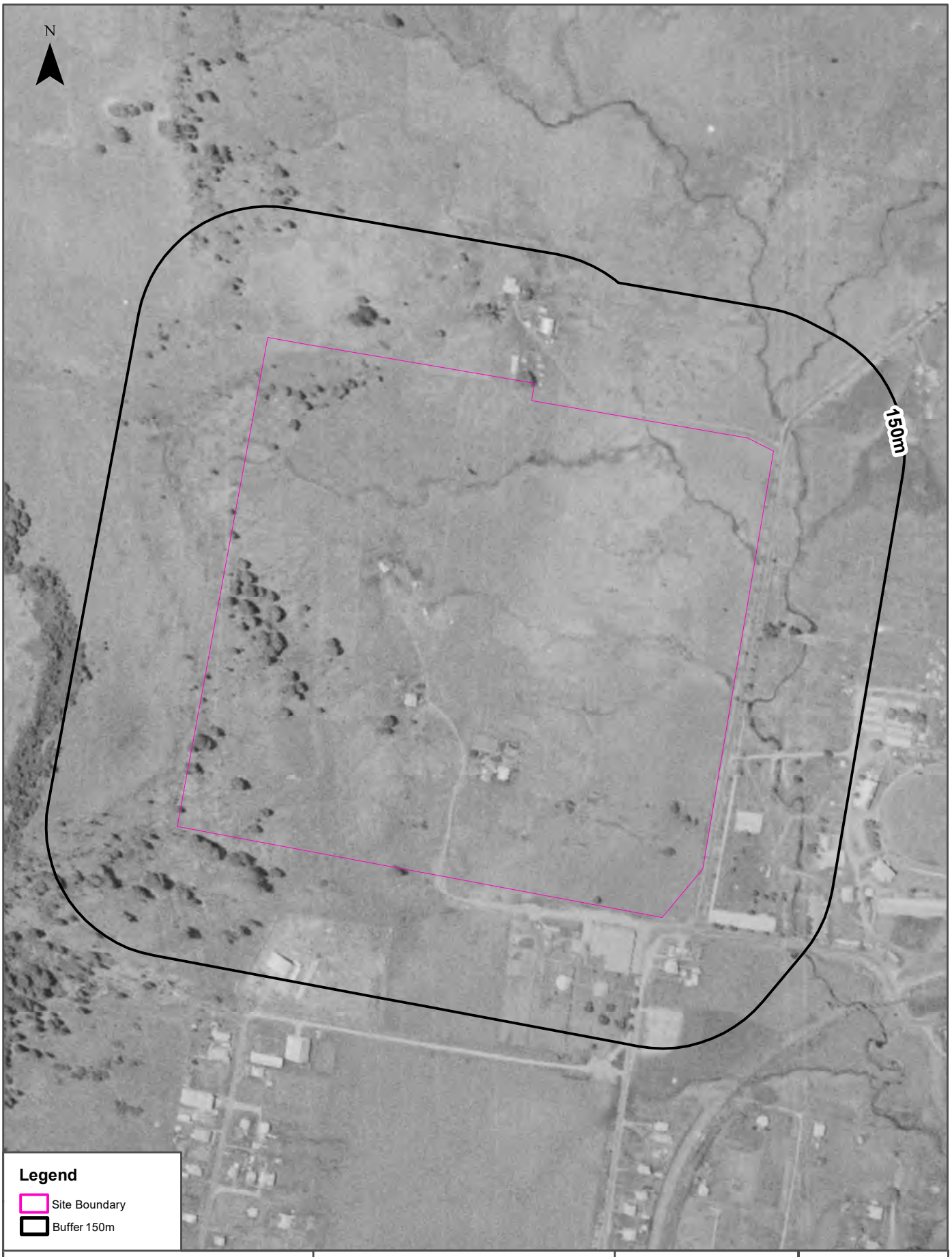


Aerial Imagery 1967

163-170 Alexandra Parade, North Lismore, NSW 2480

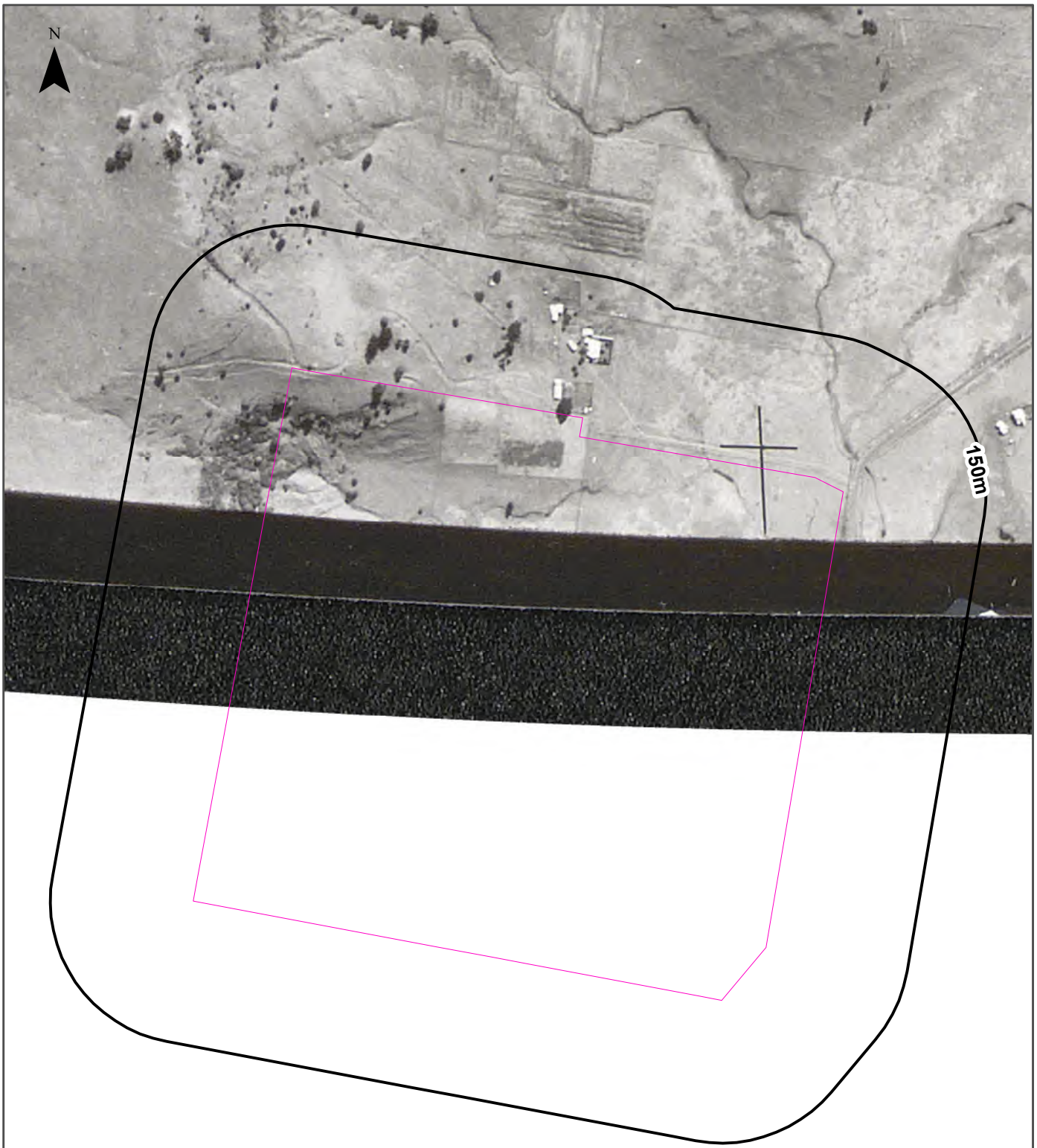
Aerial Imagery 1958

163-170 Alexandra Parade, North Lismore, NSW 2480



Aerial Imagery 1942

163-170 Alexandra Parade, North Lismore, NSW 2480



Legend

Site Boundary

Buffer 150m

Scale:
0 70 140 210 280
Meters

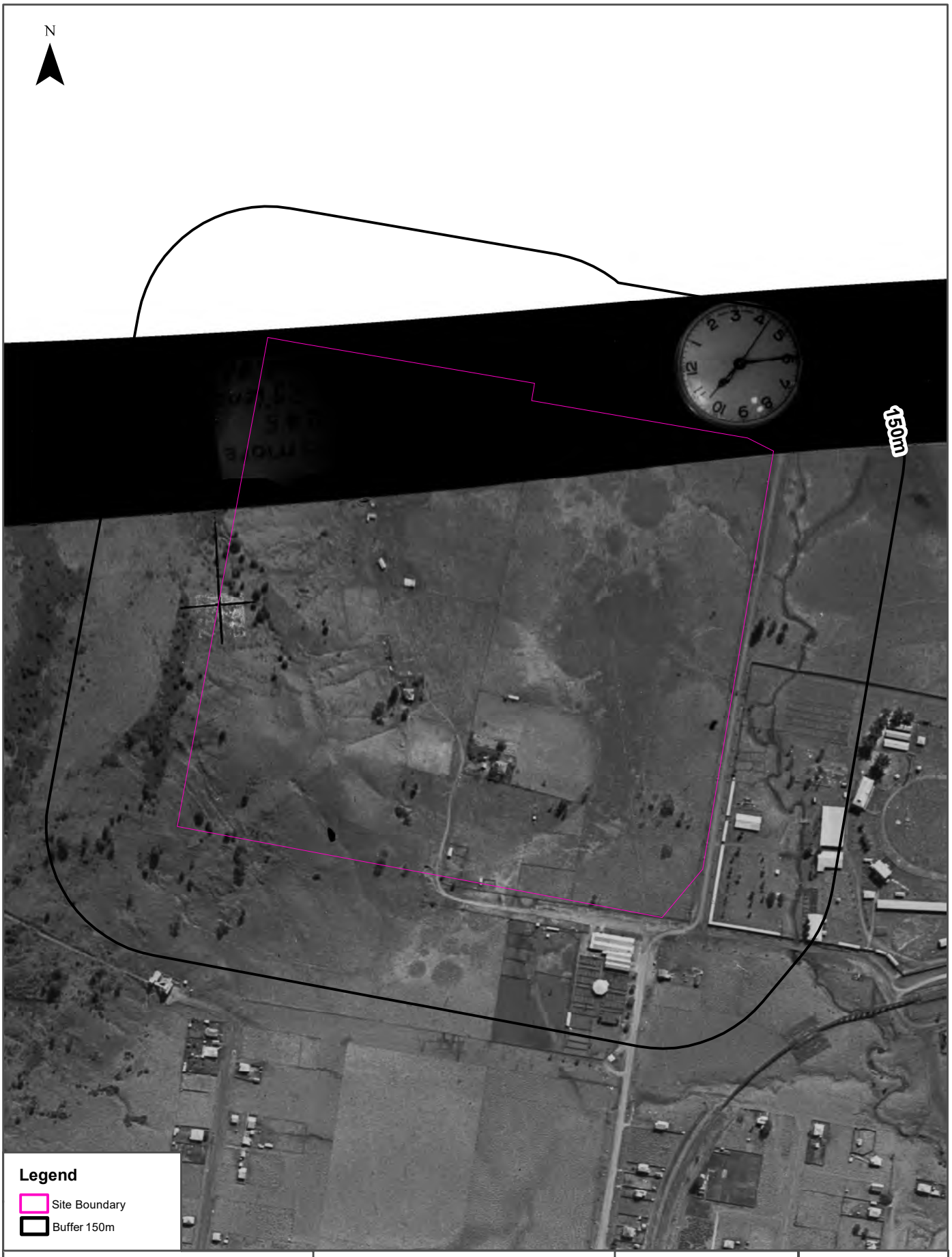
Data Source Aerial Imagery: National Library of Australia

Coordinate System:
GDA 1994 MGA Zone 56

Date: 09 October 2023

Aerial Imagery 1942

163-170 Alexandra Parade, North Lismore, NSW 2480



Topographic Map 2015

163-170 Alexandra Parade, North Lismore, NSW 2480

Scale: 0 190 380 Meters 570 760

Data Sources: Topographic Map Data
© NSW Land and Property Information

Coordinate System:
GDA 1994 MGA Zone 56

Date: 06 October 2023

Historical Map 1974

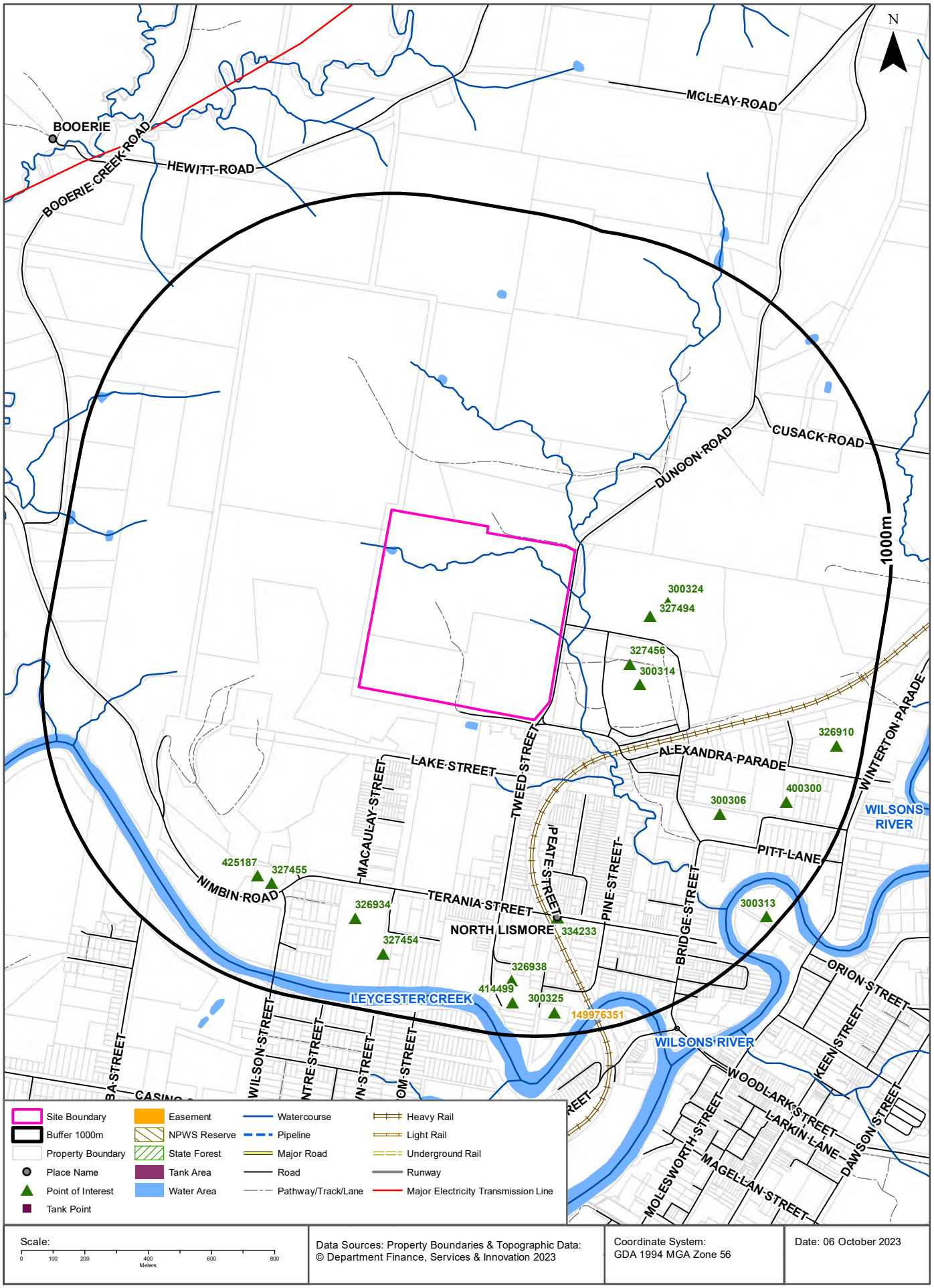
163-170 Alexandra Parade, North Lismore, NSW 2480

Historical Map c.1942

163-170 Alexandra Parade, North Lismore, NSW 2480

Topographic Features

163-170 Alexandra Parade, North Lismore, NSW 2480



Topographic Features

163-170 Alexandra Parade, North Lismore, NSW 2480

Points of Interest

What Points of Interest exist within the dataset buffer?

Map Id	Feature Type	Label	Distance	Direction
327456	Community Facility	LISMORE AUTOMOBILE CLUB	231m	East
327494	Community Facility	NORTHERN RIVERS KART CLUB	268m	East
300314	Showground	LISMORE SHOWGROUND	272m	East
300324	Motor Racing Track	LISMORE KART RACING TRACK	317m	East
334233	Suburb	NORTH LISMORE	629m	South
300306	Park	MCKENZIE PARK	644m	South East
425187	Cemetery	LISMORE PIONEER CEMETERY	677m	South West
327455	Park	NORTH LISMORE MEMORIAL REST PARK	678m	South West
326934	Park	ARTHUR PARK	721m	South
400300	High School	THE RIVERS SECONDARY COLLEGE RICHMOND RIVER HIGH C	811m	South East
327454	Community Facility	GREAT EASTLAND ARCHERS	815m	South
326938	Sports Field	PLAYING FIELDS	826m	South
414499	Club	ITALO AUSTRALIAN SPORTS AND RECREATION CLUB	896m	South
326910	Park	RICHMOND RIVER PARK	917m	East
300325	Sports Field	ITALO STARS FIELD	926m	South
300313	Dog Track	LISMORE GREYHOUND TRACK	961m	South East

Topographic Features

163-170 Alexandra Parade, North Lismore, NSW 2480

Tanks (Areas)

What are the Tank Areas located within the dataset buffer?
Note. The large majority of tank features provided by LPI are derived from aerial imagery & are therefore primarily above ground tanks.

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

Tanks (Points)

What are the Tank Points located within the dataset buffer?
Note. The large majority of tank features provided by LPI are derived from aerial imagery & are therefore primarily above ground tanks.

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

Major Easements

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

Map Id	Easement Class	Easement Type	Easement Width	Distance	Direction
149976351	Primary	Right of way		999m	South

Topographic Features

163-170 Alexandra Parade, North Lismore, NSW 2480

State Forest

What State Forest exist within the dataset buffer?

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

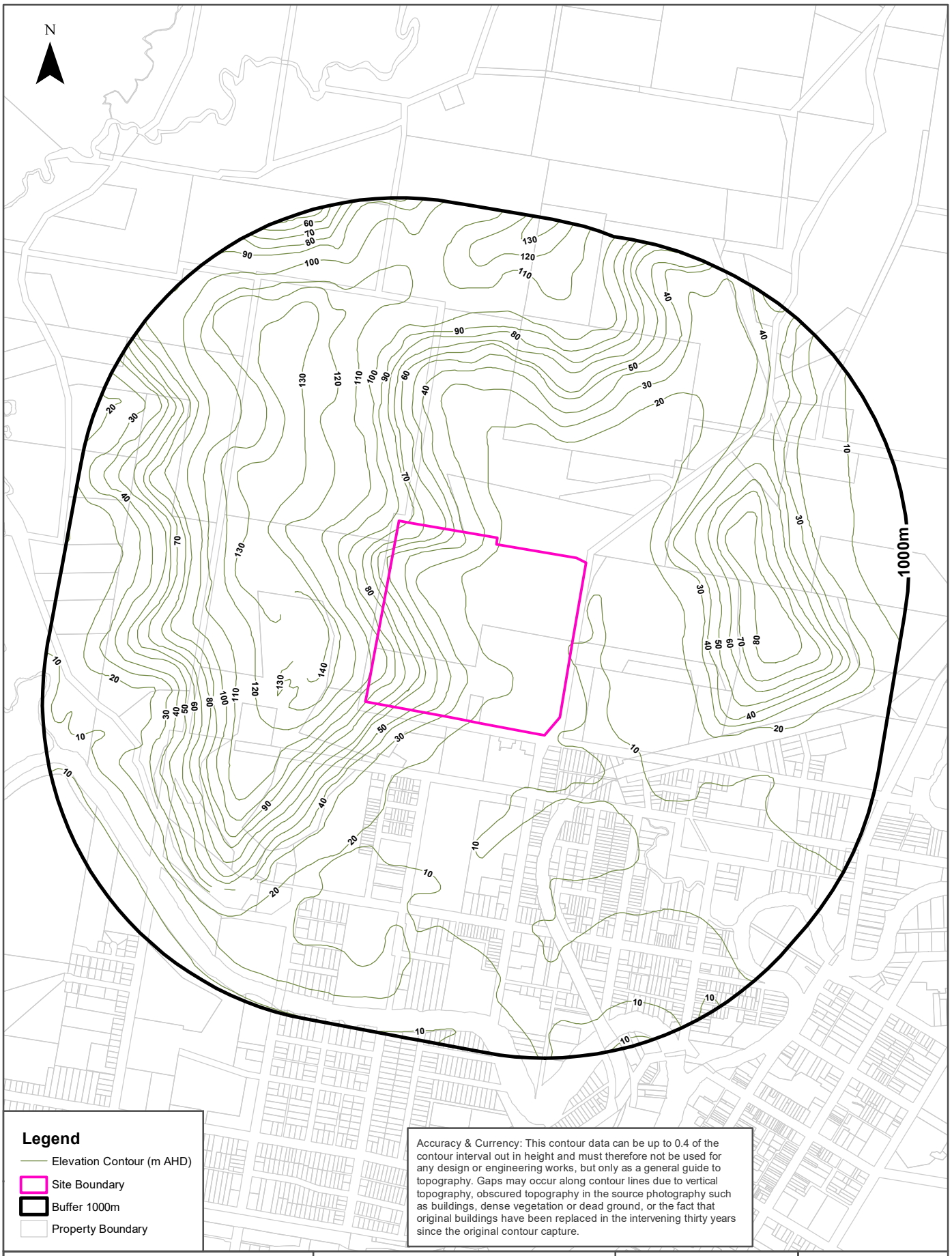
National Parks and Wildlife Service Reserves

What NPWS Reserves exist within the dataset buffer?

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

Elevation Contours (m AHD)

163-170 Alexandra Parade, North Lismore, NSW 2480



Accuracy & Currency: This contour data can be up to 0.4 of the contour interval out in height and must therefore not be used for any design or engineering works, but only as a general guide to topography. Gaps may occur along contour lines due to vertical topography, obscured topography in the source photography such as buildings, dense vegetation or dead ground, or the fact that original buildings have been replaced in the intervening thirty years since the original contour capture.

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2023	Coordinate System: GDA 1994 MGA Zone 56	Date: 06 October 2023

Hydrogeology & Groundwater

163-170 Alexandra Parade, North Lismore, NSW 2480

Hydrogeology

Description of aquifers within the dataset buffer:

Description	Distance	Direction
Porous, extensive highly productive aquifers	0m	On-site

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

Temporary Water Restriction (Botany Sands Groundwater Source) Order 2018

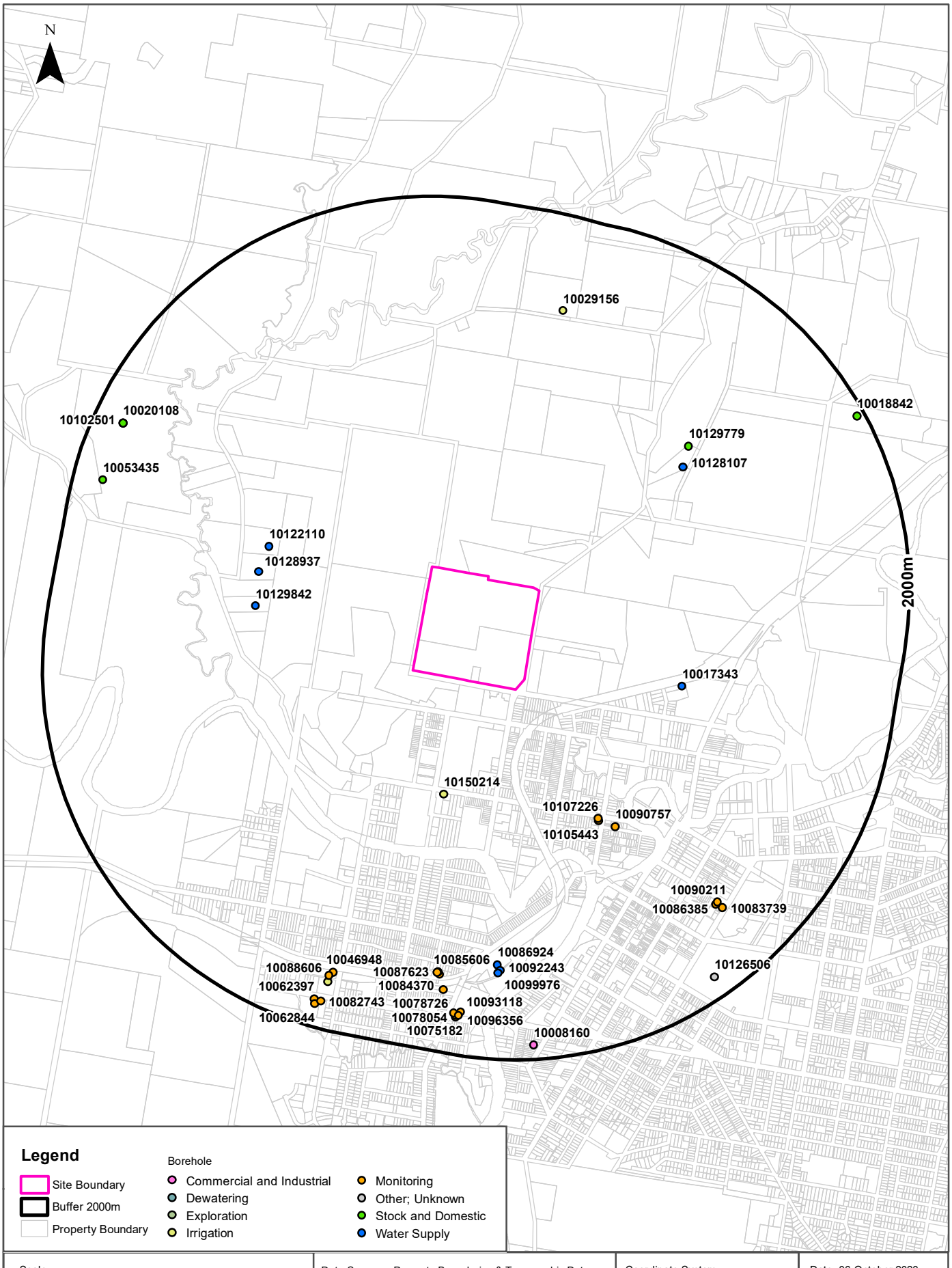
Temporary water restrictions relating to the Botany Sands aquifer within the dataset buffer:

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

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

Groundwater Boreholes

163-170 Alexandra Parade, North Lismore, NSW 2480



Hydrogeology & Groundwater

163-170 Alexandra Parade, North Lismore, NSW 2480

Groundwater Boreholes

Boreholes within the dataset buffer:

NGIS Bore ID	NSW Bore ID	Bore Type	Status	Drill Date	Bore Depth (m)	Reference Elevation	Height Datum	Salinity (mg/L)	Yield (L/s)	SWL (mbgl)	Distance	Direction
10150214	GW053165	Irrigation	Unknown	01/11/1981	7.20		AHD	0-500 ppm			628m	South
10107226	GW307931	Monitoring	Functional	25/03/2014	10.00		AHD				829m	South East
10105443	GW307932	Monitoring	Functional	25/03/2014	10.00		AHD				841m	South East
10017343	GW072536	Water Supply	Unknown	19/12/1993	30.50		AHD		1.375	2.60	849m	East
10122110	GW301386	Water Supply	Unknown	15/01/1996	109.00		AHD	Good	3.600	45.00	882m	West
10129842	GW302483	Water Supply	Removed		88.00		AHD				896m	West
10128937	GW067297	Water Supply	Functioning	07/08/1991	48.00	19.00	AHD		1.500		915m	West
10090757	GW301792	Monitoring	Removed	08/10/1998	15.50		AHD			1.60	916m	South East
10128107	GW302974	Water Supply	Unknown		6.00		AHD				1024m	North East
10129779	GW302973	Stock and Domestic	Unknown		6.00		AHD				1124m	North East
10029156	GW300669	Irrigation	Unknown	11/01/1996	144.70		AHD		0.930		1488m	North
10086924	GW307451	Water Supply	Functional	05/04/2014	12.00	11.80	AHD			8.00	1490m	South
10092243	GW307453	Water Supply	Functional	05/04/2014	10.50		AHD			8.00	1521m	South
10099976	GW307452	Water Supply	Functional	05/04/2014	10.50		AHD			8.00	1537m	South
10085606	GW302438	Monitoring	Unknown	06/10/1999	4.50		AHD				1577m	South
10087623	GW302439	Monitoring	Unknown	06/10/1999	4.50		AHD				1579m	South
10090211	GW307166	Monitoring	Functional	15/02/2012	7.00		AHD			3.20	1584m	South East
10084370	GW302437	Monitoring	Unknown	06/10/1999	4.90		AHD				1588m	South
10086385	GW307167	Monitoring	Functional	15/02/2012	7.00		AHD			3.20	1588m	South East
10083739	GW307168	Monitoring	Functional	15/02/2012	7.00		AHD			3.00	1624m	South East
10122872	GW304115	Monitoring	Unknown	13/02/2002	9.00		AHD			5.50	1666m	South
10046948	GW305129	Monitoring	Unknown	20/01/2002	9.00		AHD			5.50	1687m	South West
10088606	GW304884	Monitoring	Unknown	09/09/2004	8.60		AHD				1709m	South West
10128983	GW302111	Irrigation	Unknown	19/01/1998	32.30		AHD		1.300	8.00	1745m	South West
10093118	GW305464	Monitoring	Unknown	06/10/2005	11.00		AHD		4.000	7.00	1768m	South
10078726	GW306038	Monitoring	Functional	01/06/2007	10.00		AHD	4500	1.000	6.00	1779m	South
10096356	GW305463	Monitoring	Unknown	05/10/2005	11.00		AHD		4.000	5.90	1788m	South
10078054	GW306036	Monitoring	Functional	01/06/2007	10.00		AHD	4500	1.000	6.00	1790m	South
10075182	GW306037	Monitoring	Functional	01/06/2007	10.00		AHD	4500	1.000	6.00	1798m	South
10053435	GW037210	Stock and Domestic	Unknown		3.00		AHD				1835m	West

NGIS Bore ID	NSW Bore ID	Bore Type	Status	Drill Date	Bore Depth (m)	Reference Elevation	Height Datum	Salinity (mg/L)	Yield (L/s)	SWL (mbgl)	Distance	Direction
10020108	GW037532	Water Supply	Unknown		13.70		AHD	Hard			1837m	North West
10102501	GW037582	Stock and Domestic	Unknown		3.00		AHD				1837m	North West
10062397	GW302281	Monitoring	Unknown	25/08/1998	8.10		AHD			5.64	1854m	South West
10082743	GW301606	Monitoring	Unknown	25/08/1998	9.00		AHD			5.75	1857m	South West
10062844	GW302282	Monitoring	Unknown	25/08/1998	8.30		AHD			5.40	1879m	South West
10126506	GW071090	Other	Unknown	09/03/1993	160.00	11.00	AHD	640	7.000	0.60	1890m	South East
10008160	GW060109	Commercial and Industrial	Unknown	01/01/1982	40.00		AHD	Good			1924m	South
10018842	GW072509	Stock and Domestic	Unknown	16/04/1994	26.00		AHD		4.000	3.00	1958m	North East

Hydrogeology & Groundwater

163-170 Alexandra Parade, North Lismore, NSW 2480

Driller's Logs

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

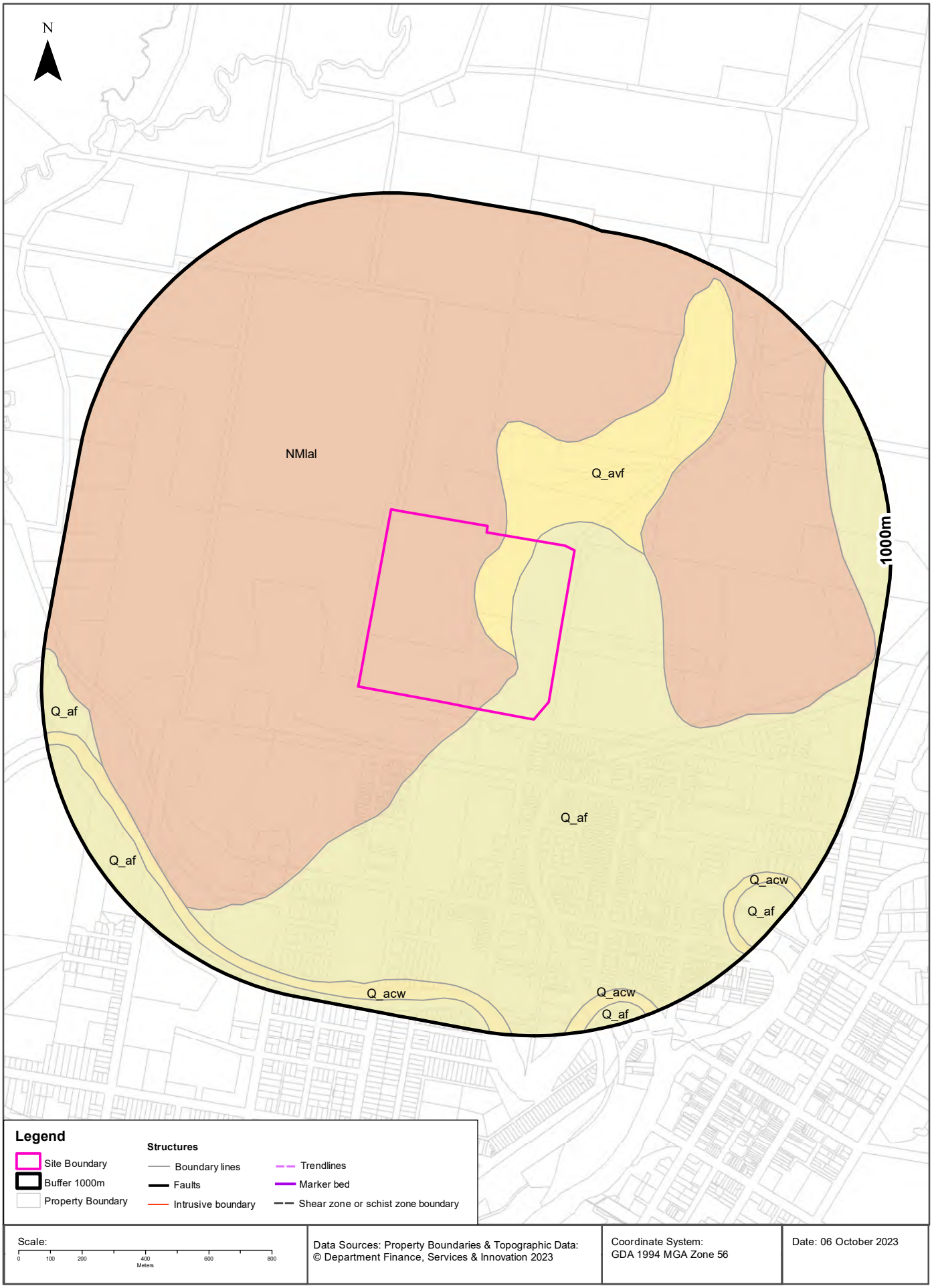
NGIS Bore ID	Drillers Log	Distance	Direction
10150214	0.00m-2.43m Topsoil 2.43m-5.43m Pug 5.43m-7.23m Sand	628m	South
10017343	0.00m-0.30m Soil 0.30m-4.20m Black Pug 4.20m-11.30m Brown Clay 11.30m-24.00m Decomposed Basalt 24.00m-27.70m Clay 27.70m-30.50m Firm Blue Basalt	849m	East
10122110	0.00m-1.00m TOPSOIL AND CLAY 1.00m-3.00m WEATHERED BASALT 3.00m-20.00m WEATHERED BASALT 20.00m-21.00m CLAY 21.00m-30.00m BASALT 30.00m-31.00m CLAY 31.00m-37.00m BASALT 37.00m-38.00m CLAY 38.00m-57.00m BASALT VERY POROUS 57.00m-67.00m CLAY 67.00m-69.00m ROTTEN ROCK 69.00m-70.00m CLAY 70.00m-84.00m BASALT VERY POROUS 84.00m-87.00m BASALT QUARTZ 87.00m-101.00m CLAY (SANDY) 101.00m-105.00m BASALT 105.00m-109.00m SAND	882m	West
10090757	0.00m-0.20m mixed fill 0.20m-3.10m grey clay, moist dense 3.10m-13.00m brown clay, moist dense 13.00m-15.50m fine brown/grey sand	916m	South East
10029156	0.00m-1.50m Soil & fill 1.50m-6.00m Clay 6.00m-19.80m Dec basalt 19.80m-42.60m Brown basalt 42.60m-109.70m Blue basalt 109.70m-114.30m Soft brown basalt 114.30m-123.40m Soft blue basalt 123.40m-129.50m Firm blue basalt 129.50m-132.50m Soft blue basalt 132.50m-144.70m Firm blue basalt	1488m	North
10086924	0.00m-0.50m Fill; dark brown/black ash fill some road base in dark brown clay matrix 0.50m-1.50m Clay; dark brown grey, stiff, minor light brown mottles 1.50m-2.20m Clay; light grey, stiff 2.20m-3.80m Clay; as above, becoming dark brown 3.80m-4.80m Clay; as above, slight light brown mottles 4.80m-5.80m Clay; brown, minor black/dark grey mottles 5.80m-7.00m Clay; medium brown, orange mottles, very stiff 7.00m-8.30m Clay; as above, becoming softer, longer ribbon lengths 8.30m-9.80m Clay; orange brown, slightly softer 9.80m-10.50m Clay, Silty; orange brown, becoming soft 10.50m-12.00m Clay; yellow orange to light brown, soft, minor sand, some grey mottling, very soft, wet	1490m	South
10092243	0.00m-0.50m Fill; gravel in medium brown clay matrix 0.50m-2.00m Clay; dark grey, stiff, minor light brown mottles 2.00m-3.00m Clay; medium dark brown/grey, stiff 3.00m-4.00m Clay; medium brown, stiff 4.00m-5.00m Clay; medium brown, becoming softer 5.00m-6.00m Clay; dark brown/grey, stiff, some light brown 6.00m-8.00m Clay; medium brown, minor orange mottles, stiff 8.00m-9.00m Clay; medium brown, stiff 9.00m-10.50m Clay; medium brown/orange, soft & wet, some fine sand in clay (gritty)	1521m	South

NGIS Bore ID	Drillers Log	Distance	Direction
10099976	0.00m-0.50m Fill; gravel in medium brown clay matrix 0.50m-1.50m Clay; dark brown/grey, stiff, minor light brown mottles 1.50m-3.00m Clay; medium brown, minor orange mottles, stiff, slightly silty 3.00m-4.00m Clay; medium brown, minor orange mottles, stiff 4.00m-5.00m Clay; medium brown with micro lenses of orange brown silty clay, soft 5.00m-7.00m Clay; brown, medium, stiff, no mottles 7.00m-8.00m Clay; medium brown, minor orange & grey mottles, very stiff 8.00m-9.00m Clay; medium brown, stiff 9.00m-10.50m Clay; light brown/orange, mottled, soft & wet, some fine sand in clay (gritty)	1537m	South
10085606	0.00m-1.20m brown clay 1.20m-2.00m brown clay 2.00m-3.20m sandy clay 3.20m-4.30m sandy clay 4.30m-4.50m grey-brown clay	1577m	South
10087623	0.00m-1.00m sandy clay and small gravel 1.00m-1.50m grey clay 1.50m-2.25m brown grey clay 2.25m-3.30m brown sandy clay 3.30m-4.50m brown clay	1579m	South
10090211	0.00m-0.20m Fill, surface; gravel 0.20m-1.20m Silty Clay; trace sand, brown, moist, firm, medium-high plasticity 1.20m-4.00m Silty Clay; dark brown, moist, stiff, medium-high plasticity, @ 3m dark grey, very stiff 4.00m-7.00m Silty Clay; @ 4m, grey, very stiff, high plasticity, very moist, @ approx 4m acquifer	1584m	South East
10084370	0.00m-2.60m brown grey clay 2.60m-3.20m brown clay 3.20m-4.90m sandy brown clay	1588m	South
10086385	0.00m-0.20m Fill, surface, gravel 0.20m-1.50m Silty Clay; trace sand, brown, moist, firm, medium high plasticity 1.50m-4.50m Silty Clay; dark brown, mosit, stiff, medium high plasticity, @ 3m grey, very stiff, high plasticity 4.50m-7.00m Silty Clay; @ 4.5m very moist, @ approx 4.5m aquifer	1588m	South East
10083739	0.00m-0.20m Fill, surface, concrete 0.20m-1.00m Silty Clay; dark grey, wet, high plasticity, soft, HC odour 1.00m-7.00m Silty Clay; dark grey, moist, medium high palsticity, HC odour, @ approx 4.5m aquifer	1624m	South East
10122872	0.00m-5.40m CLAY BROWN-GREY FIRM STIFF 5.40m-9.00m WEATHERED ROCK FABRIC BROWN-YELLOW	1666m	South
10046948	0.00m-1.00m fill: 1.00m-2.00m clay, some gravel, drk brn, med plasiciy stiff wet-moist 2.00m-3.50m clay grey firm mod plasicity monogenius damp 3.50m-7.00m clay grey/brown some mottling very stiff mod plascity dry 7.00m-8.50m clay light brown saturated some sand firm low plascity 8.50m-9.00m clay very hard high plascity trace gravel and sand brown saturated	1687m	South West
10088606	0.00m-0.10m bitumen or CBR 0.10m-8.60m clay grey hard	1709m	South West
10128983	0.00m-1.80m Fill 1.80m-12.10m pug 12.10m-26.80m Clay & Shell 26.80m-32.30m Sand	1745m	South West
10093118	0.00m-0.50m gravel fill lt brown cg, compacted 0.50m-11.00m clay, dk brown, fg. soft	1768m	South
10078726	0.00m-1.00m Sandy Clay (Fill), dark brown, low plasticity 1.00m-10.00m Silty Clay, orange/brown, high plasticity	1779m	South
10096356	0.00m-0.50m sand fill lt brown mg loose 0.50m-3.00m clay black, fg, soft 3.00m-11.00m clay dark brown fg soft	1788m	South
10078054	0.00m-2.00m Sandy Clay (Fill), dark brown, low-medium 2.00m-10.00m Silty Clay, grey, orange/brown, high plasticity	1790m	South
10075182	0.00m-0.80m Clayey Gravel (Road Base), brown 0.80m-10.00m Silty Clay, grey-orange/brown, high plasticity	1798m	South
10053435	0.00m-2.44m Soil Broken Rock 2.44m-3.05m Basalt Broken Water Supply	1835m	West
10020108	0.00m-0.60m Clay Stoney 0.60m-6.09m Clay Rock Soft 6.09m-10.66m Basalt 10.66m-13.71m Basalt Broken Water Supply	1837m	North West
10102501	0.00m-2.43m Clay 0.00m-2.43m Rock Broken 2.43m-3.04m Basalt Broken Water Supply	1837m	North West
10062397	0.00m-0.60m Fill and Concrete 0.60m-8.10m Pug	1854m	South West
10082743	0.00m-0.30m fill 0.30m-9.00m pug	1857m	South West
10062844	0.00m-0.60m Fill - Road base gravel 0.60m-8.30m Pug	1879m	South West

NGIS Bore ID	Drillers Log	Distance	Direction
10126506	0.00m-0.90m Soil 0.90m-23.00m Clay 23.00m-30.80m Clay - Sandy 30.80m-39.00m Sand - coarse & gravel 39.00m-40.20m Clay 40.20m-70.00m Shale - muddy, sandy 70.00m-160.00m Sandstone - clean interbedded with shale	1890m	South East
10018842	0.00m-0.30m Soil 0.30m-3.00m Puggy Clay 3.00m-18.90m Decomposed Basalt 18.90m-21.90m Firm Blue Basalt 21.90m-26.00m Soft Basalt	1958m	North East

Geology

163-170 Alexandra Parade, North Lismore, NSW 2480



Geology

163-170 Alexandra Parade, North Lismore, NSW 2480

Geological Units

What are the Geological Units within the dataset buffer?

Unit Code	Unit Name	Description	Unit Stratigraphy	Age	Dominant Lithology	Distance
NMlal	Lismore Basalt	Predominantly tholeiitic with occasional alkaline types of formations.	/Lamington Volcanic Complex//Lismore Basalt//	Chattian (base) to Aquitanian (top)	Basalt	0m
Q_af	Alluvial floodplain deposits	Silt, very fine- to medium-grained lithic to quartz-rich sand, clay.	/Alluvium//Alluvial floodplain deposits//	Quaternary (base) to Now (top)	Clastic sediment	0m
Q_avf	Alluvial fan deposits	Fluvially-deposited quartz-lithic sand, silt, gravel, clay.	/Alluvium//Alluvial valley deposits/Alluvial fan deposits/	Quaternary (base) to Now (top)	Clastic sediment	0m
Q_acw	Alluvial channel deposits - subaqueous	Fluvially deposited sand, gravel, silt, clay.	/Alluvium//Alluvial channel deposits/Alluvial channel deposits-subaqueous/	Quaternary (base) to Now (top)	Clastic sediment	821m

Linear Geological Structures

What are the Dyke, Sill, Fracture, Lineament and Vein trendlines within the dataset buffer?

Map ID	Feature Description	Map Sheet Name	Distance
No Features			

What are the Faults, Shear zones or Schist zones, Intrusive boundaries & Marker beds within the dataset buffer?

Map ID	Boundary Type	Description	Map Sheet Name	Distance
No Features				

Naturally Occurring Asbestos Potential

163-170 Alexandra Parade, North Lismore, NSW 2480

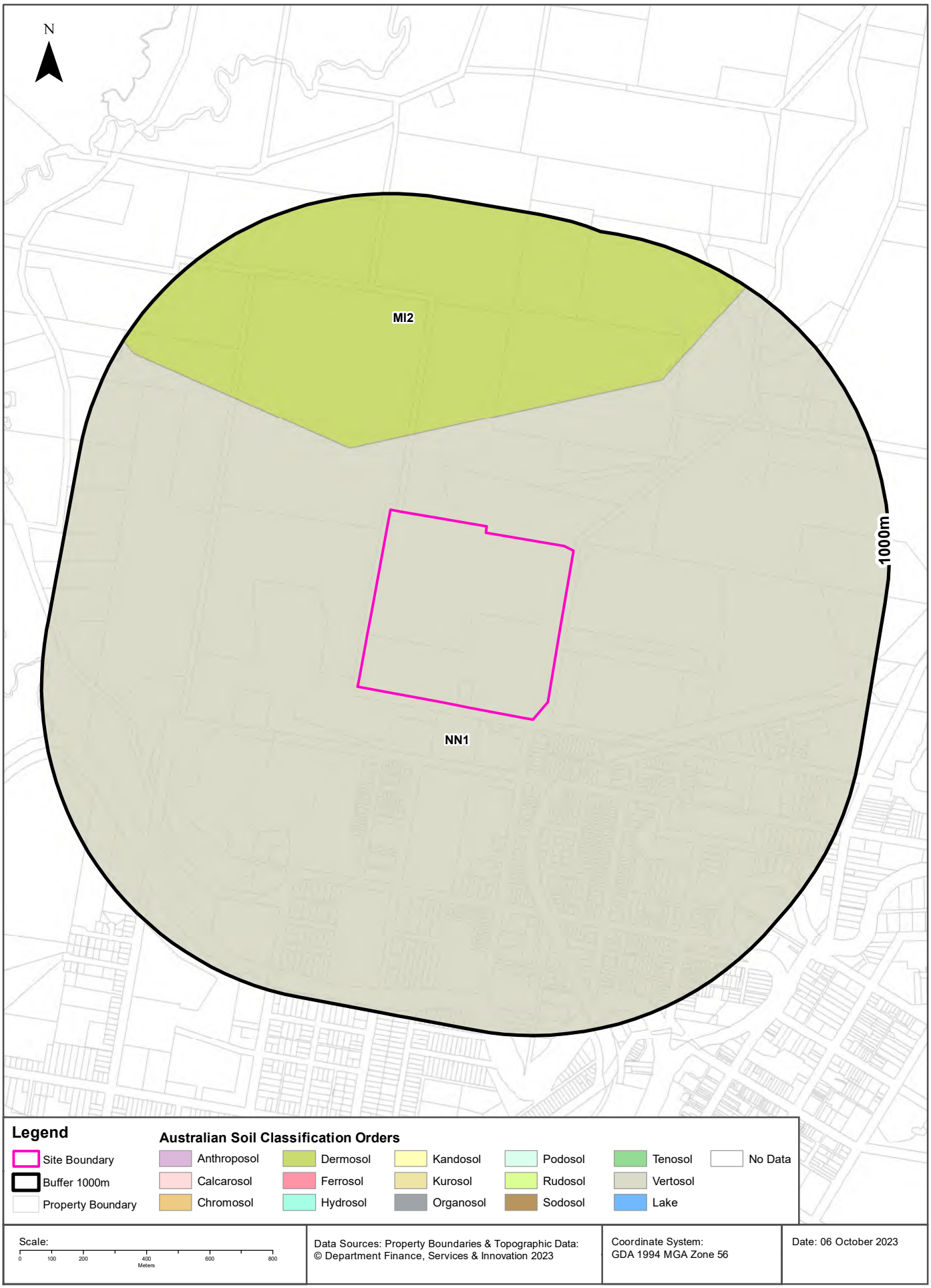
Naturally Occurring Asbestos Potential

Naturally Occurring Asbestos Potential within the dataset buffer:

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

Atlas of Australian Soils

163-170 Alexandra Parade, North Lismore, NSW 2480



Soils

163-170 Alexandra Parade, North Lismore, NSW 2480

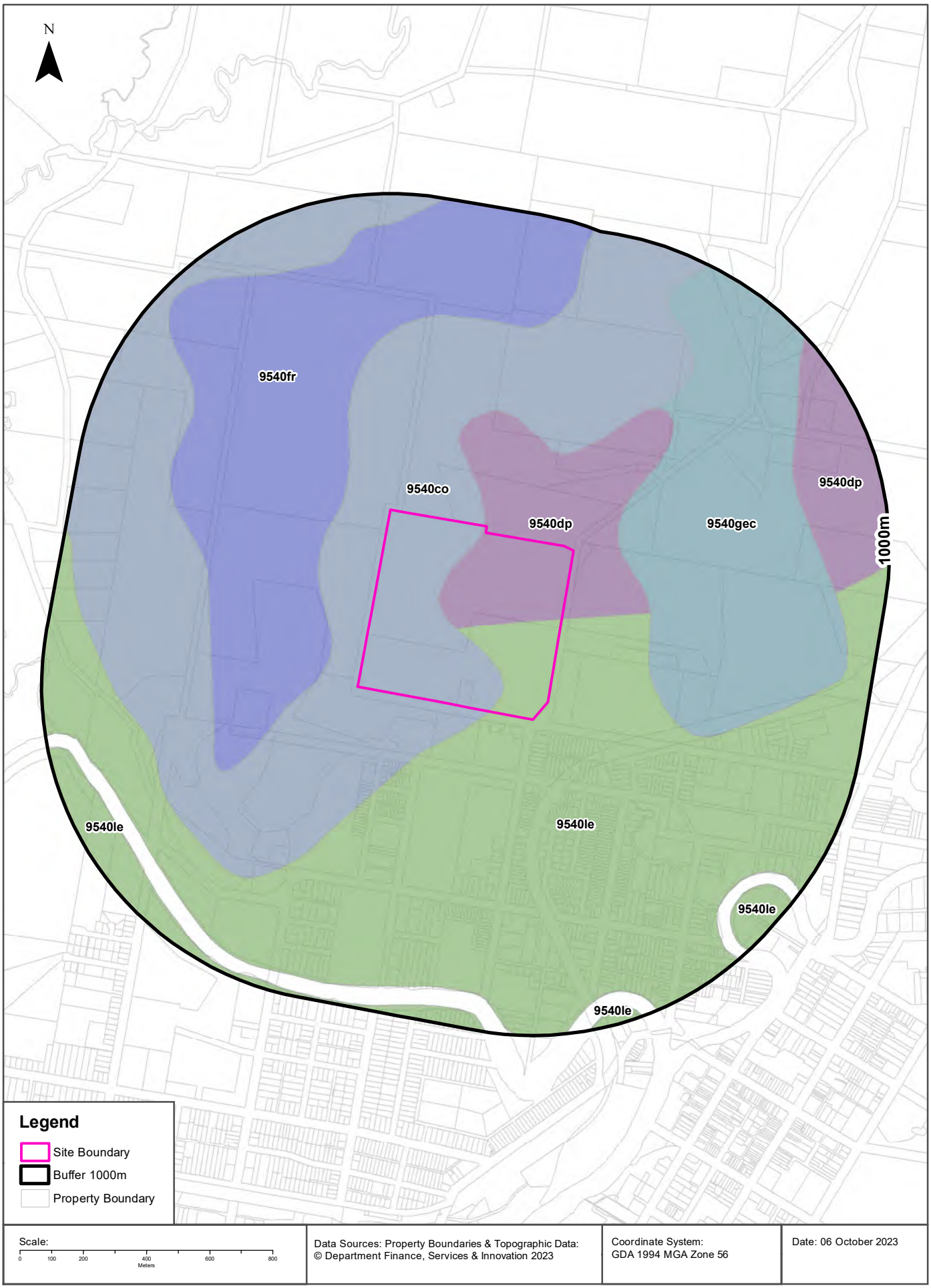
Atlas of Australian Soils

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

Map Unit Code	Soil Order	Map Unit Description	Distance	Direction
NN1	Vertosol	River flood-plains: relatively large and poorly drained, flat areas of deep dark cracking clays (Ug5.4) and (Ug5.16) with some melon-hole microrelief. Associated are friable yellow mottled soils (Dy5.1), and well-drained sandy levee soils (not described). As mapped, small islands of adjacent units are included.	0m	On-site
Ml2	Dermosol		218m	North

Soil Landscapes of Central and Eastern NSW

163-170 Alexandra Parade, North Lismore, NSW 2480



Soils

163-170 Alexandra Parade, North Lismore, NSW 2480

Soil Landscapes of Central and Eastern NSW

Soil Landscapes of Central and Eastern NSW within the dataset buffer:

Soil Code	Name	Distance	Direction
9540co	Coolamon	0m	On-site
9540dp	Disputed Plain	0m	On-site
9540le	Leycester	0m	On-site
9540fr	Frederick	103m	North West
9540gec	Georgica variant c	144m	East

Acid Sulfate Soils

163-170 Alexandra Parade, North Lismore, NSW 2480

Environmental Planning Instrument - Acid Sulfate Soils

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

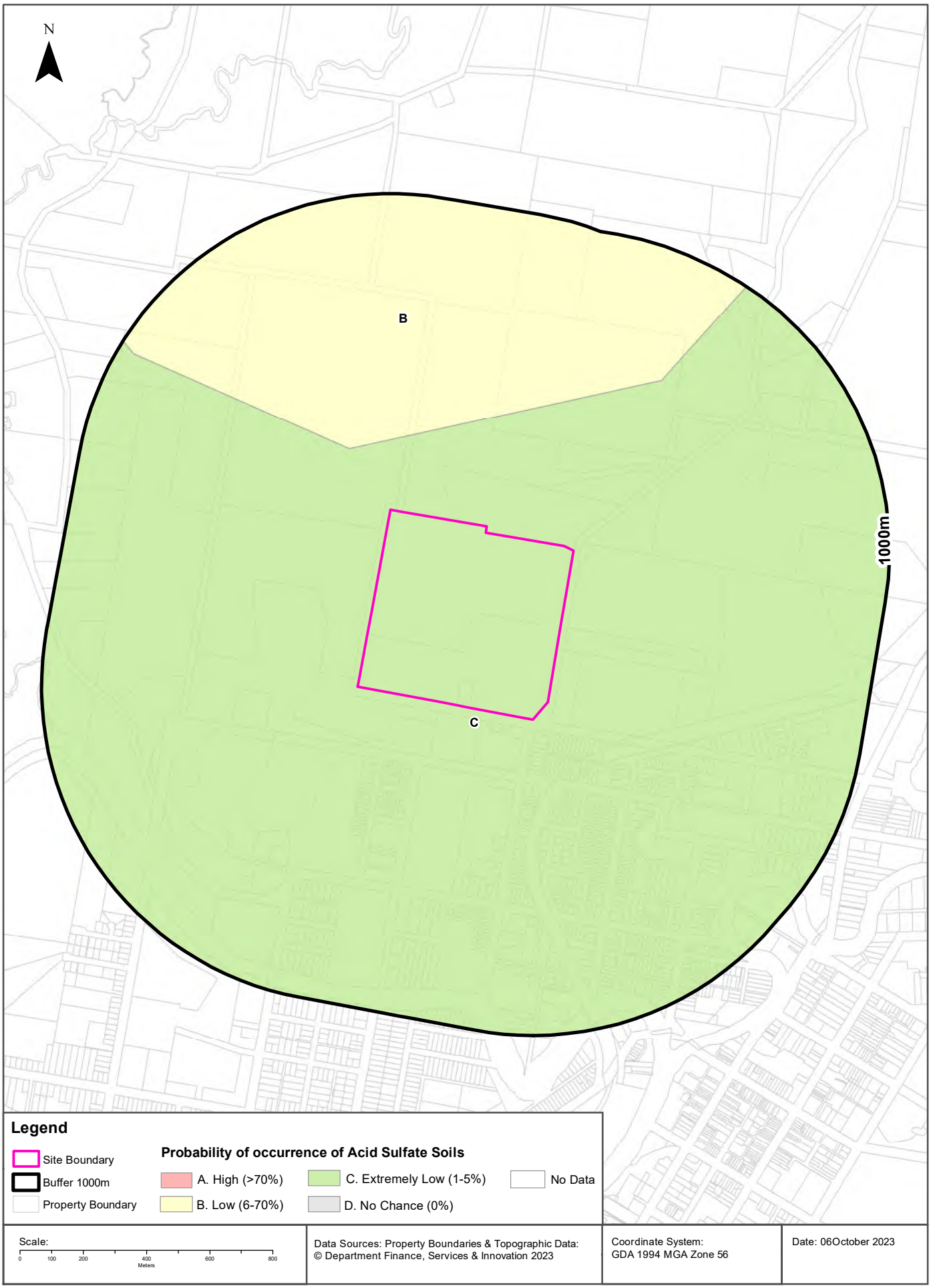
Soil Class	Description	EPI Name
N/A		

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

Soil Class	Description	EPI Name	Distance	Direction
N/A				

Atlas of Australian Acid Sulfate Soils

163-170 Alexandra Parade, North Lismore, NSW 2480



Acid Sulfate Soils

163-170 Alexandra Parade, North Lismore, NSW 2480

Atlas of Australian Acid Sulfate Soils

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

Class	Description	Distance	Direction
C	Extremely low probability of occurrence. 1-5% chance of occurrence with occurrences in small localised areas.	0m	On-site
B	Low Probability of occurrence. 6-70% chance of occurrence.	218m	North

Dryland Salinity

163-170 Alexandra Parade, North Lismore, NSW 2480

Dryland Salinity - National Assessment

Is there Dryland Salinity - National Assessment data onsite?

No

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

No

What Dryland Salinity assessments are given?

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

Dryland Salinity Data Source : National Land and Water Resources Audit
The Commonwealth and all suppliers of source data used to derive the maps of "Australia, Forecast Areas Containing Land of High Hazard or Risk of Dryland Salinity from 2000 to 2050" do not warrant the accuracy or completeness of information in this product. Any person using or relying upon such information does so on the basis that the Commonwealth and data suppliers shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information. Any persons using this information do so at their own risk.
In many cases where a high risk is indicated, less than 100% of the area will have a high hazard or risk.

Mining

163-170 Alexandra Parade, North Lismore, NSW 2480

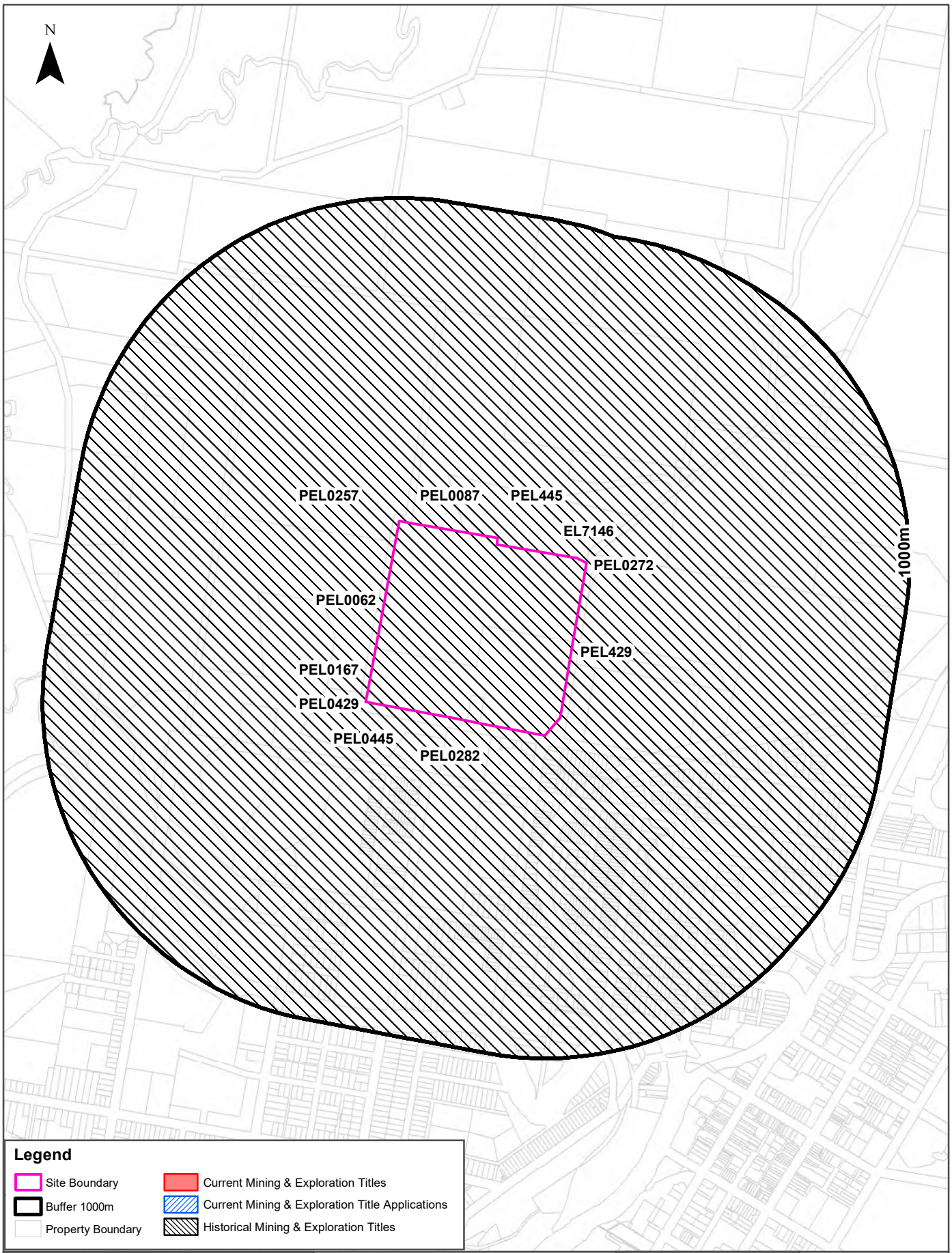
Mining Subsidence Districts

Mining Subsidence Districts within the dataset buffer:

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

Mining & Exploration Titles

163-170 Alexandra Parade, North Lismore, NSW 2480



Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2023

Coordinate System: GDA 1994 MGA Zone 56

Date: 06 October 2023

Mining

163-170 Alexandra Parade, North Lismore, NSW 2480

Current Mining & Exploration Titles

Current Mining & Exploration Titles within the dataset buffer:

Title Ref	Holder	Grant Date	Expiry Date	Last Renewed	Operation	Resource	Minerals	Dist	Dir
N/A	No records in buffer								

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

Current Mining & Exploration Title Applications

Current Mining & Exploration Title Applications within the dataset buffer:

Application Ref	Applicant	Application Date	Operation	Resource	Minerals	Dist	Dir
N/A	No records in buffer						

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

Mining

163-170 Alexandra Parade, North Lismore, NSW 2480

Historical Mining & Exploration Titles

Historical Mining & Exploration Titles within the dataset buffer:

Title Ref	Holder	Start Date	End Date	Resource	Minerals	Dist	Dir
EL7146	GRADIENT ENERGY LIMITED	20080528	20110415	MINERALS	Geothermal	0m	On-site
PEL0257	OIL AND MINERALS QUEST NL	19800312		PETROLEUM	Petroleum	0m	On-site
PEL0282	AGL PETROLEUM OPERATIONS PTY LTD	19930403	19920411	PETROLEUM	Petroleum	0m	On-site
PEL0087	NATIONAL OIL HOLDINGS LTD, ALLIANCE OIL DEVELOPMENT AUSTRALIA NL			PETROLEUM	Petroleum	0m	On-site
PEL0445	DART ENERGY (BRUXNER) PTY LTD	20050704	20160710	PETROLEUM	Petroleum	0m	On-site
PEL0062	MID-EASTERN OIL			PETROLEUM	Petroleum	0m	On-site
PEL445	DART ENERGY (BRUXNER) PTY LTD	20040419	20101102	MINERALS		0m	On-site
PEL0429	SUNOCO INC	20010210	20030111	PETROLEUM	Petroleum	0m	On-site
PEL429	SUNOCO INC.	19991026	20001117	MINERALS		0m	On-site
PEL0272	CLAREMONT PETROLEUM NL, CHARTERHALL OIL AUSTRALIA PTY LTD, BASCO ENERGY INC., PLANET RESOURCES GROUP NL, KANDER PTY LTD	19840307	19870207	PETROLEUM	Petroleum	0m	On-site
PEL0167	BRIDGE OIL			PETROLEUM	Petroleum	0m	On-site

State Environmental Planning Policy

163-170 Alexandra Parade, North Lismore, NSW 2480

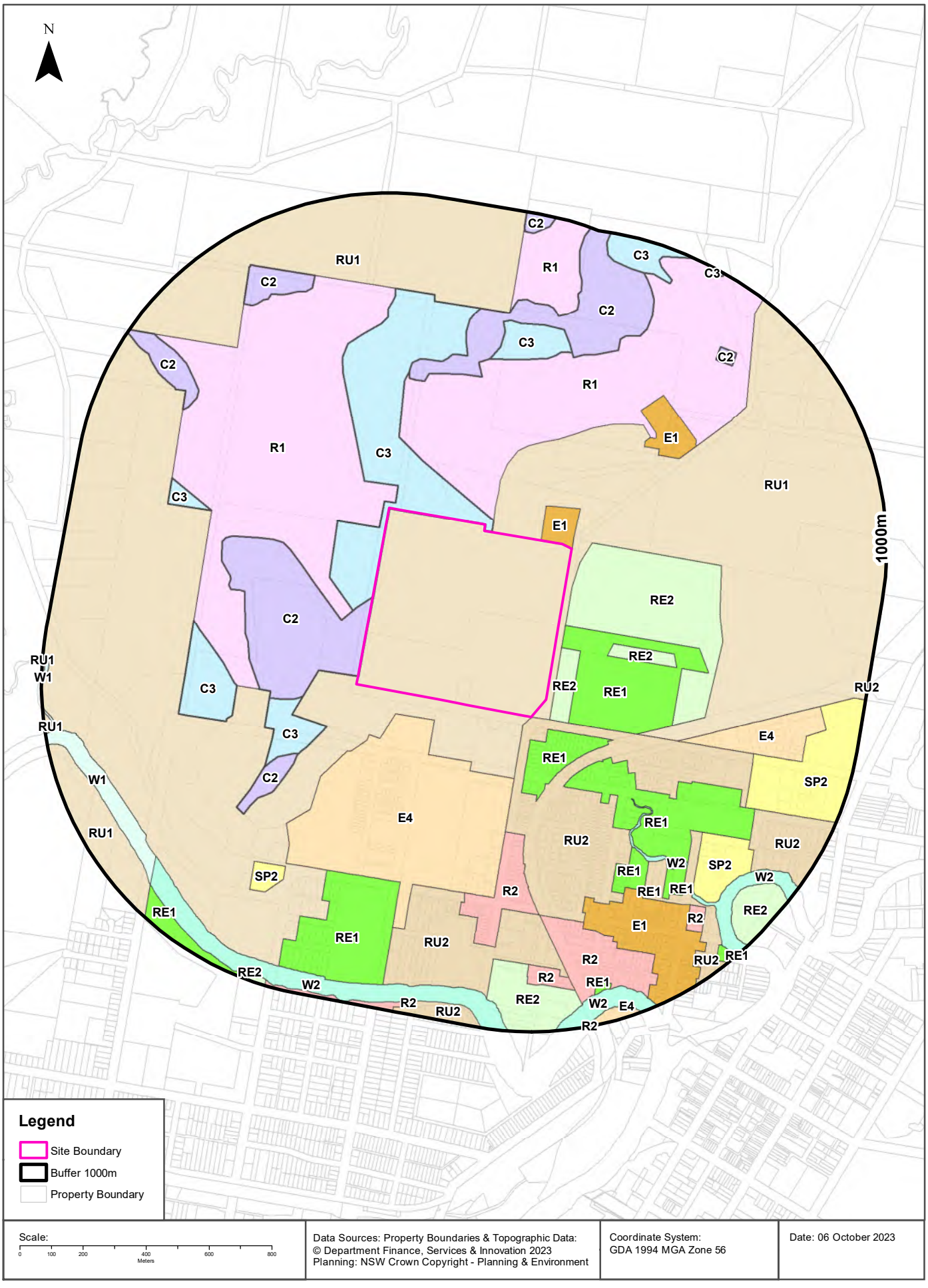
State Significant Precincts

What SEPP State Significant Precincts exist within the dataset buffer?

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

EPI Planning Zones

163-170 Alexandra Parade, North Lismore, NSW 2480



Environmental Planning Instrument

163-170 Alexandra Parade, North Lismore, NSW 2480

Land Zoning

What EPI Land Zones exist within the dataset buffer?

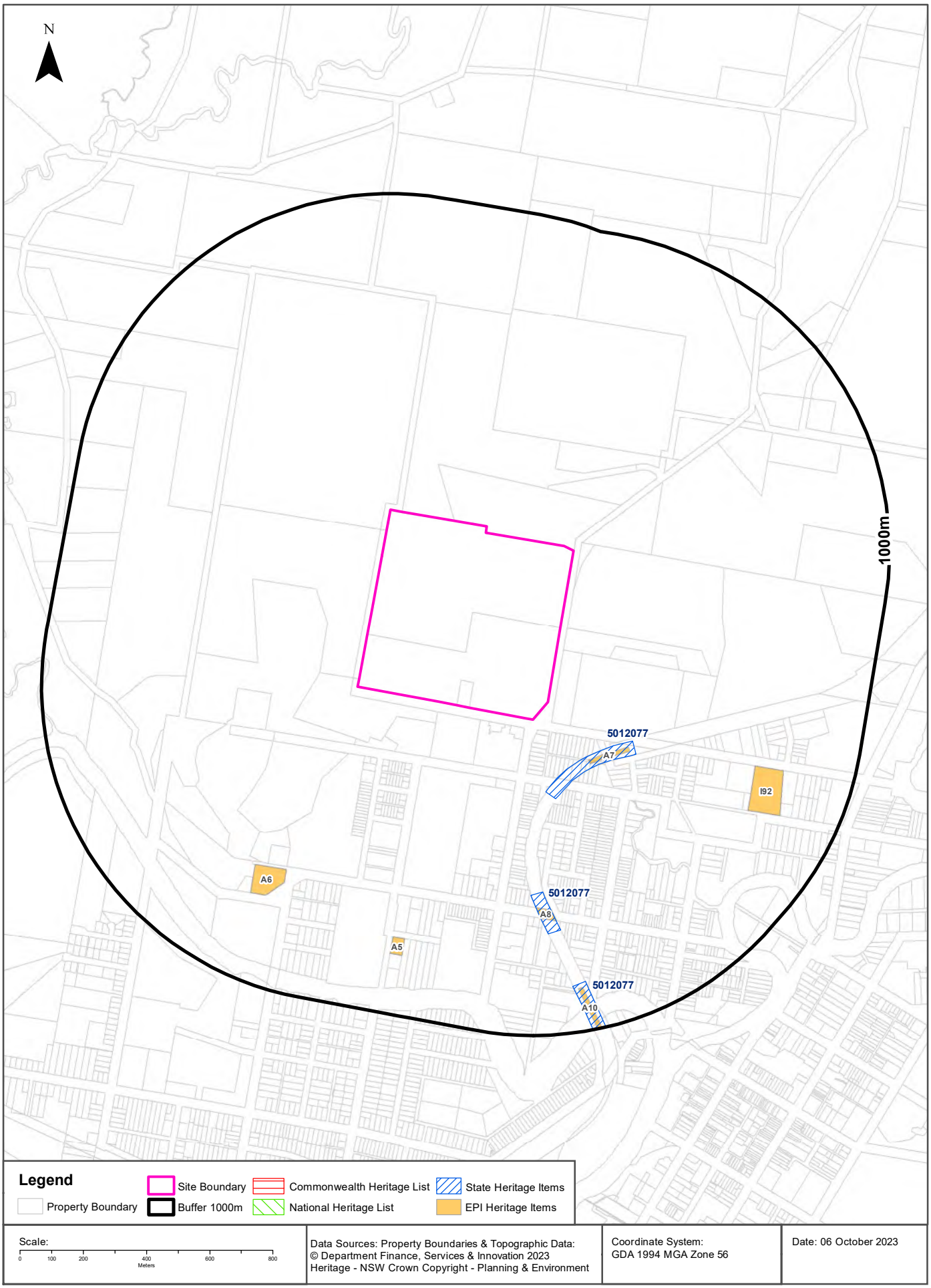
Zone	Description	Purpose	EPI Name	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
RU1	Primary Production		Lismore Local Environmental Plan 2012	07/07/2023	07/07/2023	07/07/2023	Map Amendment No 6	0m	On-site
E1	Local Centre		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	0m	North East
C3	Environmental Management		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	0m	North
C2	Environmental Conservation		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	0m	West
RU2	Rural Landscape		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	0m	South East
RE1	Public Recreation		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	20m	South East
RE2	Private Recreation		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	20m	South East
R1	General Residential		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	20m	North West
RE2	Private Recreation		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	20m	East
R1	General Residential		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	26m	North East
RE1	Public Recreation		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	64m	South East
E4	General Industrial		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	67m	South
C3	Environmental Management		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	164m	South West
RE2	Private Recreation		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	167m	East
RE1	Public Recreation		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	228m	South East
C2	Environmental Conservation		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	289m	South West
R2	Low Density Residential		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	374m	South
C3	Environmental Management		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	381m	West
E1	Local Centre		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	398m	North East
W2	Recreational Waterways		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	407m	South East

Zone	Description	Purpose	EPI Name	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
C2	Environmental Conservation		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	415m	North
E4	General Industrial		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	437m	East
C3	Environmental Management		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	518m	North
RE1	Public Recreation		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	519m	South East
C3	Environmental Management		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	554m	North West
RU2	Rural Landscape		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	588m	South
RU2	Rural Landscape		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	590m	South East
RE1	Public Recreation		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	592m	South
E1	Local Centre		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	595m	South East
SP2	Infrastructure	Cemetery	Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	621m	South West
R2	Low Density Residential		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	628m	South
RE1	Public Recreation		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	642m	South East
SP2	Infrastructure	Educational Establishment	Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	649m	South East
RE1	Public Recreation		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	653m	South East
R1	General Residential		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	675m	North
SP2	Infrastructure	Educational Establishment	Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	679m	South East
C2	Environmental Conservation		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	705m	North West
C2	Environmental Conservation		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	738m	North West
RU2	Rural Landscape		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	746m	South East
W2	Recreational Waterways		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	748m	South
C2	Environmental Conservation		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	755m	North East
RE2	Private Recreation		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	777m	South
R2	Low Density Residential		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	779m	South East
R2	Low Density Residential		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	786m	South

Zone	Description	Purpose	EPI Name	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
W1	Natural Waterways		Lismore Local Environmental Plan 2012	07/07/2023	07/07/2023	07/07/2023	Map Amendment No 6	821m	South West
RE2	Private Recreation		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	859m	South East
RE1	Public Recreation		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	861m	South
RU1	Primary Production		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	877m	South West
C3	Environmental Management		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	894m	North East
RE1	Public Recreation		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	913m	South West
RE1	Public Recreation		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	934m	South East
C2	Environmental Conservation		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	937m	North
RU2	Rural Landscape		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	939m	South
E4	General Industrial		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	954m	South
R2	Low Density Residential		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	960m	South
RE2	Private Recreation		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	970m	South West
R2	Low Density Residential		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	990m	South
RU2	Rural Landscape		Lismore Local Environmental Plan 2012	21/04/2023	26/04/2023	07/07/2023	Map Amendment No 5	997m	East

Heritage Items

163-170 Alexandra Parade, North Lismore, NSW 2480



Heritage

163-170 Alexandra Parade, North Lismore, NSW 2480

Commonwealth Heritage List

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

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

Heritage Data Source: Australian Government Department of the Environment and Energy - Heritage Branch
Creative Commons 3.0 © Commonwealth of Australia https://creativecommons.org/licenses/by/3.0/au/deed.en

National Heritage List

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

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

Heritage Data Source: Australian Government Department of the Environment and Energy - Heritage Branch
Creative Commons 3.0 © Commonwealth of Australia https://creativecommons.org/licenses/by/3.0/au/deed.en

State Heritage Register - Curtilages

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

Map Id	Name	Address	LGA	Listing Date	Listing No	Plan No	Distance	Direction
5012077	Lismore railway underbridges	North Coast railway, Lismore	LISMORE	02/04/1999	01044	2978	190m	South East
5012077	Lismore railway underbridges	North Coast railway, Lismore	LISMORE	02/04/1999	01044	2978	546m	South
5012077	Lismore railway underbridges	North Coast railway, Lismore	LISMORE	02/04/1999	01044	2978	845m	South

Heritage Data Source: NSW Crown Copyright - Office of Environment & Heritage
Creative Commons 4.0 © Commonwealth of Australia https://creativecommons.org/licenses/by/4.0/

Environmental Planning Instrument - Heritage

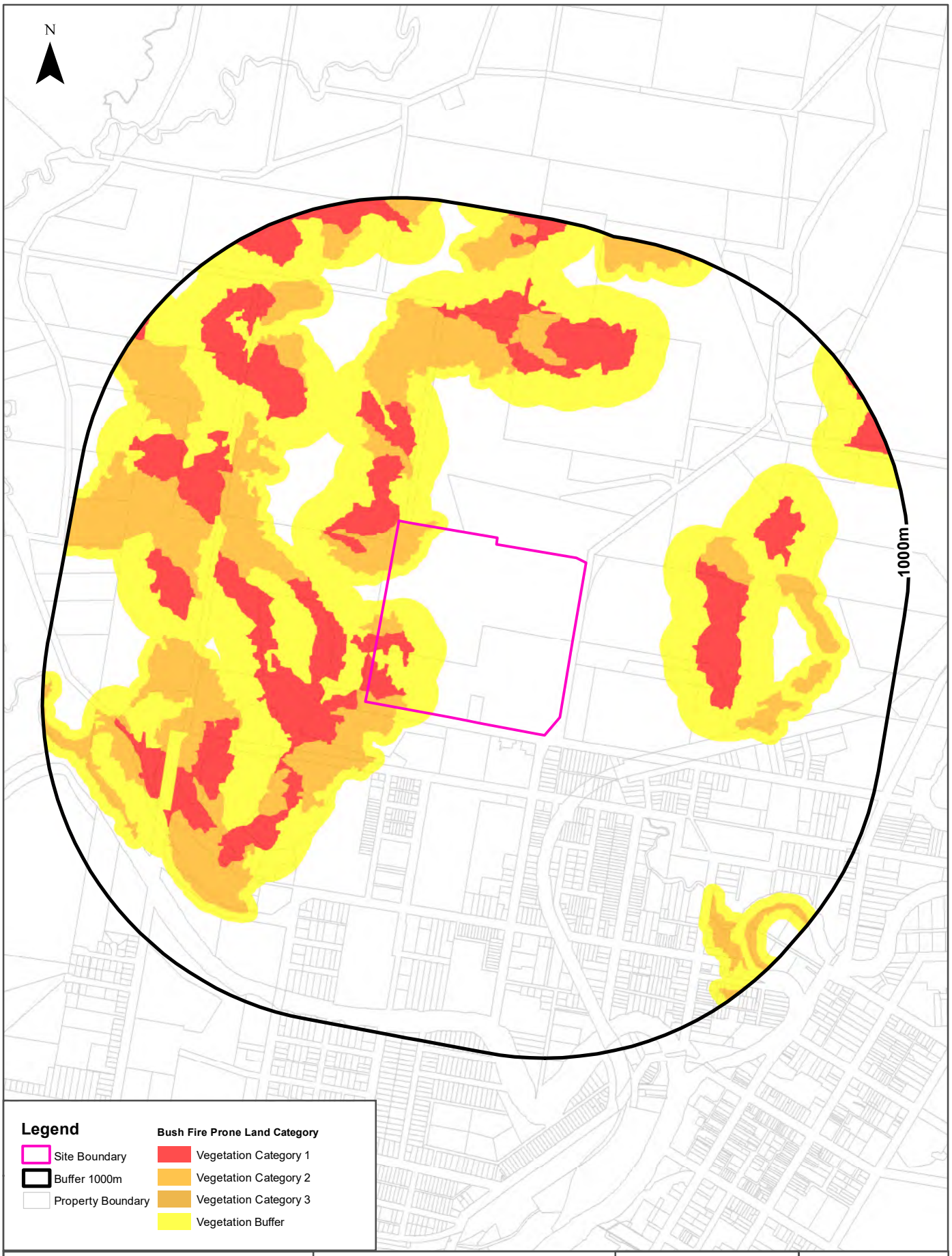
What are the EPI Heritage Items located within the dataset buffer?

Map Id	Name	Classification	Significance	EPI Name	Published Date	Commenced Date	Currency Date	Distance	Direction
A7	Railway Viaduct	Item - Archaeological	State	Lismore Local Environmental Plan 2012	22/02/2013	22/02/2013	26/08/2022	216m	South East
A8	Railway Viaduct	Item - Archaeological	State	Lismore Local Environmental Plan 2012	22/02/2013	22/02/2013	26/08/2022	595m	South

Map Id	Name	Classification	Significance	EPI Name	Published Date	Commenced Date	Currency Date	Distance	Direction
A6	Pioneer Cemetery and Memorial Rest Park	Item - Archaeological	Local	Lismore Local Environmental Plan 2012	22/02/2013	22/02/2013	26/08/2022	621m	South West
I92	Richmond River High School	Item - General	Local	Lismore Local Environmental Plan 2012	22/02/2013	22/02/2013	26/08/2022	685m	South East
A5	Locheil	Item - Archaeological	Local	Lismore Local Environmental Plan 2012	22/02/2013	22/02/2013	26/08/2022	756m	South
A10	Railway Bridge	Item - Archaeological	State	Lismore Local Environmental Plan 2012	22/02/2013	22/02/2013	26/08/2022	861m	South

Natural Hazards - Bush Fire Prone Land

163-170 Alexandra Parade, North Lismore, NSW 2480



Data Sources: Bush Fire Prone Land: © NSW Rural Fire Service 2023. Property Boundaries: © Department Finance, Services & Innovation 2023

Coordinate System: GDA 1994 MGA Zone 56

Date: 06 October 2023

Natural Hazards

163-170 Alexandra Parade, North Lismore, NSW 2480

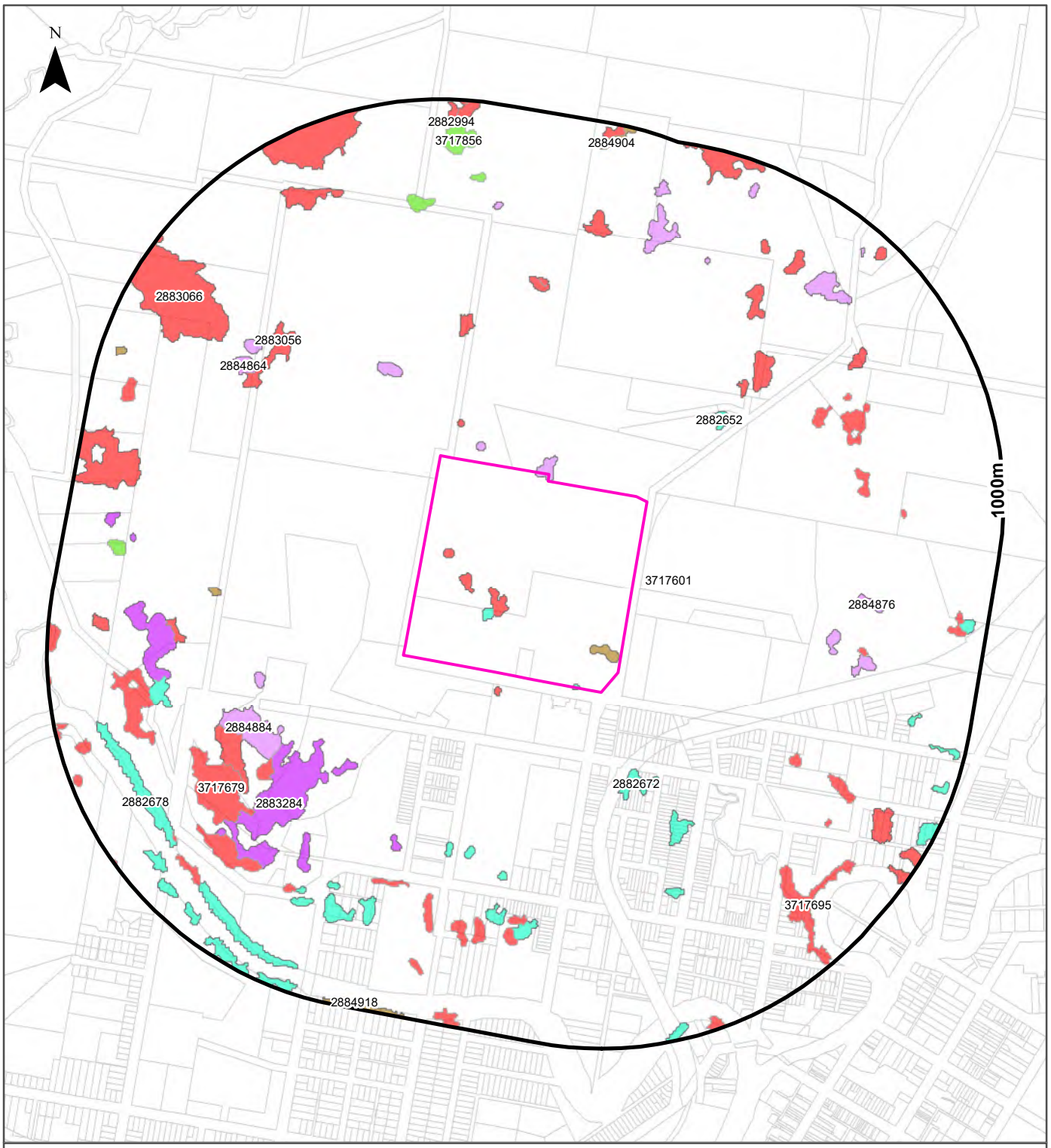
Bush Fire Prone Land

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

Bush Fire Prone Land Category	Distance	Direction
Vegetation Category 1	0m	On-site
Vegetation Category 2	0m	On-site
Vegetation Buffer	0m	On-site

Ecological Constraints - Vegetation & Ramsar Wetlands

163-170 Alexandra Parade, North Lismore, NSW 2480



- Site Boundary
- ReportBuffer
- Property Boundary
- Ramsar Wetland

Native Vegetation

- Alpine Complex
- Arid Shrublands (Acacia sub-formation)
- Arid Shrublands (Chenopod sub-formation)
- Dry Sclerophyll Forests (Shrub/grass sub-formation)
- Dry Sclerophyll Forests (Shrubby sub-formation)
- Forested Wetlands
- Freshwater Wetlands
- Grasslands
- Grassy Woodlands
- Heathlands
- Rainforests
- Saline Wetlands
- Semi-arid Woodlands (Grassy sub-formation)
- Semi-arid Woodlands (Shrubby sub-formation)
- Wet Sclerophyll Forests (Grassy sub-formation)
- Wet Sclerophyll Forests (Shrubby sub-formation)
- Non vegetated
- Unattributed
- Not classified
- Other

Scale: 0 100 200 400 600 800 Meters

Data Sources: Property Boundaries & Topographic Data: © Department Finance, Services & Innovation 2023

Coordinate System: GDA 1994 MGA Zone 56

Date: 06 October 2023

Ecological Constraints

163-170 Alexandra Parade, North Lismore, NSW 2480

Native Vegetation

What native vegetation exists within the dataset buffer?

Map ID	Vegetation Formation	Plant Community Type and Vegetation Formation	Vegetation Class	Dist	Dir
2882652	Forested Wetlands	(Forested Wetlands) Far North Swamp Oak-Tuckeroo Swamp Fringe Forest	Coastal Floodplain Wetlands	0m	On-site
2883056	Rainforests	(Rainforests) Far North Hoop Pine Dry Rainforest	Dry Rainforests	0m	On-site
2883066	Rainforests	(Rainforests) Far North Basalt Gully Dry Rainforest	Dry Rainforests	0m	On-site
2884884	Wet Sclerophyll Forests (Grassy sub-formation)	(Wet Sclerophyll Forests (Grassy sub-formation)) Northern Hinterland Grey Gum-Turpentine Mesic Forest	Northern Hinterland Wet Sclerophyll Forests	0m	On-site
2884918	Grassy Woodlands	(Grassy Woodlands) Far North Lowland Basalt Grassy Forest	Coastal Valley Grassy Woodlands	0m	On-site
3717601	Not classified	(Not classified) Not classified	Not classified	0m	On-site
2882672	Forested Wetlands	(Forested Wetlands) Northern Lowland Swamp Turpentine-Red Gum Forest	Coastal Floodplain Wetlands	0m	South East
2882994	Rainforests	(Rainforests) Northern Lowland Subtropical Rainforest	Subtropical Rainforests	90m	North
2883284	Wet Sclerophyll Forests (Shrubby sub-formation)	(Wet Sclerophyll Forests (Shrubby sub-formation)) Border Ranges Brush Box-Tallowwood Wet Forest	North Coast Wet Sclerophyll Forests	328m	South West
3717679	Rainforests	(Rainforests) Lismore Basalt Subtropical Rainforest	Subtropical Rainforests	469m	South West
3717695	Rainforests	(Rainforests) Lower Richmond Hills Dry-Subtropical Rainforest	Subtropical Rainforests	536m	South
2884864	Wet Sclerophyll Forests (Grassy sub-formation)	(Wet Sclerophyll Forests (Grassy sub-formation)) Northern Gorges Diverse Grassy Forest	Northern Hinterland Wet Sclerophyll Forests	571m	North West
2884876	Wet Sclerophyll Forests (Grassy sub-formation)	(Wet Sclerophyll Forests (Grassy sub-formation)) Northern Hinterland Grey Gum-Mahogany Grassy Forest	Northern Hinterland Wet Sclerophyll Forests	627m	East
2882678	Forested Wetlands	(Forested Wetlands) Far North River Oak Wet Forest	Eastern Riverine Forests	662m	South West
3717856	Dry Sclerophyll Forests (Shrub/grass sub-formation)	(Dry Sclerophyll Forests (Shrub/grass sub-formation)) Clarence Sandstone Rises Spotted Gum Grassy Forest	Clarence Dry Sclerophyll Forests	687m	North
2884904	Grassy Woodlands	(Grassy Woodlands) Far North Ranges Red Gum Grassy Forest	Coastal Valley Grassy Woodlands	922m	North

Ramsar Wetlands

What Ramsar Wetland areas exist within the dataset buffer?

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

Ecological Constraints - Groundwater Dependent Ecosystems Atlas

163-170 Alexandra Parade, North Lismore, NSW 2480

Ecological Constraints

163-170 Alexandra Parade, North Lismore, NSW 2480

Groundwater Dependent Ecosystems Atlas

Type	GDE Potential	Geomorphology	Ecosystem Type	Aquifer Geology	Distance	Direction
Aquatic	High potential GDE - from national assessment	Baslatic plateau terminating southeast in dissected volcanic pile (Mount Warning).	River		764m	South West
Aquatic	High potential GDE - from national assessment	Baslatic plateau terminating southeast in dissected volcanic pile (Mount Warning).	Wetland		810m	South West
Aquatic	Moderate potential GDE - from national assessment	Baslatic plateau terminating southeast in dissected volcanic pile (Mount Warning).	Wetland		816m	South West

Ecological Constraints - Inflow Dependent Ecosystems Likelihood

163-170 Alexandra Parade, North Lismore, NSW 2480

Ecological Constraints

163-170 Alexandra Parade, North Lismore, NSW 2480

Inflow Dependent Ecosystems Likelihood

Type	IDE Likelihood	Geomorphology	Ecosystem Type	Aquifer Geology	Distance	Direction
Aquatic	8	Baslatic plateau terminating southeast in dissected volcanic pile (Mount Warning).	River		764m	South West
Aquatic	10	Baslatic plateau terminating southeast in dissected volcanic pile (Mount Warning).	Wetland		810m	South West
Aquatic	4	Baslatic plateau terminating southeast in dissected volcanic pile (Mount Warning).	Wetland		816m	South West
Aquatic	5	Baslatic plateau terminating southeast in dissected volcanic pile (Mount Warning).	River		835m	South East
Aquatic	6	Baslatic plateau terminating southeast in dissected volcanic pile (Mount Warning).	Wetland		863m	West
Aquatic	6	Baslatic plateau terminating southeast in dissected volcanic pile (Mount Warning).	River		885m	West
Aquatic	5	Baslatic plateau terminating southeast in dissected volcanic pile (Mount Warning).	Wetland		901m	South

Inflow Dependent Ecosystems Likelihood Data Source: The Bureau of Meteorology

Ecological Constraints

163-170 Alexandra Parade, North Lismore, NSW 2480

NSW BioNet Atlas

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

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Amphibia	Mixophyes iteratus	Giant Barred Frog	Endangered	Category 2	Endangered	
Animalia	Aves	Amaurornis moluccana	Pale-vented Bush-hen	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Anseranas semipalmata	Magpie Goose	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Apus pacificus	Fork-tailed Swift	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Ardenna carneipes	Flesh-footed Shearwater	Vulnerable	Not Sensitive	Not Listed	ROKAMBA;JAMBA
Animalia	Aves	Atrichornis rufescens	Rufous Scrub-bird	Vulnerable	Not Sensitive	Endangered	
Animalia	Aves	Calidris acuminata	Sharp-tailed Sandpiper	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Calyptorhynchus banksii samueli	Red-tailed Black-Cockatoo (inland subspecies)	Vulnerable	Category 2	Not Listed	
Animalia	Aves	Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	Vulnerable	Category 2	Vulnerable	
Animalia	Aves	Carterornis leucotis	White-eared Monarch	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Circus assimilis	Spotted Harrier	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Coracina lineata	Barred Cuckoo-shrike	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Cuculus optatus	Oriental Cuckoo	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Daphoenositta chrysoptera	Varied Sittella	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Ephippiorhynchus asiaticus	Black-necked Stork	Endangered	Not Sensitive	Not Listed	
Animalia	Aves	Erythrotriorchis radiatus	Red Goshawk	Critically Endangered	Category 2	Vulnerable	
Animalia	Aves	Falco subniger	Black Falcon	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Gallinago hardwickii	Latham's Snipe	Not Listed	Not Sensitive	Not Listed	ROKAMBA;JAMBA
Animalia	Aves	Glossopsitta pusilla	Little Lorikeet	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Haliaeetus leucogaster	White-bellied Sea-Eagle	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Hieraaetus morphnoides	Little Eagle	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Hirundapus caudacutus	White-throated Needletail	Not Listed	Not Sensitive	Vulnerable	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Irediparra gallinacea	Comb-crested Jacana	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Ixobrychus flavicollis	Black Bittern	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Nettapus coromandelianus	Cotton Pygmy-Goose	Endangered	Not Sensitive	Not Listed	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Aves	Ninox connivens	Barking Owl	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Ninox strenua	Powerful Owl	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Onychoprion fuscata	Sooty Tern	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Oxyura australis	Blue-billed Duck	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Pandion cristatus	Eastern Osprey	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Petroica boodang	Scarlet Robin	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Phaethon rubricauda	Red-tailed Tropicbird	Vulnerable	Not Sensitive	Not Listed	CAMBA;JAMBA
Animalia	Aves	Pluvialis fulva	Pacific Golden Plover	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Pluvialis squatarola	Grey Plover	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Podargus ocellatus	Marbled Frogmouth	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Ptilinopus magnificus	Wompoo Fruit-Dove	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Ptilinopus regina	Rose-crowned Fruit-Dove	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Ptilinopus superbus	Superb Fruit-Dove	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Sterna hirundo	Common Tern	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Stictonetta naevosa	Freckled Duck	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Thalasseus bergii	Crested Tern	Not Listed	Not Sensitive	Not Listed	JAMBA
Animalia	Aves	Thinornis cucullatus cucullatus	Eastern Hooded Dotterel	Critically Endangered	Not Sensitive	Vulnerable	
Animalia	Aves	Tyto longimembris	Eastern Grass Owl	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Tyto novaehollandiae	Masked Owl	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Tyto tenebricosa	Sooty Owl	Vulnerable	Category 3	Not Listed	
Animalia	Insecta	Nurus brevis	Shorter Rainforest Ground-beetle	Endangered	Category 3	Not Listed	
Animalia	Insecta	Phyllodes imperialis southern subspecies	Southern Pink Underwing Moth	Endangered	Not Sensitive	Endangered	
Animalia	Mammalia	Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable	Not Sensitive	Endangered	
Animalia	Mammalia	Falsistrellus tasmaniensis	Eastern False Pipistrelle	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Miniopterus australis	Little Bent-winged Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Miniopterus orianae oceanensis	Large Bent-winged Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Nyctophilus bifax	Eastern Long-eared Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Nyctophilus corbeni	Corben's Long-eared Bat	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Mammalia	Petauroides volans	Southern Greater Glider	Endangered	Not Sensitive	Endangered	
Animalia	Mammalia	Petaurus norfolcensis	Squirrel Glider	Vulnerable	Not Sensitive	Not Listed	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Mammalia	Phascolarctos cinereus	Koala	Endangered	Not Sensitive	Endangered	
Animalia	Mammalia	Planigale maculata	Common Planigale	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Mammalia	Scoteanax rueppellii	Greater Broad-nosed Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Reptilia	Cacophis harriettae	White-crowned Snake	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Arthraxon hispidus	Hairy Jointgrass	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Backhousia subargentea	Giant Ironwood	Endangered	Category 3	Not Listed	
Plantae	Flora	Clematis fawcettii	Northern Clematis	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Coatesia paniculata	Axe-Breaker	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Corchorus cunninghamii	Native Jute	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Cryptocarya foetida	Stinking Cryptocarya	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Cymbidium canaliculatum	Tiger Orchid	Not Listed	Category 2	Not Listed	
Plantae	Flora	Davidsonia jerseyana	Davidson's Plum	Endangered	Category 2	Endangered	
Plantae	Flora	Desmodium acanthocladum	Thorny Pea	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Doryanthes palmeri	Giant Spear Lily	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Endiandra hayesii	Rusty Rose Walnut	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Eucalyptus glaucina	Slaty Red Gum	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Floydia praealta	Ball Nut	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Gossia fragrantissima	Sweet Myrtle	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Hicksbeachia pinnatifolia	Red Boppel Nut	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Macadamia integrifolia	Macadamia Nut	Not Listed	Not Sensitive	Vulnerable	
Plantae	Flora	Macadamia tetraphylla	Rough-shelled Bush Nut	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Marsdenia longiloba	Slender Marsdenia	Endangered	Not Sensitive	Vulnerable	
Plantae	Flora	Micromelum minutum		Extinct	Not Sensitive	Not Listed	
Plantae	Flora	Myrsine richmondensis	Ripple-leaf Muttonwood	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Oberonia complanata	Yellow-flowered King of the Fairies	Endangered	Category 2	Not Listed	
Plantae	Flora	Ochrosia moorei	Southern Ochrosia	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Owenia cepiodora	Onion Cedar	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Randia moorei	Spiny Gardenia	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Rhodamnia rubescens	Scrub Turpentine	Critically Endangered	Not Sensitive	Critically Endangered	
Plantae	Flora	Rhodomyrtus psidioides	Native Guava	Critically Endangered	Not Sensitive	Critically Endangered	
Plantae	Flora	Rhynchosia acuminatissima	Pointed Trefoil	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Sarcochilus dilatatus	Brown Butterfly Orchid	Endangered	Category 2	Not Listed	
Plantae	Flora	Senna acclinis	Rainforest Cassia	Endangered	Not Sensitive	Not Listed	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Plantae	Flora	Syzygium hodgkinsoniae	Red Lilly Pilly	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Syzygium paniculatum	Magenta Lilly Pilly	Endangered	Not Sensitive	Vulnerable	
Plantae	Flora	Thesium australe	Austral Toadflax	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Tinospora smilacina	Tinospora Vine	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Tinospora tinosporoides	Arrow-head Vine	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Triflorensia cameronii	Cameron's Tarenna	Endangered	Not Sensitive	Not Listed	

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
Area Match	Georeferenced to an approximate or general area
Road Match	Georeferenced to a road or rail corridor
Road Intersection	Georeferenced to a road intersection
Buffered Point	A point feature buffered to x metres
Adjacent Match	Land adjacent to a georeferenced feature
Network of Features	Georeferenced to a network of features
Suburb Match	Georeferenced to a suburb boundary
As Supplied	Spatial data supplied by provider

USE OF REPORT - APPLICABLE TERMS

The following terms apply to any person (End User) who is given the Report by the person who purchased the Report from Lotsearch Pty Ltd (ABN: 89 600 168 018) (Lotsearch) or who otherwise has access to the Report (Terms). The contract terms that apply between Lotsearch and the purchaser of the Report are specified in the order form pursuant to which the Report was ordered and the terms set out below are of no effect as between Lotsearch and the purchaser of the Report.

1. End User acknowledges and agrees that:
   (a) the Report is compiled from or using content (**Third Party Content**) which is comprised of:
      (i) content provided to Lotsearch by third party content suppliers with whom Lotsearch has contractual arrangements or content which is freely available or methodologies licensed to Lotsearch by third parties with whom Lotsearch has contractual arrangements (**Third Party Content Suppliers**); and
      (ii) content which is derived from content described in paragraph (i);
   (b) Neither Lotsearch nor Third Party Content Suppliers takes any responsibility for or give any warranty in relation to the accuracy or completeness of any Third Party Content included in the Report including any contaminated land assessment or other assessment included as part of a Report;
   (c) the Third Party Content Suppliers do not constitute an exhaustive set of all repositories or sources of information available in relation to the property which is the subject of the Report (**Property**) and accordingly neither Lotsearch nor Third Party Content Suppliers gives any warranty in relation to the accuracy or completeness of the Third Party Content incorporated into the report including any contaminated land assessment or other assessment included as part of a Report;
   (d) Reports are generated at a point in time (as specified by the date/time stamp appearing on the Report) and accordingly the Report is based on the information available at that point in time and Lotsearch is not obliged to undertake any additional reporting to take into consideration any information that may become available between the point in time specified by the date/time stamp and the date on which the Report was provided by Lotsearch to the purchaser of the Report;
   (e) Reports must be used or reproduced in their entirety and End User must not reproduce or make available to other persons only parts of the Report;
   (f) Lotsearch has not undertaken any physical inspection of the property;
   (g) neither Lotsearch nor Third Party Content Suppliers warrants that all land uses or features whether past or current are identified in the Report;
   (h) the Report does not include any information relating to the actual state or condition of the Property;
   (i) the Report should not be used or taken to indicate or exclude actual fitness or unfitness of Land or Property for any particular purpose
   (j) the Report should not be relied upon for determining saleability or value or making any other decisions in relation to the Property and in particular should not be taken to be a rating or assessment of the desirability or market value of the property or its features; and
   (k) the End User should undertake its own inspections of the Land or Property to satisfy itself that there are no defects or failures
2. The End User may not make the Report or any copies or extracts of the report or any part of it available to any other person. If End User wishes to provide the Report to any other person or make extracts or copies of the Report, it must contact the purchaser of the Report before doing so to ensure the proposed use is consistent with the contract terms between Lotsearch and the purchaser.
3. Neither Lotsearch (nor any of its officers, employees or agents) nor any of its Third Party Content Suppliers will have any liability to End User or any person to whom End User provides the Report and End User must not represent that Lotsearch or any of its Third Party Content Suppliers accepts liability to any such person or make any other representation to any such person on behalf of Lotsearch or any Third Party Content Supplier.
4. The End User hereby to the maximum extent permitted by law:
   (a) acknowledges that the Lotsearch (nor any of its officers, employees or agents), nor any of its Third Party Content Supplier have any liability to it under or in connection with the

Report or these Terms;

(b) waives any right it may have to claim against Third Party Content Supplier in connection with the Report, or the negotiation of, entry into, performance of, or termination of these Terms; and

(c) releases each Third Party Content Supplier from any claim it may have otherwise had in connection with the Report, or the negotiation of, entry into, performance of, or termination of these Terms.

5. The End User acknowledges that any Third Party Supplier shall be entitled to plead the benefits conferred on it under clause 4, despite not being a party to these terms.
6. End User must not remove any copyright notices, trade marks, digital rights management information, other embedded information, disclaimers or limitations from the Report or authorise any person to do so.
7. End User acknowledges and agrees that Lotsearch and Third Party Content Suppliers retain ownership of all copyright, patent, design right (registered or unregistered), trade marks (registered or unregistered), database right or other data right, moral right or know how or any other intellectual property right in any Report or any other item, information or data included in or provided as part of a Report.
8. To the extent permitted by law and subject to paragraph 9, all implied terms, representations and warranties whether statutory or otherwise relating to the subject matter of these Terms other than as expressly set out in these Terms are excluded.
9. Subject to paragraph 6, Lotsearch excludes liability to End User for loss or damage of any kind, however caused, due to Lotsearch's negligence, breach of contract, breach of any law, in equity, under indemnities or otherwise, arising out of all acts, omissions and events whenever occurring.
10. Lotsearch acknowledges that if, under applicable State, Territory or Commonwealth law, End User is a consumer certain rights may be conferred on End User which cannot be excluded, restricted or modified. If so, and if that law applies to Lotsearch, then, Lotsearch's liability is limited to the greater of an amount equal to the cost of resupplying the Report and the maximum extent permitted under applicable laws.
11. Subject to paragraph 9, neither Lotsearch nor the End User is liable to the other for:
    (a) any indirect, incidental, consequential, special or exemplary damages arising out of or in relation to the Report or these Terms; or
    (b) any loss of profit, loss of revenue, loss of interest, loss of data, loss of goodwill or loss of business opportunities, business interruption arising directly or indirectly out of or in relation to the Report or these Terms,

    irrespective of how that liability arises including in contract or tort, liability under indemnity or for any other common law, equitable or statutory cause of action or otherwise.
12. These Terms are subject to New South Wales law.

Appendix C: Laboratory Results Summary Tables

ABBREVIATIONS AND EXPLANATIONS

Abbreviations used in the Tables:

ADWG: AustralianDrinking Water Guidelines
ANZG Australian and New Zealand Guidelines
B(a)P: Benzo(a)pyrene
CRC: Cooperative Research Centre
ESLs: Ecological Screening Levels
GIL: Groundwater Investigation Levels
HILs: Health Investigation Levels
HSLs: Health Screening Levels
HSL-SSA: Health Screening Level-SiteSpecific Assessment
NA: Not Analysed
NC: Not Calculated
NEPM: National Environmental Protection Measure
NHMRC: National Health and Medical Research Council
NL: Not Limiting
NSL: No Set Limit
OCP: Organochlorine Pesticides
OPP: Organophosphorus Pesticides
PAHs: Polycyclic Aromatic Hydrocarbons
ppm: Parts per million
PCBs: Polychlorinated Biphenyls
PCE: Perchloroethylene (Tetrachloroethylene or Tetrachloroethene)
PQL: Practical Quantitation Limit
RS: Rinsate Sample
RSL: Regional Screening Levels
SAC: Site Assessment Criteria
SSA: Site Specific Assessment
SSHSLs Site Specific Health Screening Levels
TB: Trip Blank
TCA: 1,1,1 Trichloroethane (methyl chloroform)
TCE: Trichloroethylene (Trichloroethene)
TS: Trip Spike
TRH: Total Recoverable Hydrocarbons
UCL: Upper Level Confidence Limit on Mean Value
USEPA United States Environmental Protection Agency
VOCC: Volatile Organic Chlorinated Compounds
WHO: World Health Organisation

TABLE G1
SUMMARY OF GROUNDWATER LABORATORY RESULTS COMPARED TO ECOLOGICAL & HUMAN HEALTH GILs SAC
All results in µg/L unless stated otherwise.

	PQL Envirolab Services	Recreational (10 x NHMRC ADWG)	NHMRC ADWG 2011	ANZG 2018 Fresh Waters	MW62	MW62 - [LAB_DUP]	MW206	MW206 - [LAB_DUP]	MW212	MW212 - [LAB_DUP]	MW214	MW214 - [LAB_DUP]	Creek1	GWDUP301	GWDUP302
Inorganic Compounds and Parameters															
pH		6.5 - 8.5	6.5 - 8.5	6.5 - 8.5	**7.1**	[NT]	**7.3**	[NT]	**7.4**	[NT]	**7.1**	[NT]	**6.6**	[NT]	[NT]
Electrical Conductivity (µS/cm)	1	NSL	NSL	NSL	**1400**	[NT]	**340**	[NT]	**1200**	[NT]	**3700**	[NT]	**210**	[NT]	[NT]
Turbidity (NTU)		NSL	5	NSL	<0.1	[NT]	**420**	[NT]	**540**	[NT]	**0.1**	[NT]	**550**	[NT]	[NT]
Redox Potential (Eh)	-	NSL	NSL	NSL	**198**	**197**	**178**	[NT]	**184**	[NT]	**182**	[NT]	**157**	[NT]	[NT]
Total Dissolved Solids (TDS) (mg/L)	5	NSL	NSL	NSL	**770**	**760**	[NT]	[NT]	**1300**	[NT]	**2300**	[NT]	**120**	[NT]	[NT]
Total Suspended Solids (TSS) (mg/L)	5	NSL	NSL	NSL	<5	[NT]	[NT]	[NT]	**2700**	**2700**	**22000**	[NT]	**820**	[NT]	[NT]
Total Organic Carbon (TOC) (mg/L)	1	NSL	NSL	NSL	**1**	**1**	**4**	[NT]	**18**	[NT]	**2**	[NT]	**20**	[NT]	[NT]
Dissolved Oxygen (mg/L)	0.1	NSL	NSL	NSL	**8.6**	[NT]	**7.2**	[NT]	**8.5**	[NT]	**8.3**	[NT]	**8.4**	[NT]	[NT]
Total Hardness (mg/L)	3	NSL	NSL	NSL	**8.6**	[NT]	**7.2**	[NT]	**8.5**	[NT]	**8.3**	[NT]	**8.4**	[NT]	[NT]
Silica (SiO2) (mg/L)	0.1	NSL	NSL	NSL	**52**	**51**	**54**	[NT]	**20**	[NT]	**43**	[NT]	**28**	[NT]	[NT]
Phosphorus (mg/L)	0.05	NSL	NSL	NSL	**0.05**	<0.05	**0.63**	[NT]	**8.5**	[NT]	**12**	[NT]	**2**	[NT]	[NT]
Acidity (as CaCO3)	5	NSL	NSL	NSL	<5	[NT]	<5	[NT]	<5	[NT]	<5	[NT]	<5	[NT]	[NT]
Metals and Metalloids															
Arsenic (As III)	1	100	10	24	<1	<1	<1	[NT]	<1	[NT]	<1	[NT]	<1	<1	[NT]
Cadmium	0.1	20	2	0.2	<0.1	<0.1	<0.1	[NT]	<0.1	[NT]	<0.1	[NT]	<0.1	<0.1	[NT]
Chromium (total)	1	500	50	3.3	<1	<1	<1	[NT]	<1	[NT]	<1	[NT]	<1	<1	[NT]
Copper	1	20000	2000	1.4	<1	<1	<1	[NT]	<1	[NT]	<1	[NT]	<1	<1	[NT]
Lead	1	100	10	3.4	<1	<1	<1	[NT]	<1	[NT]	<1	[NT]	<1	<1	[NT]
Total Mercury (inorganic)	0.05	10	1	0.06	<0.05	[NT]	<0.05	<0.05	<0.05	[NT]	<0.05	[NT]	<0.05	<0.05	[NT]
Nickel	1	200	20	11	<1	<1	**2**	[NT]	**3**	[NT]	**2**	[NT]	**4**	<1	[NT]
Zinc	1	30000	3000	8	<1	<1	**1**	[NT]	**8**	[NT]	<1	[NT]	**2**	<1	[NT]
Aluminium	10	NSL	NSL	55	<10	<10	**20**	[NT]	<10	[NT]	<10	[NT]	**30**	[NT]	[NT]
Antimony	1	30	3	NSL	<1	<1	<1	[NT]	<1	[NT]	<1	[NT]	<1	[NT]	[NT]
Barium	1	20000	2000	NSL	**10**	**11**	**19**	[NT]	**24**	[NT]	**59**	[NT]	**49**	[NT]	[NT]
Boron	20	40000	4000	940	<20	<20	**20**	[NT]	<20	[NT]	<20	[NT]	<20	[NT]	[NT]
Beryllium	0.05	600	60	NSL	<0.5	<0.5	<0.5	[NT]	<0.5	[NT]	<0.5	[NT]	<0.5	[NT]	[NT]
Cobalt	1	NSL	NSL	NSL	<1	<1	<1	[NT]	**2**	[NT]	<1	[NT]	**9**	[NT]	[NT]
Iron	10	NSL	NSL	NSL	<10	<10	**60**	[NT]	<10	[NT]	**20**	[NT]	**190**	[NT]	[NT]
Lithium	1	NSL	NSL	NSL	**5**	**6**	**4**	[NT]	**2**	[NT]	**6**	[NT]	<1	[NT]	[NT]
Manganese	5	5000	500	1900	<5	<5	47	[NT]	**240**	[NT]	**53**	[NT]	**840**	[NT]	[NT]
Molybdenum	1	500	50	NSL	<1	<1	6	[NT]	**14**	[NT]	**2**	[NT]	<1	[NT]	[NT]
Selenium	1	100	10	5	<1	<1	<1	[NT]	**11**	[NT]	<1	[NT]	<1	[NT]	[NT]
Silver	1	1000	100	0.05	<1	<1	<1	[NT]	<1	[NT]	<1	[NT]	<1	[NT]	[NT]
Strontium	1	NSL	NSL	NSL	**650**	**650**	**130**	[NT]	**440**	[NT]	**2200**	[NT]	**100**	[NT]	[NT]
Uranium	0.5	200	20	NSL	<0.5	<0.5	<0.5	[NT]	**1.2**	[NT]	**1.2**	[NT]	<0.5	[NT]	[NT]
Vanadium	1	NSL	NSL	NSL	**2**	**2**	**1**	[NT]	**2**	[NT]	**3**	[NT]	**3**	[NT]	[NT]
Monocyclic Aromatic Hydrocarbons (BTEX Compounds)															
Benzene	1	10	1	950	<1	[NT]	<1	[NT]	<1	[NT]	<1	<1	<1	<1	<1
Toluene	1	8000	800	180	<1	[NT]	<1	[NT]	**3**	[NT]	<1	<1	**9**	<1	<1
Ethylbenzene	1	3000	300	80	<1	[NT]	<1	[NT]	<1	[NT]	<1	<1	<1	<1	<1
m+p-xylene	2	NSL	NSL	75	<2	[NT]	<2	[NT]	<2	[NT]	**3**	**2**	<2	<2	<2
o-xylene	1	NSL	NSL	350	<1	[NT]	<1	[NT]	<1	[NT]	**3**	**3**	<1	<1	<1
Total xylenes	2	6000	600	NSL	<2	[NT]	<2	[NT]	<2	[NT]	**6**	**5**	<2	<2	<2
Total Recoverable Hydrocarbons (TRHs)															
TRH F1	10	NSL	NSL	NSL	<10	[NT]	**12**	[NT]	**13**	[NT]	**41**	**35**	**11**	<10	**12**
TRH F2	50	NSL	NSL	NSL	<50	[NT]	**110**	[NT]	**420**	[NT]	**450**	[NT]	<50	<50	**120**
TRH F3	100	NSL	NSL	NSL	<100	<100	<100	[NT]	**110**	[NT]	**100**	[NT]	<100	<100	<100
TRH F4	100	NSL	NSL	NSL	<100	<100	<100	[NT]	<100	[NT]	<100	[NT]	<100	<100	<100
Polycyclic Aromatic Hydrocarbons (PAHs)															
Naphthalene	0.2	NSL	NSL	16	<0.1	<0.1	**0.1**	[NT]	<0.1	[NT]	**0.4**	[NT]	<0.1	<0.1	<0.1
Acenaphthylene	0.1	NSL	NSL	NSL	<0.1	<0.1	<0.1	[NT]	<0.1	[NT]	**0.1**	[NT]	<0.1	<0.1	<0.1
Acenaphthene	0.1	NSL	NSL	NSL	<0.1	<0.1	<0.1	[NT]	<0.1	[NT]	<0.1	[NT]	<0.1	<0.1	<0.1
Fluorene	0.1	NSL	NSL	NSL	<0.1	<0.1	<0.1	[NT]	<0.1	[NT]	**0.3**	[NT]	<0.1	<0.1	<0.1
Phenanthrene	0.1	NSL	NSL	0.6	<0.1	<0.1	<0.1	[NT]	<0.1	[NT]	<0.1	[NT]	<0.1	<0.1	<0.1
Anthracene	0.1	NSL	NSL	0.01	<0.1	<0.1	<0.1	[NT]	<0.1	[NT]	<0.1	[NT]	<0.1	<0.1	<0.1
Fluoranthene	0.1	NSL	NSL	1	<0.1	<0.1	<0.1	[NT]	<0.1	[NT]	<0.1	[NT]	<0.1	<0.1	<0.1
Pyrene	0.1	NSL	NSL	NSL	<0.1	<0.1	<0.1	[NT]	<0.1	[NT]	<0.1	[NT]	<0.1	<0.1	<0.1
Benzo(a)anthracene	0.1	NSL	NSL	NSL	<0.1	<0.1	<0.1	[NT]	<0.1	[NT]	<0.1	[NT]	<0.1	<0.1	<0.1
Chrysene	0.1	NSL	NSL	NSL	<0.1	<0.1	<0.1	[NT]	<0.1	[NT]	<0.1	[NT]	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	0.2	NSL	NSL	NSL	<0.2	<0.2	<0.2	[NT]	<0.2	[NT]	<0.2	[NT]	<0.2	<0.2	<0.2
Benzo(a)pyrene	0.1	0.1	0.01	0.1	<0.1	<0.1	<0.1	[NT]	<0.1	[NT]	<0.1	[NT]	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	0.1	NSL	NSL	NSL	<0.1	<0.1	<0.1	[NT]	<0.1	[NT]	<0.1	[NT]	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	0.1	NSL	NSL	NSL	<0.1	<0.1	<0.1	[NT]	<0.1	[NT]	<0.1	[NT]	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	0.1	NSL	NSL	NSL	<0.1	<0.1	<0.1	[NT]	<0.1	[NT]	<0.1	[NT]	<0.1	<0.1	<0.1
Anions and Cations															
Calcium (mg/L)	0.5	NSL	NSL	NSL	**68**	[NT]	**15**	[NT]	**44**	[NT]	**180**	[NT]	**9.5**	[NT]	[NT]
Potassium (mg/L)	0.5	NSL	NSL	NSL	**0.9**	[NT]	**2**	[NT]	**2**	[NT]	**2**	[NT]	**5.1**	[NT]	[NT]
Sodium (mg/L)	0.5	NSL	NSL	NSL	**160**	[NT]	**50**	[NT]	**170**	[NT]	**390**	[NT]	**23**	[NT]	[NT]
Magnesium (mg/L)	0.5	NSL	NSL	NSL	**57**	[NT]	**7**	[NT]	**22**	[NT]	**140**	[NT]	**6.8**	[NT]	[NT]
Hydroxide Alkalinity (as CaCO3) (mg/L)	5	NSL	NSL	NSL	<5	[NT]	<5	[NT]	<5	[NT]	<5	[NT]	<5	[NT]	[NT]
Bicarbonate Alkalinity (as CaCO3) (mg/L)	5	NSL	NSL	NSL	**460**	[NT]	**160**	[NT]	**250**	[NT]	**780**	[NT]	**87**	[NT]	[NT]
Carbonate Alkalinity (as CaCO3) (mg/L)	5	NSL	NSL	NSL	<5	[NT]	<5	[NT]	<5	[NT]	<5	[NT]	<5	[NT]	[NT]
Total Alkalinity (as CaCO3) (mg/L)	5	NSL	NSL	NSL	**460**	[NT]	**160**	[NT]	**250**	[NT]	**780**	[NT]	**87**	[NT]	[NT]
Sulphate (mg/L)	1	NSL	NSL	NSL	**31**	[NT]	**8**	[NT]	**84**	**84**	**130**	[NT]	**1**	[NT]	[NT]
Chloride (mg/L)	1	NSL	NSL	NSL	**150**	[NT]	**17**	[NT]	**140**	**150**	**710**	[NT]	**18**	[NT]	[NT]
Ionic Balance (%)	-	NSL	NSL	NSL	**3**	[NT]	**-3**	[NT]	**3**	[NT]	**-1**	[NT]	**-2**	[NT]	[NT]
Sodium Adsorption Ratio (SAR)	0.01	NSL	NSL	NSL	**3.4**	[NT]	**2.7**	[NT]	**5.2**	[NT]	**5.2**	[NT]	**1.4**	[NT]	[NT]
Nutrients															
Ammonia (mg/L) (pH dependent)	0.005	NSL	NSL	0.9	<0.005	[NT]	**0.02**	[NT]	<0.005	[NT]	<0.005	[NT]	**0.29**	[NT]	[NT]
Nitrate (mg/L)	0.005	500000	50000	NSL	**0.41**	[NT]	**2.1**	[NT]	<0.005	[NT]	**1.8**	[NT]	**0.065**	[NT]	[NT]
Nitrite (mg/L)	0.005	30000	3000	NSL	<0.005	[NT]	**0.058**	[NT]	<0.005	[NT]	**0.01**	[NT]	**0.02**	[NT]	[NT]
Nitrogen Oxides (NOX) (mg/L)	0.005	NSL	NSL	NSL	**0.41**	[NT]	**2.1**	[NT]	<0.005	[NT]	**1.8**	[NT]	**0.087**	[NT]	[NT]
Total Nitrogen (mg/L)	0.1	NSL	NSL	NSL	**0.4**	[NT]	**2.6**	[NT]	**0.4**	[NT]	**3.8**	[NT]	**1.7**	[NT]	[NT]
Phosphate (mg/L)	0.005	NSL	NSL	NSL	**0.064**	[NT]	**0.41**	[NT]	**0.01**	[NT]	**0.057**	[NT]	**0.067**	[NT]	[NT]
Microbiological Organisms															
Faecal Coliforms (MPN/100mL)	1	NA	NA	NSL	<1000	[NT]	**790 MPN/100mL**	[NT]	[NT]	[NT]	<18 MPN/100mL	[NT]	**16000 MPN/100mL**	[NT]	[NT]
E Coli (MPN/100mL)	1	NA	NA	NSL	<1000	[NT]	**20 MPN/100mL**	[NT]	[NT]	[NT]	<18 MPN/100mL	[NT]	**16000 MPN/100mL**	[NT]	[NT]
Organochlorine Pesticides (OCPs)															
alpha-BHC	0.2	NSL	NSL	NSL	<0.2	<0.2	<0.2	[NT]	<0.2	[NT]	<0.2	[NT]	[NT]	<0.2	<0.2
HCB	0.2	NSL	NSL	NSL	<0.2	<0.2	<0.2	[NT]	<0.2	[NT]	<0.2	[NT]	[NT]	<0.2	<0.2
beta-BHC	0.2	NSL	NSL	NSL	<0.2	<0.2	<0.2	[NT]	<0.2	[NT]	<0.2	[NT]	[NT]	<0.2	<0.2
gamma-BHC	0.2	NSL	NSL	NSL	<0.2	<0.2	<0.2	[NT]	<0.2	[NT]	<0.2	[NT]	[NT]	<0.2	<0.2
delta-BHC	0.2	NSL	NSL	NSL	<0.2	<0.2	<0.2	[NT]	<0.2	[NT]	<0.2	[NT]	[NT]	<0.2	<0.2
Heptachlor	0.2	3	0.3	0.01	<0.2	<0.2	<0.2	[NT]	<0.2	[NT]	<0.2	[NT]	[NT]	<0.2	<0.2
Heptachlor Epoxide	0.2				<0.2	<0.2	<0.2	[NT]	<0.2	[NT]	<0.2	[NT]	[NT]	<0.2	<0.2
Aldrin	0.2	3	0.3	0.001	<0.2	<0.2	<0.2	[NT]	<0.2	[NT]	<0.2	[NT]	[NT]	<0.2	<0.2
Dieldrin	0.2			0.01	<0.2	<0.2	<0.2	[NT]	<0.2	[NT]	<0.2	[NT]	[NT]	<0.2	<0.2
gamma-Chlordane	0.2	20	2	0.03	<0.2	<0.2	<0.2	[NT]	<0.2	[NT]	<0.2	[NT]	[NT]	<0.2	<0.2
alpha-Chlordane	0.2				<0.2	<0.2	<0.2	[NT]	<0.2	[NT]	<0.2	[NT]	[NT]	<0.2	<0.2
Endosulfan I	0.2				<0.2	<0.2	<0.2	[NT]	<0.2	[NT]	<0.2	[NT]	[NT]	<0.2	<0.2
Endosulfan II	0.2	200	20	0.03	<0.2	<0.2	<0.2	[NT]	<0.2	[NT]	<0.2	[NT]	[NT]	<0.2	<0.2
Endosulfan Sulphate	0.2				<0.2	<0.2	<0.2	[NT]	<0.2	[NT]	<0.2	[NT]	[NT]	<0.2	<0.2
DDT	0.2				<0.2	<0.2	<0.2	[NT]	<0.2	[NT]	<0.2	[NT]	[NT]	<0.2	<0.2
pp-DDD	0.2	90	9	0.006	<0.2	<0.2	<0.2	[NT]	<0.2	[NT]	<0.2	[NT]	[NT]	<0.2	<0.2
pp-DDE	0.2				<0.2	<0.2	<0.2	[NT]	<0.2	[NT]	<0.2	[NT]	[NT]	<0.2	<0.2
Endrin	0.2	NSL	NSL	0.01	<0.2	<0.2	<0.2	[NT]	<0.2	[NT]	<0.2	[NT]	[NT]	<0.2	<0.2
Endrin Aldehyde	0.2	NSL	NSL		<0.2	<0.2	<0.2	[NT]	<0.2	[NT]	<0.2	[NT]	[NT]	<0.2	<0.2
Methoxychlor	0.2	3,000	300	0.005	<0.2	<0.2	<0.2	[NT]	<0.2	[NT]	<0.2	[NT]	[NT]	<0.2	<0.2

Concentration above the SAC	**Bold**
Positive result	**Bold**
GIL >PQL	Red

TABLE Q1
GROUNDWATER QA/QC SUMMARY

		TRH C6 - C10	TRH >C10-C16	TRH >C16-C34	TRH >C34-C40	Benzene	Toluene	Ethylbenzene	m+p-xylene	o-Xylene	Naphthalene	Acenaphthylene	Acenaph-thene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b,j+k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthra-cene	Benzo(g,h,i)perylene	Arsenic	Cadmium	Chromium VI	Copper	Lead	Mercury	Nickel	Zinc
	PQL Envirolab SYD	*10*	*50*	*100*	*100*	*1*	*1*	*1*	*2*	*1*	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*	*1*	*0.1*	*1*	*1*	*1*	*0.05*	*1*	*1*
	PQL Envirolab VIC	*10*	*50*	*100*	*100*	*1.0*	*1.0*	*1.0*	*2.0*	*1.0*	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.2*	*0.1*	*0.1*	*0.1*	*0.1*	*1*	*0.1*	*1*	*1*	*1*	*0.05*	*1*	*1*
Intra	MW62	<10	<50	<100	<100	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<1	<1	<0.05	<1	<1
laboratory	GWDUP301	<10	<50	<100	<100	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<1	<1	<0.05	<1	<1
duplicate	MEAN	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Inter	MW206	12	110	<100	<100	<1	<1	<1	<2	<1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<1	<1	<0.05	2	1
laboratory	GWDUP302	12	120	<100	<100	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	NA	NA	NA	NA	NA	NA	NA	NA
duplicate	MEAN	12	115	nc	nc	nc	nc	nc	nc	nc	0.1	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
	RPD %	0%	9%	nc	nc	nc	nc	nc	nc	nc	0%	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Field	TB301	<10	<50	<100	<100	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	<1	<1	<0.05	<1	<1
Blank	31/05/2025																																
Field	FR302-IP	87	<50	<100	<100	<1	<1	<1	<2	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<1	310	<1	<0.05	1	11
Rinsate	31/05/2025																																
Trip	TS301	-	-	-	-	110%	107%	102%	103%	105%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Spike	31/05/2025																																

Result outside of QA/QC acceptance criteria Value

Appendix D: Borehole Logs

JKGeotechnics

BOREHOLE LOG

Borehole No. 62

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED HIGH SCHOOL

Location: 163-170 ALEXANDRA PARADE, NORTH LISMORE, NSW

Job No.: 36314LT **Method:** SPIRAL AUGER **R.L. Surface:** 18.61 m

Date: 11/10/24 **Datum:** AHD

Plant Type: JK309 **Logged/Checked By:** A.G./A.B.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING									CH	TOPSOIL: Silty clay, high plasticity, dark brown, with root fibres.	w>PL	St		SCREEN: 11.65kg 0-0.1m, NO FCF
										Silty CLAY: high plasticity, dark brown, with fine grained, brown and dark grey, rounded basalt gravel, fine grained ironstone gravel, fine grained, grey to light grey quartz gravel, and root fibres.			110 120 140	COLLUVIAL HP TESTING ON REMOULDED SAMPLE
					N = 13 3,5,8	18	1					Hd	440 400 500	ORGANIC ODOUR HP TESTING ON REMOULDED SAMPLE
					N = 14 4,7,7	17	2						600 590 >600	
										Gravelly silty CLAY: high plasticity, light brown, fine to coarse grained, dark grey, rounded to sub-rounded basalt gravel, trace of fine grained ironstone gravel.	w<PL		>600 >600 >600	RESIDUAL POSSIBLY COLLUVIAL
					N=SPT 10/ 150mm REFUSAL	16	3							
						15	4							VERY LOW 'TC' BIT RESISTANCE GROUNDWATER MONITORING WELL INSTALLED TO 11.29m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 7.0m TO 11.29m. CASING 0m TO 7.0m. 2mm SAND FILTER PACK 6.0m TO 11.29m. BENTONITE SEAL 0m TO 6.0m. BACKFILLED WITH SAND TO THE SURFACE. COMPLETED WITH A CONCRETED GALVANISED MONUMENT.
						14	5							
						13	6							
						12			-	BASALT: fine grained, dark grey.	SW	H		LISMORE BASALT
										REFER TO CORED BOREHOLE LOG				HIGH RESISTANCE

JKGeotechnics

CORED BOREHOLE LOG

Borehole No. 62

Client: SCHOOL INFRASTRUCTURE NSW

Project: PROPOSED HIGH SCHOOL

Location: 163-170 ALEXANDRA PARADE, NORTH LISMORE, NSW

Job No.: 36314LT | **Core Size:** NMLC | **R.L. Surface:** 18.61 m

Date: 11/10/24 | **Inclination:** VERTICAL | **Datum:** AHD

Plant Type: JK309 | **Bearing:** N/A | **Logged/Checked By:** A.G./A.B.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	SPACING (mm)	DEFECT DETAILS: DESCRIPTION (Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness)	Formation
		12			START CORING AT 6.75m						
					BASALT: fine grained, dark grey.	SW	VH				
ON 16/11/24			7		NO CORE 0.18m						
					BASALT: fine grained, dark grey.	HW	VH			(7.05m) J, 30°, P, R, Fe Sn	
						SW				(7.18m) XWS, 30°, 150 mm.t	
										(7.25m) Jh, 90°, Un, Sn	
										(7.32m) J, 20°, P, S, Fe Sn	
								4.2		(7.34m) J, 90°, Ir, R, Fe Sn	
		11								(7.45m) XWS, 20°, 2 mm.t	
										(7.52m) XWS, 20°, 50 mm.t	
								4.6		(7.62m) J, 20°, P, S, Fe Sn	
										(7.70m) J, 20°, Un, R, Fe Sn	
										(7.74m) J, 45°, C, S, Fe Sn	
			8							(7.93m) XWS, 50°, 6 mm.t	
						HW	VL - L			(7.98m) XWS, 0°, 4 mm.t	
										(8.07m) Cr, 0°, 40 mm.t	
										(8.10m) J, 70°, P, S, Fe Sn	
						FR	VH	3.2		(8.21m) Cr, 0 - 50°, 50 mm.t	
										(8.25m) J, 50°, P, S, Fe Sn	
										(8.40m) J, 70°, P, S, Fe Sn	
		10								(8.52m) Cr, 0°, 115 mm.t	
										(8.63m) XWS, 0°, 6 mm.t	
										(8.67m) XWS, 0°, 6 mm.t	
90% RETURN										(8.79m) J, 70°, P, S, Fe Sn	
			9					4.3		(8.95m) XWS, 0°, 50 mm.t	
										(9.12m) J, 20°, P, R, Fe Sn	
										(9.22m) J, 45°, P, R, Fe Sn	
								4.0		(9.27m) XWS, 5°, 3 mm.t	
		9								(9.54m) J, 20°, Ir, R, Fe Sn	
						MW		3.5		(9.58m) XWS, 5°, 2 mm.t	
						FR				(9.85m) J, 40°, Ir, R, Fe Sn	
			10							(9.88m) XWS, 0°, 4 mm.t	
										(9.93m) J, 70 - 90°, C, S, Cn	
										(10.18m) XWS, 0°, 40 mm.t	
										(10.27m) XWS, 10°, 1 mm.t	
								4.3		(10.44m) XWS, 5°, 4 mm.t	
		8								(10.64m) XWS, 5°, 10 mm.t	
								5.0		(10.80m) XWS, 0°, 3 mm.t	
			11							(11.06m) XWS, 0°, 15 mm.t	
								4.1		(11.12m) XWS, 0°, 5 mm.t	
					END OF BOREHOLE AT 11.29 m						
		7									
			12								
		6									

Lismore Basalt

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

BOREHOLE LOG

Borehole No. 206

Client: DEPARTMENT OF EDUCATION

Project: NORTHERN RIVERS FLOOD RECOVERY-RICHMOND RIVER HIGH CAMPUS REDEVELOPMENT

Location: 163 AND 170 ALEXANDRA PARADE, NORTH LISMORE, NSW

Job No.: 37635UOR **Method:** SPIRAL AUGER **R.L. Surface:** 17.8 m

Date: 28/5/25 TO 29/5/25 **Datum:** AHD

Plant Type: JK300 **Logged/Checked By:** A.G./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
ON COMPLETION - DRY ON COMPLETION OF CORING AUGERING										TOPSOIL: Silty clay, medium plasticity, dark brown, with root fibres.	w>PL			
									CI	Silty CLAY: medium plasticity, dark brown, with fine to coarse grained, sub-angular basalt gravel.	w>PL	St - VSt		RESIDUAL
						17	1		-	BASALT: grey, highly fractured, with numerous clay bands.	HW - MW	L - M		LISMORE BASALT LOW BUCKET RESISTANCE
						16	2			BASALT: dark grey.	MW	H		HIGH 'TC' BIT RESISTANCE
						15	3			REFER TO CORED BOREHOLE LOG				GROUNDWATER MONITORING WELL INSTALLED TO 5.7m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 5.7m TO 1.5m. CASING +1.05m TO 1.5m. 2mm SAND FILTER PACK 5.7m TO 1.0m. BENTONITE SEAL 1.0m TO 0.1m. BACKFILLED WITH SAND AND CUTTINGS TO THE SURFACE. COMPLETED WITH A CONCRETED MONUMENT.
						14	4							
						13	5							
						12	6							
						11								

JKGeotechnics

CORED BOREHOLE LOG

Borehole No. 206 **2 / 3**

Client: DEPARTMENT OF EDUCATION

Project: NORTHERN RIVERS FLOOD RECOVERY-RICHMOND RIVER HIGH CAMPUS REDEVELOPMENT

Location: 163 AND 170 ALEXANDRA PARADE, NORTH LISMORE, NSW

Job No.: 37635UOR **Core Size:** NMLC **R.L. Surface:** 17.8 m

Date: 28/5/25 TO 29/5/25 **Inclination:** VERTICAL **Datum:** AHD

Plant Type: JK300 **Bearing:** N/A **Logged/Checked By:** A.G./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$ VL 0.1 L 0.3 M 1 H 3 VH 10 EH	DEFECT DETAILS SPACING (mm) 600 200 60 20	DESCRIPTION Type, orientation, defect shape and roughness, defect coatings and seams, openness and thickness Specific / General	Formation
					START CORING AT 2.65m						
20% RETURN		15	3		BASALT: dark grey.	MW	M - H	0.80 1.2		(2.85m) J, 90°, C, R, Fe Sn (2.65-4.15m) J, 15°, P, R, Fe Sn, Spaced 10mm-50mm (2.65-4.15m) J, 45°, P, R, Fe Sn, Spaced 10mm-50mm	
		14	4		NO CORE 0.27m						
30% RETURN		13	5		BASALT: dark grey.	HW	L - M	0.20	20		Lismore Basalt
							M	0.30		(5.62m) XWS, 45°, 2 mm.t (4.42-6.90m) J, 45 - 60°, P, S, Fe Sn, Spaced 10mm-40mm (5.78m) XWS, 45°, 2 mm.t	
		12	6					0.60			
20% RETURN		11	7					0.30		(6.26-6.60m) J, 45 - 90°, Ir, R, Fe Sn (6.73m) XWS, 0°, 20 mm.t (6.84m) J, 0°, P, R, Fe Sn	
								0.50			
20% RETURN					NO CORE 0.60m						
		10	8		BASALT: dark grey.	HW	M	0.80		(7.69-8.63m) J, 0 - 10°, Ir, R, Fe Sn, Spaced 5mm-50mm (8.42m) J, 90°, Ir, R, Fe Sn (8.52m) J, 65°, P, R, Clay FILLED, 2 mm.t	Lismore Basalt
					NO CORE 0.25m						
		9			BASALT: dark grey.	HW	L - M		60 60 60 20	(8.87m) XWS, 0°, 70 mm.t	

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

CORED BOREHOLE LOG

Borehole No. 206 3 / 3

Client: DEPARTMENT OF EDUCATION

Project: NORTHERN RIVERS FLOOD RECOVERY-RICHMOND RIVER HIGH CAMPUS REDEVELOPMENT

Location: 163 AND 170 ALEXANDRA PARADE, NORTH LISMORE, NSW

Job No.: 37635UOR **Core Size:** NMLC **R.L. Surface:** 17.8 m

Date: 28/5/25 TO 29/5/25 **Inclination:** VERTICAL **Datum:** AHD

Plant Type: JK300 **Bearing:** N/A **Logged/Checked By:** A.G./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS: SPACING (mm)	DEFECT DETAILS: DESCRIPTION (Specific / General)	Formation
80% RETURN		8	10		BASALT: dark grey. *(continued)*	HW	L - M	0.30; 0.10		(9.09m) XWS, 0°, 30 mm.t (9.24m) XWS, 0°, 5 mm.t (9.55m) J, 0°, P, R, Fe FILLED (9.85m) XWS, 0°, 10 mm.t (10.11m) XWS, 30°, 8 mm.t	Lismore Basalt
							M	0.70; 0.60		(8.88-11.65m) J, 15 - 90°, P or Ir, R, Fe Sn, Spaced 10mm-150mm	
		7	11			SW	VH	4.3; 3.3		(8.88-12.95m) Ji, 15 - 90°, Ir, Fe FILLED, Spaced 1mm-50mm (11.12m) J, 5°, Ir, R, Fe Sn (11.17m) J, 0°, Ir, R, Fe Sn (11.42m) J, 90°, Un, R, Fe Sn	
80% RETURN		6	12			HW	M	0.60; 0.70; 0.70	20		
		5			NO CORE 0.15m						
		4	13		VOLCANIC BRECCIA: grey and light grey brown, fine to coarse grained angular basalt gravel.	HW	VL - L	0.070		(13.00m) XWS, 0°, 100 mm.t (13.19m) XWS, 20°, 18 mm.t (13.40m) XWS, 0°, 140 mm.t	Lismore Basalt
			14				M	0.20			
					as above, but fine grained and dark grey.			0.40		(14.05m) J, 55°, Ir, R, Fe Sn (14.11m) J, 45°, P, S, Fe Sn (14.15m) J, 45°, P, R, Fe Sn (14.21m) Cr, 0°, 35 mm.t (14.36m) XWS, 70°, 40 mm.t (14.48m) J, 70°, P, R, Clay Vn	
		3	15		END OF BOREHOLE AT 14.55 m						
		2									

JK 9.02.4 LIB GLB Log JK CORED BOREHOLE - MASTER 37635UOR NORTHLISMORE.GPJ <<DrawingFile>> 25/06/2025 16:11 10.01.00.01 Datgel Lab and In Situ Tool - DGD | Lib: JK 9.02.4 2019-05-31 Prj: JK 9.01.0 2018-03-20

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

BOREHOLE LOG

Borehole No. 212

Client: DEPARTMENT OF EDUCATION

Project: NORTHERN RIVERS FLOOD RECOVERY-RICHMOND RIVER HIGH CAMPUS REDEVELOPMENT

Location: 163 AND 170 ALEXANDRA PARADE, NORTH LISMORE, NSW

Job No.: 37635UOR **Method:** SPIRAL AUGER **R.L. Surface:** 22.2 m

Date: 27/5/25 **Datum:** AHD

Plant Type: JK300 **Logged/Checked By:** C.S./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING						22				FILL: Gravel, fine to coarse grained, angular, grey.	D			
									CH	FILL: Sandy gravel, fine to medium grained, angular, brown, fine to coarse grained sand.	M w~PL	St		ALLUVIAL
					N = 6 2,3,3					Gravelly CLAY: high plasticity, dark grey mottled brown, fine to medium grained angular gravel,, trace of roots.			240 220 160 190	
						21	1		GC	Clayey GRAVEL: fine to medium grained, angular, dark grey mottled dark red, orange, grey and brown, with clay bands, some shear planes in clay bands.	M	(VD)		COLLUVIAL
					N=SPT 20/ 120mm REFUSAL						D			
						20	2							
ON COMPLETION OF CORING					N=SPT 20/ 100mm REFUSAL	19	3							
							4							
					N=SPT 10/ 50mm REFUSAL	18			-	BASALT: brown mottled grey.	HW	(L)		POSSIBLE BOULDER
						17	5							
							6		GC	Clayey GRAVEL:fine to coarse grained angular, brown mottled orange, grey and yellow.	D	(VD)		POSSIBLE EXTREMELY WEATHERED BASALT
					N=SPT 15/ 100mm REFUSAL	16								

JKGeotechnics

BOREHOLE LOG

Borehole No.
212
2 / 3

Client: DEPARTMENT OF EDUCATION

Project: NORTHERN RIVERS FLOOD RECOVERY-RICHMOND RIVER HIGH CAMPUS REDEVELOPMENT

Location: 163 AND 170 ALEXANDRA PARADE, NORTH LISMORE, NSW

Job No.: 37635UOR **Method:** SPIRAL AUGER **R.L. Surface:** 22.2 m

Date: 27/5/25 **Datum:** AHD

Plant Type: JK300 **Logged/Checked By:** C.S./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
						15			GC	Clayey GRAVEL:fine to coarse grained angular, brown mottled orange, grey and yellow. *(continued)*	D	(VD)		
						14	8		-	BASALT: grey.	HW	(L)		LISMORE BASALT
						13	9			REFER TO CORED BOREHOLE LOG				GROUNDWATER MONITORING WELL INSTALLED TO 6.0m. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 6.0m TO 1.0m. CASING 0m TO 1.0m. 2mm SAND FILTER PACK 6.0m TO 1.0m. BENTONITE SEAL 1.0m TO 0.1m. STEEL COVER INSTALLED FLUSH WITH GROUND AND CONCRETED.
						12	10							
						11	11							
						10	12							
						9	13							

JKGeotechnics

CORED BOREHOLE LOG

Borehole No. 212 **3 / 3**

Client: DEPARTMENT OF EDUCATION

Project: NORTHERN RIVERS FLOOD RECOVERY-RICHMOND RIVER HIGH CAMPUS REDEVELOPMENT

Location: 163 AND 170 ALEXANDRA PARADE, NORTH LISMORE, NSW

Job No.: 37635UOR **Core Size:** NMLC **R.L. Surface:** 22.2 m

Date: 27/5/25 **Inclination:** VERTICAL **Datum:** AHD

Plant Type: JK300 **Bearing:** N/A **Logged/Checked By:** C.S./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS: SPACING (mm)	DEFECT DETAILS: DESCRIPTION (Specific / General)	Formation
		14			START CORING AT 8.65m						
100% RETURN		13	9		BASALT: dark grey, trace of chlorite seams.	FR	VH	3.8		(8.90m) XWS, 5°, 1 mm.t	Lismore Basalt
		12	10					5.2		(9.14m) J, 15°, P, S, Cn	
		11	11					3.8		(9.49m) XWS, 5°, 2 mm.t (9.56m) J, 40°, P, S, Cn (9.61m) XWS, 0°, 2 mm.t	
		10	12					3.3		(9.90m) J, 0°, Ir, R, Fe Sn (9.98m) J, 45°, St, R, Ca Vn (10.05m) J, 5°, P, S, Chlorite Vn	
		9	13					7.6		(11.09m) J, 15°, P, S, Fe Sn, x 2, and Chlorite Veneer	
		8	14					5.5		(11.39-11.91m) Numerous J's, 0 - 30°, P and C, S, Chlorite Vn, Spaced ~100mm	
								5.4		(12.18m) J, 0°, P, S, Chlorite Vn (12.20m) J, 0°, P, S, Chlorite Vn (12.26m) J, 0°, P, S, Chlorite Vn	
										(12.73m) J, 30°, P, S, Chlorite Vn	
										(13.13-13.60m) J, 5°, P, S, Chlorite Vn, Spaced 60mm-180mm	
										(13.85m) J, 35°, P, R, Cn	
					END OF BOREHOLE AT 14.73 m						

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

JKGeotechnics

BOREHOLE LOG

Borehole No. 214

Client: DEPARTMENT OF EDUCATION

Project: NORTHERN RIVERS FLOOD RECOVERY-RICHMOND RIVER HIGH CAMPUS REDEVELOPMENT

Location: 163 AND 170 ALEXANDRA PARADE, NORTH LISMORE, NSW

Job No.: 37635UOR **Method:** SPIRAL AUGER **R.L. Surface:** 14.6 m

Date: 4/6/25 **Datum:** AHD

Plant Type: JK309 **Logged/Checked By:** A.G./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
DRY ON COMPLETION OF AUGERING										TOPSOIL: Silty clay, high plasticity, dark brown, trace of root fibres.	w>PL			
									CH	Silty CLAY: high plasticity, dark brown, trace of fine to medium grained basalt and ironstone gravel.	w>PL	St	110 130 190	ALLUVIAL
					N = 5 2,2,3	14							160 190 210	
							1							
					N = 8 2,3,5	13						St - VSt	270 340 340 370	
							2							
ON COMPLETION OF CORING					N > 13 3,8,5/ 50mm REFUSAL	12								
							3			Silty CLAY: high plasticity, light brown and brown, trace of fine to medium grained ironstone gravel.		VSt - Hd	360 360 420	RESIDUAL
									-	Extremely Weathered BASALT: Silty gravelly clay, low plasticity, brown, fine to medium grained basalt and ironstone gravel.	XW	(Hd)		LISMORE BASALT
						11	4							
					N=SPT 6/ 50mm REFUSAL	10				Extremely Weathered BASALT: Clayey GRAVEL, fine grained, brown, basalt and ironstone gravel.		(VD)		LOW 'TC' BIT RESISTANCE GROUNDWATER MONITORING WELL INSTALLED TO 6.3m DEPTH IN ADJACENT BOREHOLE. CLASS 18 MACHINE SLOTTED 50mm DIA. PVC STANDPIPE 6.3m TO 1.3m. CASING 0m TO 1.3m. 2mm SAND FILTER PACK 6.3m TO 0.5m. BENTONITE SEAL 0.5m TO 0m.
							5							
						9								
							6							
										Extremely Weathered BASALT: Clayey GRAVEL, fine grained, brown, basalt and ironstone gravel, with low to high strength bands of basalt and ironstone.				LOW RESISTANCE WITH OCCASIONAL HIGH RESISTANCE BANDS
						8								

JKGeotechnics

BOREHOLE LOG

Borehole No. 214

Client: DEPARTMENT OF EDUCATION

Project: NORTHERN RIVERS FLOOD RECOVERY-RICHMOND RIVER HIGH CAMPUS REDEVELOPMENT

Location: 163 AND 170 ALEXANDRA PARADE, NORTH LISMORE, NSW

Job No.: 37635UOR **Method:** SPIRAL AUGER **R.L. Surface:** 14.6 m

Date: 4/6/25 **Datum:** AHD

Plant Type: JK309 **Logged/Checked By:** A.G./P.R.

Groundwater Record	SAMPLES ES	SAMPLES U50	SAMPLES DB	SAMPLES DS	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa)	Remarks
						7	8		-	Extremely Weathered BASALT: Clayey GRAVEL, fine grained, brown, basalt and ironstone gravel, with low to high strength bands of basalt and ironstone. *(continued)*	XW	(VD)		LOW RESISTANCE WITH OCCASIONAL HIGH RESISTANCE BANDS
						6	9							
						5	10							
						4	11							
						3	12							
						2	13							HIGH RESISTANCE
						1								

JKGeotechnics

CORED BOREHOLE LOG

Borehole No. 214

Client: DEPARTMENT OF EDUCATION

Project: NORTHERN RIVERS FLOOD RECOVERY-RICHMOND RIVER HIGH CAMPUS REDEVELOPMENT

Location: 163 AND 170 ALEXANDRA PARADE, NORTH LISMORE, NSW

Job No.: 37635UOR **Core Size:** NMLC **R.L. Surface:** 14.6 m

Date: 4/6/25 **Inclination:** VERTICAL **Datum:** AHD

Plant Type: JK309 **Bearing:** N/A **Logged/Checked By:** A.G./P.R.

Water Loss\Level	Barrel Lift	RL (m AHD)	Depth (m)	Graphic Log	CORE DESCRIPTION: Rock Type, grain characteristics, colour, texture and fabric, features, inclusions and minor components	Weathering	Strength	POINT LOAD STRENGTH INDEX $I_s(50)$	DEFECT DETAILS: SPACING (mm)	DEFECT DETAILS: DESCRIPTION (Specific / General)	Formation
		1			START CORING AT 13.95m						
90% RETURN		0	14		BASALT: dark grey, trace of rounded gravel sized green chlorite inclusions.	SW	VH	4.3		(14.03m) J, 45°, P, R, Fe Sn (14.08m) J, 30°, P, R, Fe Sn (14.16m) J, 90°, Un, R, Cn (14.26m) XWS, 20°, 100 mm.t	Lismore Basalt
										(14.40m) Jh, 85°, P, Chlorite FILLED (14.48m) Jh, 45°, P, Chlorite FILLED (14.53m) J, 45°, P, Chlorite FILLED	
						HW	L	0.10		(14.60-14.90m) J, 0 - 45°, P, Fe Sn, Spaced 5mm-40mm	
		-1	15			SW	VH	3.6 4.1		(15.14m) J, 35°, P, R, Fe Sn (15.42m) J, 45°, P, R, Cn	
		-2	16					4.6 4.1 4.3		(16.07m) J, 65°, P, R, Cn (16.30m) J, 15°, P, R, Cn	
		-3	17		END OF BOREHOLE AT 16.90 m						
		-4	18								
		-5	19								

FRACTURES NOT MARKED ARE CONSIDERED TO BE DRILLING AND HANDLING BREAKS

ENVIRONMENTAL LOGS EXPLANATION NOTES

INTRODUCTION

These notes have been provided to amplify the environmental report in regard to classification methods, field procedures and certain matters relating to the logging of soil and rock. Not all notes are necessarily relevant to all reports.

Where geotechnical borehole logs are utilised for environmental purpose, reference should also be made to the explanatory notes included in the geotechnical report. Environmental logs are not suitable for geotechnical purposes.

The ground is a product of continuing natural and man-made processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time. Environmental studies include gathering and assimilating limited facts about these characteristics and properties in order to understand or predict the behaviour of the ground on a particular site under certain conditions. This report may contain such facts obtained by inspection, excavation, probing, sampling, testing or other means of investigation. If so, they are directly relevant only to the ground at the place where and time when the investigation was carried out.

DESCRIPTION AND CLASSIFICATION METHODS

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726:2017 *'Geotechnical Site Investigations'*. In general, descriptions cover the following properties – soil or rock type, colour, structure, strength or density, and inclusions. Identification and classification of soil and rock involves judgement and the Company infers accuracy only to the extent that is common in current geoenvironmental practice.

Soil types are described according to the predominating particle size and behaviour as set out in the attached soil classification table qualified by the grading of other particles present (eg. sandy clay) as set out below:

Soil Classification	Particle Size
Clay	< 0.002mm
Silt	0.002 to 0.075mm
Sand	0.075 to 2.36mm
Gravel	2.36 to 63mm
Cobbles	63 to 200mm
Boulders	> 200mm

Non-cohesive soils are classified on the basis of relative density, generally from the results of Standard Penetration Test (SPT) as below:

Relative Density	SPT 'N' Value (blows/300mm)
Very loose (VL)	< 4
Loose (L)	4 to 10
Medium dense (MD)	10 to 30
Dense (D)	30 to 50
Very Dense (VD)	> 50

Cohesive soils are classified on the basis of strength (consistency) either by use of a hand penetrometer, vane shear, laboratory testing and/or tactile engineering examination. The strength terms are defined as follows.

Classification	Unconfined Compressive Strength (kPa)	Indicative Undrained Shear Strength (kPa)
Very Soft (VS)	≤ 25	≤ 12
Soft (S)	> 25 and ≤ 50	> 12 and ≤ 25
Firm (F)	> 50 and ≤ 100	> 25 and ≤ 50
Stiff (St)	> 100 and ≤ 200	> 50 and ≤ 100
Very Stiff (VSt)	> 200 and ≤ 400	> 100 and ≤ 200
Hard (Hd)	> 400	> 200
Friable (Fr)	Strength not attainable – soil crumbles	

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc. Where relevant, further information regarding rock classification is given in the text of the report. In the Sydney Basin, 'shale' is used to describe fissile mudstone, with a weakness parallel to bedding. Rocks with alternating inter-laminations of different grain size (eg. siltstone/claystone and siltstone/fine grained sandstone) are referred to as 'laminite'.

INVESTIGATION METHODS

The following is a brief summary of investigation methods currently adopted by the Company and some comments on their use and application. All methods except test pits, hand auger drilling and portable Dynamic Cone Penetrometers require the use of a mechanical rig which is commonly mounted on a truck chassis or track base.

Test Pits: These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the insitu soils and 'weaker' bedrock if it is safe to descend into the pit. The depth of penetration is limited to about 3m for a backhoe and up to 6m for a large excavator. Limitations of test pits are the problems associated with disturbance and difficulty of reinstatement and the consequent effects on close-by structures. Care must be taken if construction is to be carried out near test pit locations to either properly recompact the backfill during construction or to design and construct the

structure so as not to be adversely affected by poorly compacted backfill at the test pit location.

Hand Auger Drilling: A borehole of 50mm to 100mm diameter is advanced by manually operated equipment. Refusal of the hand auger can occur on a variety of materials such as obstructions within any fill, tree roots, hard clay, gravel or ironstone, cobbles and boulders, and does not necessarily indicate rock level.

Continuous Spiral Flight Augers: The borehole is advanced using 75mm to 115mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling and insitu testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface by the flights or may be collected after withdrawal of the auger flights, but they can be very disturbed and layers may become mixed. Information from the auger sampling (as distinct from specific sampling by SPTs or undisturbed samples) is of limited reliability due to mixing or softening of samples by groundwater, or uncertainties as to the original depth of the samples. Augering below the groundwater table is of even lesser reliability than augering above the water table.

Rock Augering: Use can be made of a Tungsten Carbide (TC) bit for auger drilling into rock to indicate rock quality and continuity by variation in drilling resistance and from examination of recovered rock cuttings. This method of investigation is quick and relatively inexpensive but provides only an indication of the likely rock strength and predicted values may be in error by a strength order. Where rock strengths may have a significant impact on construction feasibility or costs, then further investigation by means of cored boreholes may be warranted.

Wash Boring: The borehole is usually advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be assessed from the cuttings, together with some information from "feel" and rate of penetration.

Mud Stabilised Drilling: Either Wash Boring or Continuous Core Drilling can use drilling mud as a circulating fluid to stabilise the borehole. The term 'mud' encompasses a range of products ranging from bentonite to polymers. The mud tends to mask the cuttings and reliable identification is only possible from intermittent intact sampling (eg. from SPT and U50 samples) or from rock coring, etc.

Continuous Core Drilling: A continuous core sample is obtained using a diamond tipped core barrel. Provided full core recovery is achieved (which is not always possible in very low strength rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation. In rocks, NMLC or HQ triple tube core barrels, which give a core of about 50mm and 61mm diameter, respectively, is usually used with water flush. The length of core recovered is compared to the length drilled and any length not recovered is shown as NO CORE. The location of NO CORE recovery is determined on site by the supervising engineer; where the location is uncertain, the loss is placed at the bottom of the drill run.

Standard Penetration Tests: Standard Penetration Tests (SPT) are used mainly in non-cohesive soils, but can also be used in cohesive soils, as a means of indicating density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289.6.3.1–2004 (R2016) *'Methods of Testing Soils for Engineering Purposes, Soil Strength and Consolidation Tests – Determination of the Penetration Resistance of a Soil – Standard Penetration Test (SPT)'*.

The test is carried out in a borehole by driving a 50mm diameter split sample tube with a tapered shoe, under the impact of a 63.5kg hammer with a free fall of 760mm. It is normal for the tube to be driven in three successive 150mm increments and the 'N' value is taken as the number of blows for the last 300mm. In dense sands, very hard clays or weak rock, the full 450mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form:

- In the case where full penetration is obtained with successive blow counts for each 150mm of, say, 4, 6 and 7 blows, as

  N = 13
  4, 6, 7

- In a case where the test is discontinued short of full penetration, say after 15 blows for the first 150mm and 30 blows for the next 40mm, as

  N > 30
  15, 30/40mm

The results of the test can be related empirically to the engineering properties of the soil.

A modification to the SPT is where the same driving system is used with a solid 60° tipped steel cone of the same diameter as the SPT hollow sampler. The solid cone can be continuously driven for some distance in soft clays or loose sands, or may be used where damage would otherwise occur to the SPT. The results of this Solid Cone Penetration Test (SCPT) are shown as 'N_c' on the borehole logs, together with the number of blows per 150mm penetration.

LOGS

The borehole or test pit logs presented herein are an interpretation of the subsurface conditions, and their reliability will depend to some extent on the frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will enable the most reliable assessment, but is not always practicable or possible to justify on economic grounds. In any case, the boreholes or test pits represent only a very small sample of the total subsurface conditions.

The terms and symbols used in preparation of the logs are defined in the following pages.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than 'straight line' variations between the boreholes or test pits. Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations.

GROUNDWATER

Where groundwater levels are measured in boreholes, there are several potential problems:

- Although groundwater may be present, in low permeability soils it may enter the hole slowly or perhaps not at all during the time it is left open.
- A localised perched water table may lead to an erroneous indication of the true water table.
- Water table levels will vary from time to time with seasons or recent weather changes and may not be the same at the time of construction.
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must be washed out of the hole or 'reverted' chemically if reliable water observations are to be made.

More reliable measurements can be made by installing standpipes which are read after the groundwater level has stabilised at intervals ranging from several days to perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from perched water tables or surface water.

FILL

The presence of fill materials can often be determined only by the inclusion of foreign objects (eg. bricks, steel, etc) or by distinctly unusual colour, texture or fabric. Identification of the extent of fill materials will also depend on investigation methods and frequency. Where natural soils similar to those at the site are used for fill, it may be difficult with limited testing and sampling to reliably assess the extent of the fill.

The presence of fill materials is usually regarded with caution as the possible variation in density and material type is much greater than with natural soil deposits. Consequently, there is an increased risk of adverse environmental characteristics or behaviour. If the volume and nature of fill is of importance to a project, then frequent test pit excavations are preferable to boreholes.

LABORATORY TESTING

Laboratory testing has not been undertaken to confirm the soil classification and rock strengths indicated on the environmental logs unless noted in the report.

SYMBOL LEGENDS

SOIL


FILL


TOPSOIL


CLAY (CL, CI, CH)


SILT (ML, MH)


SAND (SP, SW)


GRAVEL (GP, GW)


SANDY CLAY (CL, CI, CH)


SILTY CLAY (CL, CI, CH)


CLAYEY SAND (SC)


SILTY SAND (SM)


GRAVELLY CLAY (CL, CI, CH)


CLAYEY GRAVEL (GC)


SANDY SILT (ML, MH)


PEAT AND HIGHLY ORGANIC SOILS (Pt)

ROCK


CONGLOMERATE


SANDSTONE


SHALE/MUDSTONE


SILTSTONE


CLAYSTONE


COAL


LAMINITE


LIMESTONE


PHYLLITE, SCHIST


TUFF


GRANITE, GABBRO


DOLERITE, DIORITE


BASALT, ANDESITE


QUARTZITE

OTHER MATERIALS


BRICKS OR PAVERS


CONCRETE


ASPHALTIC CONCRETE

CLASSIFICATION OF COARSE AND FINE GRAINED SOILS

Major Divisions		Group Symbol	Typical Names	Field Classification of Sand and Gravel	Laboratory Classification	
Coarse grained soil (more than 65% of soil excluding oversize fraction is greater than 0.075mm)	GRAVEL (more than half of coarse fraction is larger than 2.36mm	GW	Gravel and gravel-sand mixtures, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	$C_u > 4$ $1 < C_c < 3$
		GP	Gravel and gravel-sand mixtures, little or no fines, uniform gravels	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	Fails to comply with above
		GM	Gravel-silt mixtures and gravel-sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength	≥ 12% fines, fines are silty	Fines behave as silt
		GC	Gravel-clay mixtures and gravel-sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength	≥ 12% fines, fines are clayey	Fines behave as clay
	SAND (more than half of coarse fraction is smaller than 2.36mm)	SW	Sand and gravel-sand mixtures, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	$C_u > 6$ $1 < C_c < 3$
		SP	Sand and gravel-sand mixtures, little or no fines	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	Fails to comply with above
		SM	Sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength	≥ 12% fines, fines are silty	N/A
		SC	Sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength	≥ 12% fines, fines are clayey	

Major Divisions		Group Symbol	Typical Names	Field Classification of Silt and Clay			Laboratory Classification
				Dry Strength	Dilatancy	Toughness	% < 0.075mm
ine grained soils (more than 35% of soil excluding oversize fraction is less than 0.075mm)	SILT and CLAY (low to medium plasticity)	ML	Inorganic silt and very fine sand, rock flour, silty or clayey fine sand or silt with low plasticity	None to low	Slow to rapid	Low	Below A line
		CL, CI	Inorganic clay of low to medium plasticity, gravelly clay, sandy clay	Medium to high	None to slow	Medium	Above A line
		OL	Organic silt	Low to medium	Slow	Low	Below A line
	SILT and CLAY (high plasticity)	MH	Inorganic silt	Low to medium	None to slow	Low to medium	Below A line
		CH	Inorganic clay of high plasticity	High to very high	None	High	Above A line
		OH	Organic clay of medium to high plasticity, organic silt	Medium to high	None to very slow	Low to medium	Below A line
	Highly organic soil	Pt	Peat, highly organic soil	–	–	–	–

Laboratory Classification Criteria

A well graded coarse grained soil is one for which the coefficient of uniformity $Cu > 4$ and the coefficient of curvature $1 < C_c < 3$. Otherwise, the soil is poorly graded. These coefficients are given by:

$$C_U = \frac{D_{60}}{D_{10}} \qquad and \qquad C_C = \frac{(D_{30})^2}{D_{10}\, D_{60}}$$

Where D_{10}, D_{30} and D_{60} are those grain sizes for which 10%, 30% and 60% of the soil grains, respectively, are smaller.

NOTES:

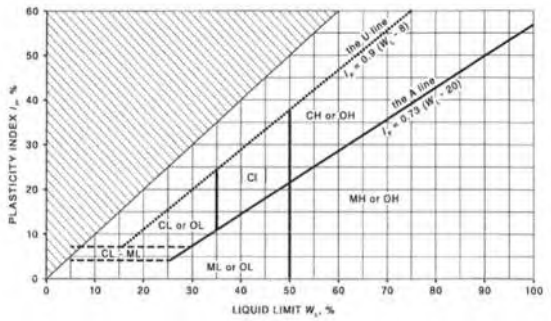
1 For a coarse grained soil with a fines content between 5% and 12%, the soil is given a dual classification comprising the two group symbols separated by a dash; for example, for a poorly graded gravel with between 5% and 12% silt fines, the classification is GP-GM.

2 Where the grading is determined from laboratory tests, it is defined by coefficients of curvature (C_c) and uniformity (C_u) derived from the particle size distribution curve.

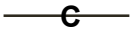
3 Clay soils with liquid limits > 35% and ≤ 50% may be classified as being of medium plasticity.

4 The U line on the Modified Casagrande Chart is an approximate upper bound for most natural soils.

Modified Casagrande Chart for Classifying Silts and Clays according to their Behaviour



LOG SYMBOLS

Log Column	Symbol	Definition
Groundwater Record		Standing water level. Time delay following completion of drilling/excavation may be shown.
		Extent of borehole/test pit collapse shortly after drilling/excavation.
		Groundwater seepage into borehole or test pit noted during drilling or excavation.
Samples	ES	Sample taken over depth indicated, for environmental analysis.
	U50	Undisturbed 50mm diameter tube sample taken over depth indicated.
	DB	Bulk disturbed sample taken over depth indicated.
	DS	Small disturbed bag sample taken over depth indicated.
	ASB	Soil sample taken over depth indicated, for asbestos analysis.
	ASS	Soil sample taken over depth indicated, for acid sulfate soil analysis.
	SAL	Soil sample taken over depth indicated, for salinity analysis.
	PFAS	Soil sample taken over depth indicated, for analysis of Per- and Polyfluoroalkyl Substances.
Field Tests	N = 17 4, 7, 10	Standard Penetration Test (SPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration. 'Refusal' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	N_c = 5 7 3R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60° solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	VNS = 25	Vane shear reading in kPa of undrained shear strength.
	PID = 100	Photoionisation detector reading in ppm (soil sample headspace test).
Moisture Condition (Fine Grained Soils)	w > PL	Moisture content estimated to be greater than plastic limit.
	$w \approx$ PL	Moisture content estimated to be approximately equal to plastic limit.
	w < PL	Moisture content estimated to be less than plastic limit.
	$w \approx$ LL	Moisture content estimated to be near liquid limit.
	w > LL	Moisture content estimated to be wet of liquid limit.
(Coarse Grained Soils)	D	DRY – runs freely through fingers.
	M	MOIST – does not run freely but no free water visible on soil surface.
	W	WET – free water visible on soil surface.
Strength (Consistency) Cohesive Soils	VS	VERY SOFT – unconfined compressive strength ≤ 25kPa.
	S	SOFT – unconfined compressive strength > 25kPa and ≤ 50kPa.
	F	FIRM – unconfined compressive strength > 50kPa and ≤ 100kPa.
	St	STIFF – unconfined compressive strength > 100kPa and ≤ 200kPa.
	VSt	VERY STIFF – unconfined compressive strength > 200kPa and ≤ 400kPa.
	Hd	HARD – unconfined compressive strength > 400kPa.
	Fr	FRIABLE – strength not attainable, soil crumbles.
	( )	Bracketed symbol indicates estimated consistency based on tactile examination or other assessment.
Density Index/ Relative Density (Cohesionless Soils)		**Density Index (I_D) Range (%)** / **SPT 'N' Value Range (Blows/300mm)** VERY LOOSE: ≤ 15 / 0 – 4 LOOSE: > 15 and ≤ 35 / 4 – 10 MEDIUM DENSE: > 35 and ≤ 65 / 10 – 30 DENSE: > 65 and ≤ 85 / 30 – 50 VERY DENSE: > 85 / > 50
	VL	
	L	
	MD	
	D	
	VD	
	( )	Bracketed symbol indicates estimated density based on ease of drilling or other assessment.

Log Column	Symbol	Definition
Hand Penetrometer Readings	300 250	Measures reading in kPa of unconfined compressive strength. Numbers indicate individual test results on representative undisturbed material unless noted otherwise.
Remarks	'V' bit	Hardened steel 'V' shaped bit.
	'TC' bit	Twin pronged tungsten carbide bit.
	T_{60}	Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers.
	Soil Origin	The geological origin of the soil can generally be described as: RESIDUAL – soil formed directly from insitu weathering of the underlying rock. No visible structure or fabric of the parent rock. EXTREMELY WEATHERED – soil formed directly from insitu weathering of the underlying rock. Material is of soil strength but retains the structure and/or fabric of the parent rock. ALLUVIAL – soil deposited by creeks and rivers. ESTUARINE – soil deposited in coastal estuaries, including sediments caused by inflowing creeks and rivers, and tidal currents. MARINE – soil deposited in a marine environment. AEOLIAN – soil carried and deposited by wind. COLLUVIAL – soil and rock debris transported downslope by gravity, with or without the assistance of flowing water. Colluvium is usually a thick deposit formed from a landslide. The description 'slopewash' is used for thinner surficial deposits. LITTORAL – beach deposited soil.

Classification of Material Weathering

Term		Abbreviation		Definition
Residual Soil		RS		Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely Weathered		XW		Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible.
Highly Weathered	Distinctly Weathered (Note 1)	HW	DW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Moderately Weathered		MW		The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.
Slightly Weathered		SW		Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh		FR		Rock shows no sign of decomposition of individual minerals or colour changes.

NOTE 1: The term 'Distinctly Weathered' is used where it is not practicable to distinguish between 'Highly Weathered' and 'Moderately Weathered' rock. 'Distinctly Weathered' is defined as follows: *'Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores'*. There is some change in rock strength.

Rock Material Strength Classification

Term	Abbreviation	Uniaxial Compressive Strength (MPa)	Guide to Strength	
			Point Load Strength Index $Is_{(50)}$ (MPa)	Field Assessment
Very Low Strength	VL	0.6 to 2	0.03 to 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 30mm thick can be broken by finger pressure.
Low Strength	L	2 to 6	0.1 to 0.3	Easily scored with a knife; indentations 1mm to 3mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium Strength	M	6 to 20	0.3 to 1	Scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
High Strength	H	20 to 60	1 to 3	A piece of core 150mm long by 50mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High Strength	VH	60 to 200	3 to 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely High Strength	EH	> 200	> 10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Appendix E: Laboratory Reports & COC Documents

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 382346

Client Details

Client	JK Environments
Attention	Oisin Butler
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E36314PT Lismore**
Number of Samples	10 Water
Date samples received	03/06/2025
Date completed instructions received	03/06/2025

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	11/06/2025
Date of Issue	11/06/2025

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Diego Bigolin, Inorganics Supervisor
Dragana Tomas, Senior Chemist
Giovanni Agosti, Group Technical Manager
Stuart Chen, Asbestos Approved Identifier/Report coordinator
Tabitha Roberts, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Water						
Our Reference		382346-1	382346-2	382346-3	382346-4	382346-5
Your Reference	UNITS	MW62	MW206	MW212	MW214	Creek1
Date Sampled		30/05/2025	30/05/2025	30/05/2025	31/05/2025	29/05/2025
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	05/06/2025	05/06/2025	05/06/2025	05/06/2025	05/06/2025
Date analysed	-	06/06/2025	06/06/2025	06/06/2025	06/06/2025	06/06/2025
TRH C_6 - C_9	µg/L	<10	<10	14	12	19
TRH C_6 - C_{10}	µg/L	<10	12	16	46	20
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	12	13	41	11
Benzene	µg/L	<1	<1	<1	<1	<1
Toluene	µg/L	<1	<1	3	<1	9
Ethylbenzene	µg/L	<1	<1	<1	<1	<1
m+p-xylene	µg/L	<2	<2	<2	3	<2
o-xylene	µg/L	<1	<1	<1	3	<1
Naphthalene	µg/L	<1	<1	<1	2	<1
Surrogate Dibromofluoromethane	%	103	103	102	103	102
Surrogate Toluene-d8	%	98	99	100	100	99
Surrogate 4-Bromofluorobenzene	%	96	99	97	100	98

vTRH(C6-C10)/BTEXN in Water						
Our Reference		382346-6	382346-7	382346-8	382346-9	382346-10
Your Reference	UNITS	GWDUP301	GWDUP302	FR302-IP	TB301	TS301
Date Sampled		30/05/2025	30/05/2025	30/05/2025	27/05/2025	27/05/2025
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	05/06/2025	05/06/2025	05/06/2025	05/06/2025	05/06/2025
Date analysed	-	06/06/2025	06/06/2025	06/06/2025	06/06/2025	06/06/2025
TRH C_6 - C_9	µg/L	<10	<10	84	<10	[NA]
TRH C_6 - C_{10}	µg/L	<10	12	87	<10	[NA]
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	12	87	<10	[NA]
Benzene	µg/L	<1	<1	<1	<1	110%
Toluene	µg/L	<1	<1	<1	<1	107%
Ethylbenzene	µg/L	<1	<1	<1	<1	102%
m+p-xylene	µg/L	<2	<2	<2	<2	103%
o-xylene	µg/L	<1	<1	<1	<1	105%
Naphthalene	µg/L	<1	<1	<1	<1	[NA]
Surrogate Dibromofluoromethane	%	101	103	101	103	101
Surrogate Toluene-d8	%	99	100	100	100	100
Surrogate 4-Bromofluorobenzene	%	94	98	98	95	99

svTRH (C10-C40) in Water						
Our Reference		382346-1	382346-2	382346-3	382346-4	382346-5
Your Reference	UNITS	MW62	MW206	MW212	MW214	Creek1
Date Sampled		30/05/2025	30/05/2025	30/05/2025	31/05/2025	29/05/2025
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	04/06/2025	04/06/2025	04/06/2025	04/06/2025	04/06/2025
Date analysed	-	05/06/2025	05/06/2025	05/06/2025	05/06/2025	05/06/2025
TRH C_{10} - C_{14}	µg/L	<50	78	170	350	<50
TRH C_{15} - C_{28}	µg/L	<100	<100	380	220	<100
TRH C_{29} - C_{36}	µg/L	<100	<100	<100	<100	<100
Total +ve TRH (C10-C36)	µg/L	<50	80	550	570	<50
TRH >C_{10} - C_{16}	µg/L	<50	110	420	450	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	110	420	450	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100	110	100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	µg/L	<50	110	540	560	<50
Surrogate o-Terphenyl	%	134	106	130	116	102

svTRH (C10-C40) in Water					
Our Reference		382346-6	382346-7	382346-8	382346-9
Your Reference	UNITS	GWDUP301	GWDUP302	FR302-IP	TB301
Date Sampled		30/05/2025	30/05/2025	30/05/2025	27/05/2025
Type of sample		Water	Water	Water	Water
Date extracted	-	04/06/2025	04/06/2025	04/06/2025	04/06/2025
Date analysed	-	05/06/2025	05/06/2025	05/06/2025	05/06/2025
TRH C_{10} - C_{14}	µg/L	<50	78	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100	<100	<100
Total +ve TRH (C10-C36)	µg/L	<50	80	<50	<50
TRH >C_{10} - C_{16}	µg/L	<50	120	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	120	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	µg/L	<50	120	<50	<50
Surrogate o-Terphenyl	%	105	108	109	112

PAHs in Water						
Our Reference		382346-1	382346-2	382346-3	382346-4	382346-5
Your Reference	UNITS	MW62	MW206	MW212	MW214	Creek1
Date Sampled		30/05/2025	30/05/2025	30/05/2025	31/05/2025	29/05/2025
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	04/06/2025	04/06/2025	04/06/2025	04/06/2025	04/06/2025
Date analysed	-	05/06/2025	05/06/2025	05/06/2025	05/06/2025	05/06/2025
Naphthalene	µg/L	<0.1	0.1	<0.1	0.4	<0.1
Acenaphthylene	µg/L	<0.1	<0.1	<0.1	0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1	<0.1	0.3	<0.1
Phenanthrene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	µg/L	<0.1	0.11	<0.1	0.79	<0.1
Surrogate p-Terphenyl-d14	%	104	99	99	100	90

PAHs in Water					
Our Reference		382346-6	382346-7	382346-8	382346-9
Your Reference	UNITS	GWDUP301	GWDUP302	FR302-IP	TB301
Date Sampled		30/05/2025	30/05/2025	30/05/2025	27/05/2025
Type of sample		Water	Water	Water	Water
Date extracted	-	04/06/2025	04/06/2025	04/06/2025	04/06/2025
Date analysed	-	05/06/2025	05/06/2025	05/06/2025	10/06/2025
Naphthalene	µg/L	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	µg/L	<0.1	<0.1	<0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1	<0.1	<0.1
Phenanthrene	µg/L	<0.1	<0.1	<0.1	<0.1
Anthracene	µg/L	<0.1	<0.1	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.1	<0.1	<0.1
Pyrene	µg/L	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	<0.1	<0.1	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	µg/L	<0.1	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-d14	%	100	98	99	112

Organochlorine Pesticides in Water						
Our Reference	UNITS	382346-1	382346-2	382346-3	382346-4	382346-6
Your Reference		MW62	MW206	MW212	MW214	GWDUP301
Date Sampled		30/05/2025	30/05/2025	30/05/2025	31/05/2025	30/05/2025
Type of sample		Water	Water	Water	Water	Water
Date extracted	-	04/06/2025	04/06/2025	04/06/2025	04/06/2025	04/06/2025
Date analysed	-	05/06/2025	05/06/2025	05/06/2025	05/06/2025	05/06/2025
alpha-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
HCB	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
beta-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
gamma-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
delta-BHC	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Aldrin	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Heptachlor Epoxide	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
gamma-Chlordane	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
alpha-Chlordane	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan I	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDE	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Dieldrin	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan II	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDD	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin Aldehyde	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
pp-DDT	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Endosulfan Sulphate	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Methoxychlor	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Mirex	ug/L	<0.2	<0.2	<0.2	<0.2	<0.2
Surrogate 4-Chloro-3-NBTF	%	67	63	67	70	67

Organochlorine Pesticides in Water		
Our Reference		382346-7
Your Reference	UNITS	GWDUP302
Date Sampled		30/05/2025
Type of sample		Water
Date extracted	-	04/06/2025
Date analysed	-	05/06/2025
alpha-BHC	µg/L	<0.2
HCB	µg/L	<0.2
beta-BHC	µg/L	<0.2
gamma-BHC	µg/L	<0.2
Heptachlor	µg/L	<0.2
delta-BHC	µg/L	<0.2
Aldrin	µg/L	<0.2
Heptachlor Epoxide	µg/L	<0.2
gamma-Chlordane	µg/L	<0.2
alpha-Chlordane	µg/L	<0.2
Endosulfan I	µg/L	<0.2
pp-DDE	µg/L	<0.2
Dieldrin	µg/L	<0.2
Endrin	µg/L	<0.2
Endosulfan II	µg/L	<0.2
pp-DDD	µg/L	<0.2
Endrin Aldehyde	µg/L	<0.2
pp-DDT	µg/L	<0.2
Endosulfan Sulphate	µg/L	<0.2
Methoxychlor	µg/L	<0.2
Mirex	ug/L	<0.2
Surrogate 4-Chloro-3-NBTF	%	68

All metals in water-dissolved						
Our Reference		382346-1	382346-2	382346-3	382346-4	382346-5
Your Reference	UNITS	MW62	MW206	MW212	MW214	Creek1
Date Sampled		30/05/2025	30/05/2025	30/05/2025	31/05/2025	29/05/2025
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	04/06/2025	04/06/2025	04/06/2025	04/06/2025	04/06/2025
Date analysed	-	04/06/2025	04/06/2025	04/06/2025	04/06/2025	04/06/2025
Aluminium-Dissolved	µg/L	<10	20	<10	<10	30
Silver-Dissolved	µg/L	<1	<1	<1	<1	<1
Antimony-Dissolved	µg/L	<1	<1	<1	<1	<1
Barium-Dissolved	µg/L	10	19	24	59	49
Beryllium-Dissolved	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Boron-Dissolved	µg/L	<20	20	<20	<20	<20
Cobalt-Dissolved	µg/L	<1	<1	2	<1	9
Iron-Dissolved	µg/L	<10	60	<10	20	190
Lithium-Dissolved	µg/L	5	4	2	6	<1
Manganese-Dissolved	µg/L	<5	47	240	53	840
Molybdenum-Dissolved	µg/L	<1	6	14	2	<1
Selenium-Dissolved	µg/L	<1	<1	11	<1	<1
Strontium-Dissolved	µg/L	650	130	440	2,200	100
Uranium-Dissolved	µg/L	<0.5	<0.5	1.2	1.2	<0.5
Vanadium-Dissolved	µg/L	2	1	2	3	3
Arsenic-Dissolved	µg/L	<1	<1	<1	<1	<1
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	<1	<1	<1	<1
Copper-Dissolved	µg/L	<1	<1	<1	<1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	<1	2	3	2	4
Lead-Dissolved	µg/L	<1	<1	<1	<1	<1
Zinc-Dissolved	µg/L	<1	1	8	<1	2

All metals in water-dissolved				
Our Reference		382346-6	382346-8	382346-9
Your Reference	UNITS	GWDUP301	FR302-IP	TB301
Date Sampled		30/05/2025	30/05/2025	27/05/2025
Type of sample		Water	Water	Water
Date prepared	-	04/06/2025	04/06/2025	04/06/2025
Date analysed	-	04/06/2025	04/06/2025	04/06/2025
Arsenic-Dissolved	µg/L	<1	<1	<1
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	<1	<1
Copper-Dissolved	µg/L	<1	310	<1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	<1	1	<1
Lead-Dissolved	µg/L	<1	<1	<1
Zinc-Dissolved	µg/L	<1	11	<1

Metals in Waters - Acid extractable						
Our Reference		382346-1	382346-2	382346-3	382346-4	382346-5
Your Reference	UNITS	MW62	MW206	MW212	MW214	Creek1
Date Sampled		30/05/2025	30/05/2025	30/05/2025	31/05/2025	29/05/2025
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	05/06/2025	05/06/2025	05/06/2025	05/06/2025	05/06/2025
Date analysed	-	05/06/2025	05/06/2025	05/06/2025	05/06/2025	05/06/2025
Phosphorus - Total	mg/L	0.05	0.63	8.5	12	2.0

Miscellaneous Inorganics						
Our Reference	UNITS	382346-1	382346-2	382346-3	382346-4	382346-5
Your Reference		MW62	MW206	MW212	MW214	Creek1
Date Sampled		30/05/2025	30/05/2025	30/05/2025	31/05/2025	29/05/2025
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	03/06/2025	03/06/2025	03/06/2025	03/06/2025	03/06/2025
Date analysed	-	03/06/2025	03/06/2025	03/06/2025	03/06/2025	03/06/2025
Electrical Conductivity	µS/cm	1,400	340	1,200	3,700	210
pH	pH Units	7.1	7.3	7.4	7.1	6.6
Redox Potential*	mV	198	178	184	182	157
Dissolved Oxygen*	mg/L	8.6	7.2	8.5	8.3	8.4
Turbidity	NTU	<0.1	420	540	0.1	550
Total Dissolved Solids (grav)	mg/L	770	[NA]	1,300	2,300	120
Total Suspended Solids	mg/L	<5	[NA]	2,700	22,000	820
Total Organic Carbon	mg/L	1	4	18	2	20
Sodium Adsorption Ratio	-	3.4	2.7	5.2	5.2	1.4
Silica (Reactive - SiO_2)	mg/L	52	54	20	43	28
Ammonia as N in water	mg/L	<0.005	0.02	<0.005	<0.005	0.29
Nitrate as N in water	mg/L	0.41	2.1	<0.005	1.8	0.065
Nitrite as N in water	mg/L	<0.005	0.058	<0.005	0.01	0.02
NOx as N in water	mg/L	0.41	2.1	<0.005	1.8	0.087
Total Nitrogen in water	mg/L	0.4	2.6	0.4	3.8	1.7
TKN in water	mg/L	<0.1	0.5	0.4	2.0	1.6
Phosphate as P in water	mg/L	0.064	0.41	0.01	0.057	0.067
Organic Nitrogen as N	mg/L	<0.2	0.5	0.4	2.0	1.3

Ion Balance						
Our Reference		382346-1	382346-2	382346-3	382346-4	382346-5
Your Reference	UNITS	MW62	MW206	MW212	MW214	Creek1
Date Sampled		30/05/2025	30/05/2025	30/05/2025	31/05/2025	29/05/2025
Type of sample		Water	Water	Water	Water	Water
Date prepared	-	03/06/2025	03/06/2025	03/06/2025	03/06/2025	03/06/2025
Date analysed	-	03/06/2025	03/06/2025	03/06/2025	03/06/2025	03/06/2025
Calcium - Dissolved	mg/L	68	15	44	180	9.5
Potassium - Dissolved	mg/L	0.9	2	2	2	5.1
Sodium - Dissolved	mg/L	160	50	170	390	23
Magnesium - Dissolved	mg/L	57	7.0	22	140	6.8
Hardness (calc) equivalent $CaCO_3$	mg/L	410	65	200	1,000	52
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	<5	<5	<5	<5	<5
Bicarbonate Alkalinity as $CaCO_3$	mg/L	460	160	250	780	87
Carbonate Alkalinity as $CaCO_3$	mg/L	<5	<5	<5	<5	<5
Total Alkalinity as $CaCO_3$	mg/L	460	160	250	780	87
Sulphate, SO4	mg/L	31	8	84	130	1
Chloride, Cl	mg/L	150	17	140	710	18
Ionic Balance	%	3.0	-3.0	3.0	-1.0	-2.0

Microbiologocal Testing					
Our Reference		382346-1	382346-2	382346-4	382346-5
Your Reference	UNITS	MW62	MW206	MW214	Creek1
Date Sampled		30/05/2025	30/05/2025	31/05/2025	29/05/2025
Type of sample		Water	Water	Water	Water
Date of testing	-	04/06/2025	04/06/2025	04/06/2025	04/06/2025
E. coli	cfu/100mL	<1000	20 MPN/100mL	<18 MPN/100mL	16000 MPN/100mL
Thermotolerant Coliforms	cfu/100mL	<1000	790 MPN/100mL	<18 MPN/100mL	16000 MPN/100mL

Method ID	Methodology Summary
Ext-008	Subcontracted to Sonic Food & Water Testing. NATA Accreditation No. 4034.
Inorg-001	pH - Measured using pH meter and electrode. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell.
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180+/-10°C. NOTE: Where the EC of the sample is <100µS/cm, the TDS will typically be below 70mg/L (as the sample is very likely to be at least drinking water quality). Therefore to ensure data quality for TDS, the TDS is typically calculated as per the equation below:- TDS = EC * 0.6
Inorg-019	Suspended Solids - determined gravimetricially by filtration of the sample. The samples are dried at 104+/-5°C.
Inorg-022	Turbidity - measured nephelometrically using a turbidimeter, in accordance with APHA latest edition, 2130-B.
Inorg-035	Analysed using an electrode. Please note that the results for water analyses are indicative only, samples are ideally analysed on collection.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 15% ie total anions = total cations +/-15%.
Inorg-055	Nitrate - determined colourimetrically. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
Inorg-055	Nitrite - determined colourimetrically based on APHA latest edition NO2- B. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
Inorg-055/062/127	Total Nitrogen - Calculation sum of TKN and oxidised Nitrogen. Alternatively analysed by combustion and chemiluminescence.
Inorg-057	Ammonia - determined colourimetrically, based on APHA latest edition 4500-NH3 F. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a KCl extraction.
Inorg-060	Phosphate determined colourimetrically based on EPA365.1 and APHA latest edition 4500 P E. Waters samples are filtered on receipt prior to analysis. Soils are analysed following a water extraction.
Inorg-062	TKN - determined colourimetrically based on APHA latest edition 4500 Norg. Alternatively, TKN can be derived from calculation (Total N - NOx).
Inorg-079	TOC determined using a TOC analyser using the combustion method. Dissolved requires filtering prior to determination. Analysis using APHA latest edition 5310B.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Inorg-112	Dissolved Oxygen using membrane electrode. Note this analysis should ideally be carried out immediately after sampling.
INORG-120	Reactive Silica (SiO2) determined colorimetrically. Waters samples are filtered on receipt prior to analysis.

Method ID	Methodology Summary
Metals-020	Determination of various metals by ICP-AES. Total Phosphate determined stochiometrically from Phosphorus (assumed to be present as Phosphate). Where salts (oxides, chlorides etc.) are calculated from the element concentration stoichiometrically there is no guarantee that the salt form is completely soluble in the acids used in the preparation.
Metals-020	Calcium and Magnesium analysed by ICP-AES and SAR calculated.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Where salts (oxides, chlorides etc.) are calculated from the element concentration stoichiometrically there is no guarantee that the salt form is completely soluble in the acids used in the preparation.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-023	Water samples are analysed directly by purge and trap GC-MS.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			05/06/2025	4	05/06/2025	06/06/2025		05/06/2025	[NT]
Date analysed	-			06/06/2025	4	06/06/2025	10/06/2025		06/06/2025	[NT]
TRH C_6 - C_9	µg/L	10	Org-023	<10	4	12	<10	18	80	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-023	<10	4	46	40	14	80	[NT]
Benzene	µg/L	1	Org-023	<1	4	<1	<1	0	83	[NT]
Toluene	µg/L	1	Org-023	<1	4	<1	<1	0	81	[NT]
Ethylbenzene	µg/L	1	Org-023	<1	4	<1	<1	0	79	[NT]
m+p-xylene	µg/L	2	Org-023	<2	4	3	2	40	79	[NT]
o-xylene	µg/L	1	Org-023	<1	4	3	3	0	79	[NT]
Naphthalene	µg/L	1	Org-023	<1	4	2	2	0	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-023	101	4	103	103	0	100	[NT]
Surrogate Toluene-d8	%		Org-023	99	4	100	100	0	101	[NT]
Surrogate 4-Bromofluorobenzene	%		Org-023	96	4	100	98	2	102	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	382346-3
Date extracted	-			04/06/2025	1	04/06/2025	04/06/2025		04/06/2025	04/06/2025
Date analysed	-			05/06/2025	1	05/06/2025	05/06/2025		05/06/2025	05/06/2025
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	1	<50	<50	0	117	121
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	1	<100	<100	0	111	124
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	1	<100	<100	0	100	103
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	1	<50	<50	0	117	121
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	1	<100	<100	0	111	124
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	1	<100	<100	0	100	103
Surrogate o-Terphenyl	%		Org-020	109	1	134	108	21	101	130

QUALITY CONTROL: PAHs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	382346-3
Date extracted	-			04/06/2025	1	04/06/2025	04/06/2025		04/06/2025	04/06/2025
Date analysed	-			05/06/2025	1	05/06/2025	05/06/2025		05/06/2025	05/06/2025
Naphthalene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	89	87
Acenaphthylene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	73	68
Fluorene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	77	74
Phenanthrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	92	85
Anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	86	78
Pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	88	82
Benzo(a)anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Chrysene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	74	73
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	75	73
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-022/025	103	1	104	98	6	104	94

QUALITY CONTROL: Organochlorine Pesticides in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	
Date extracted	-			04/06/2025	1	04/06/2025	04/06/2025		04/06/2025	[NT]
Date analysed	-			05/06/2025	1	05/06/2025	05/06/2025		05/06/2025	[NT]
alpha-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	74	[NT]
HCB	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
beta-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	70	[NT]
gamma-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Heptachlor	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	78	[NT]
delta-BHC	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Aldrin	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	93	[NT]
Heptachlor Epoxide	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	95	[NT]
gamma-Chlordane	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
alpha-Chlordane	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan I	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDE	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	81	[NT]
Dieldrin	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	94	[NT]
Endrin	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	84	[NT]
Endosulfan II	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDD	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	86	[NT]
Endrin Aldehyde	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
pp-DDT	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Endosulfan Sulphate	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	90	[NT]
Methoxychlor	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Mirex	ug/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0	[NT]	[NT]
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	68	1	67	65	3	73	[NT]

QUALITY CONTROL: Organochlorine Pesticides in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	382346-3
Date extracted	-			[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	04/06/2025
Date analysed	-			[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	05/06/2025
alpha-BHC	µg/L	0.2	Org-022/025	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	68
beta-BHC	µg/L	0.2	Org-022/025	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	66
Heptachlor	µg/L	0.2	Org-022/025	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	73
Aldrin	µg/L	0.2	Org-022/025	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	87
Heptachlor Epoxide	µg/L	0.2	Org-022/025	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	87
pp-DDE	µg/L	0.2	Org-022/025	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	77
Dieldrin	µg/L	0.2	Org-022/025	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	88
Endrin	µg/L	0.2	Org-022/025	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	82
pp-DDD	µg/L	0.2	Org-022/025	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	81
Endosulfan Sulphate	µg/L	0.2	Org-022/025	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	83
Surrogate 4-Chloro-3-NBTF	%		Org-022/025	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]	71

QUALITY CONTROL: All metals in water-dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W8	382346-2
Date prepared	-			04/06/2025	1	04/06/2025	04/06/2025		04/06/2025	04/06/2025
Date analysed	-			04/06/2025	1	04/06/2025	04/06/2025		04/06/2025	04/06/2025
Aluminium-Dissolved	µg/L	10	Metals-022	<10	1	<10	<10	0	103	100
Silver-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	103	116
Antimony-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	84	73
Barium-Dissolved	µg/L	1	Metals-022	<1	1	10	11	10	116	114
Beryllium-Dissolved	µg/L	0.5	Metals-022	<0.5	1	<0.5	<0.5	0	98	99
Boron-Dissolved	µg/L	20	Metals-022	<20	1	<20	<20	0	86	88
Cobalt-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	117	118
Iron-Dissolved	µg/L	10	Metals-022	<10	1	<10	<10	0	118	115
Lithium-Dissolved	µg/L	1	Metals-022	<1	1	5	6	18	99	105
Manganese-Dissolved	µg/L	5	Metals-022	<5	1	<5	<5	0	106	104
Molybdenum-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	107	89
Selenium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	93	94
Strontium-Dissolved	µg/L	1	Metals-022	<1	1	650	650	0	115	103
Uranium-Dissolved	µg/L	0.5	Metals-022	<0.5	1	<0.5	<0.5	0	101	79
Vanadium-Dissolved	µg/L	1	Metals-022	<1	1	2	2	0	107	105
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	104	104
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	<0.1	<0.1	0	105	105
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	106	103
Copper-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	115	115
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	[NT]		94	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	116	117
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	103	94
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	<1	<1	0	103	104

QUALITY CONTROL: All metals in water-dissolved					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	382346-3
Date prepared	-			[NT]	2	04/06/2025	04/06/2025		[NT]	04/06/2025
Date analysed	-			[NT]	2	04/06/2025	04/06/2025		[NT]	04/06/2025
Aluminium-Dissolved	µg/L	10	Metals-022	[NT]	2	20	[NT]		[NT]	[NT]
Silver-Dissolved	µg/L	1	Metals-022	[NT]	2	<1	[NT]		[NT]	[NT]
Antimony-Dissolved	µg/L	1	Metals-022	[NT]	2	<1	[NT]		[NT]	[NT]
Barium-Dissolved	µg/L	1	Metals-022	[NT]	2	19	[NT]		[NT]	[NT]
Beryllium-Dissolved	µg/L	0.5	Metals-022	[NT]	2	<0.5	[NT]		[NT]	[NT]
Boron-Dissolved	µg/L	20	Metals-022	[NT]	2	20	[NT]		[NT]	[NT]
Cobalt-Dissolved	µg/L	1	Metals-022	[NT]	2	<1	[NT]		[NT]	[NT]
Iron-Dissolved	µg/L	10	Metals-022	[NT]	2	60	[NT]		[NT]	[NT]
Lithium-Dissolved	µg/L	1	Metals-022	[NT]	2	4	[NT]		[NT]	[NT]
Manganese-Dissolved	µg/L	5	Metals-022	[NT]	2	47	[NT]		[NT]	[NT]
Molybdenum-Dissolved	µg/L	1	Metals-022	[NT]	2	6	[NT]		[NT]	[NT]
Selenium-Dissolved	µg/L	1	Metals-022	[NT]	2	<1	[NT]		[NT]	[NT]
Strontium-Dissolved	µg/L	1	Metals-022	[NT]	2	130	[NT]		[NT]	[NT]
Uranium-Dissolved	µg/L	0.5	Metals-022	[NT]	2	<0.5	[NT]		[NT]	[NT]
Vanadium-Dissolved	µg/L	1	Metals-022	[NT]	2	1	[NT]		[NT]	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	[NT]	2	<1	[NT]		[NT]	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	[NT]	2	<0.1	[NT]		[NT]	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	[NT]	2	<1	[NT]		[NT]	[NT]
Copper-Dissolved	µg/L	1	Metals-022	[NT]	2	<1	[NT]		[NT]	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	[NT]	2	<0.05	<0.05	0	[NT]	91
Nickel-Dissolved	µg/L	1	Metals-022	[NT]	2	2	[NT]		[NT]	[NT]
Lead-Dissolved	µg/L	1	Metals-022	[NT]	2	<1	[NT]		[NT]	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	[NT]	2	1	[NT]		[NT]	[NT]

QUALITY CONTROL: Metals in Waters - Acid extractable						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			05/06/2025	1	05/06/2025	05/06/2025		05/06/2025	[NT]
Date analysed	-			05/06/2025	1	05/06/2025	05/06/2025		05/06/2025	[NT]
Phosphorus - Total	mg/L	0.05	Metals-020	<0.05	1	0.05	<0.05	0	86	[NT]

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			03/06/2025	1	03/06/2025	03/06/2025		03/06/2025	[NT]
Date analysed	-			03/06/2025	1	03/06/2025	03/06/2025		03/06/2025	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	<1	1	1400	[NT]		96	[NT]
pH	pH Units		Inorg-001	[NT]	1	7.1	[NT]		98	[NT]
Redox Potential*	mV		Inorg-035	[NT]	1	198	197	1	109	[NT]
Dissolved Oxygen*	mg/L	0.1	Inorg-112	<0.1	1	8.6	[NT]		[NT]	[NT]
Turbidity	NTU	0.1	Inorg-022	<0.1	1	<0.1	[NT]		99	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	1	770	760	1	97	[NT]
Total Suspended Solids	mg/L	5	Inorg-019	<5	1	<5	[NT]		100	[NT]
Total Organic Carbon	mg/L	1	Inorg-079	<1	1	1	1	0	102	[NT]
Sodium Adsorption Ratio	-	0.01	Metals-020	[NT]	1	3.4	[NT]		96	[NT]
Silica (Reactive - SiO_2)	mg/L	0.1	INORG-120	<0.1	1	52	51	2	100	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	<0.005	1	<0.005	[NT]		90	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.41	[NT]		96	[NT]
Nitrite as N in water	mg/L	0.005	Inorg-055	<0.005	1	<0.005	[NT]		104	[NT]
NOx as N in water	mg/L	0.005	Inorg-055	<0.005	1	0.41	[NT]		97	[NT]
Total Nitrogen in water	mg/L	0.1	Inorg-055/062/127	<0.1	1	0.4	[NT]		93	[NT]
TKN in water	mg/L	0.1	Inorg-062	<0.1	1	<0.1	[NT]		[NT]	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	<0.005	1	0.064	[NT]		109	[NT]
Organic Nitrogen as N	mg/L	0.2	Inorg-055/062/127	<0.2	1	<0.2	[NT]		[NT]	[NT]

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	3	03/06/2025	03/06/2025		[NT]	[NT]
Date analysed	-			[NT]	3	03/06/2025	03/06/2025		[NT]	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	[NT]	3	1200	[NT]		[NT]	[NT]
pH	pH Units		Inorg-001	[NT]	3	7.4	[NT]		[NT]	[NT]
Redox Potential*	mV		Inorg-035	[NT]	3	184	[NT]		[NT]	[NT]
Dissolved Oxygen*	mg/L	0.1	Inorg-112	[NT]	3	8.5	[NT]		[NT]	[NT]
Turbidity	NTU	0.1	Inorg-022	[NT]	3	540	[NT]		[NT]	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	[NT]	3	1300	[NT]		[NT]	[NT]
Total Suspended Solids	mg/L	5	Inorg-019	[NT]	3	2700	2700	0	[NT]	[NT]
Total Organic Carbon	mg/L	1	Inorg-079	[NT]	3	18	[NT]		[NT]	[NT]
Sodium Adsorption Ratio	-	0.01	Metals-020	[NT]	3	5.2	[NT]		[NT]	[NT]
Silica (Reactive - SiO_2)	mg/L	0.1	INORG-120	[NT]	3	20	[NT]		[NT]	[NT]
Ammonia as N in water	mg/L	0.005	Inorg-057	[NT]	3	<0.005	[NT]		[NT]	[NT]
Nitrate as N in water	mg/L	0.005	Inorg-055	[NT]	3	<0.005	[NT]		[NT]	[NT]
Nitrite as N in water	mg/L	0.005	Inorg-055	[NT]	3	<0.005	[NT]		[NT]	[NT]
NOx as N in water	mg/L	0.005	Inorg-055	[NT]	3	<0.005	[NT]		[NT]	[NT]
Total Nitrogen in water	mg/L	0.1	Inorg-055/062/127	[NT]	3	0.4	[NT]		[NT]	[NT]
TKN in water	mg/L	0.1	Inorg-062	[NT]	3	0.4	[NT]		[NT]	[NT]
Phosphate as P in water	mg/L	0.005	Inorg-060	[NT]	3	0.01	[NT]		[NT]	[NT]
Organic Nitrogen as N	mg/L	0.2	Inorg-055/062/127	[NT]	3	0.4	[NT]		[NT]	[NT]

QUALITY CONTROL: Ion Balance						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			03/06/2025	3	03/06/2025	03/06/2025		03/06/2025	[NT]
Date analysed	-			03/06/2025	3	03/06/2025	03/06/2025		03/06/2025	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	3	44	[NT]		100	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	3	2	[NT]		103	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	3	170	[NT]		96	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	3	22	[NT]		99	[NT]
Hardness (calc) equivalent $CaCO_3$	mg/L	3	Metals-020	[NT]	3	200	[NT]		[NT]	[NT]
Hydroxide Alkalinity (OH^-) as $CaCO_3$	mg/L	5	Inorg-006	<5	3	<5	[NT]		[NT]	[NT]
Bicarbonate Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	3	250	[NT]		[NT]	[NT]
Carbonate Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	3	<5	[NT]		[NT]	[NT]
Total Alkalinity as $CaCO_3$	mg/L	5	Inorg-006	<5	3	250	[NT]		114	[NT]
Sulphate, SO4	mg/L	1	Inorg-081	<1	3	84	84	0	92	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	3	140	150	7	94	[NT]
Ionic Balance	%		Inorg-040	[NT]	3	3.0	[NT]		[NT]	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Air volumes are typically provided by customers (often as flow rate(s) and sampling time(s) and/or simply volumes) sampled or exposure times (determines 'volume' passive badges are exposed to)). Hence in such circumstances the volume measurement is inevitably not covered by Envirolab's NATA accreditation. An exception may occur where Envirolab Newcastle does the sampling where accreditation exists for certain types of sampling and hence volume determination(s). Note air volumes are often used to determine concentrations for dust and/or analyses on filters, sorbents and in impingers. For canister sampling, the air volume is covered by Envirolab's NATA accreditation.

Urine Analysis - The BEI values listed are taken from the 2022 edition of "TLVs and BEIs Threshold Limits" by ACGIH.

Report Comments

Holding time exceedance for PH/EC and nutrients.

vTRH & BTEXN in Water NEPM - TRH C6-C9/C6-C10 Results are positive (or in part positive) due to the presence of THMs within the sample.

Microbiology analysed by Sonic Food & Water Testing. Report no. W2512539, W2512509.

The time between collection and the commencement of testing should not exceed 24 hours. Samples tested outside this time may have their results compromised.

Escherichia Coli, Faecal coliforms not detected by the method.

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details

Client	JK Environments
Attention	Oisin Butler

Sample Login Details

Your reference	E36314PT Lismore
Envirolab Reference	382346
Date Sample Received	03/06/2025
Date Instructions Received	03/06/2025
Date Results Expected to be Reported	11/06/2025

Sample Condition

Samples received in appropriate condition for analysis	Holding time exceedance
No. of Samples Provided	10 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	10
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Please contact the laboratory within 24 hours if you wish to cancel the aformentioned testing. Otherwise testing will proceed as per the COC and hence invoiced accordingly.

Please direct any queries to:

Aileen Hie	Jacinta Hurst
Phone: 02 9910 6200	**Phone: 02 9910 6200**
Fax: 02 9910 6201	**Fax: 02 9910 6201**
Email: ahie@envirolab.com.au	**Email: jhurst@envirolab.com.au**

Analysis Underway, details on the following page:

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

Sample ID	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHs in Water	All metals in water-dissolved	Metals in Waters -Acid extractable	Electrical Conductivity	pH	Redox Potential*	Dissolved Oxygen*	Turbidity	Total Dissolved Solids(grav)	Total Suspended Solids	Total Organic Carbon	Sodium Adsorption Ratio	Silica (Reactive - SiO2)	Ammonia as N in water	Nitrate as N in water	Nitrite as N in water	NOx as N in water	Total Nitrogen in water	TKN in water	Phosphate as P in water	Organic Nitrogen as N	Calcium - Dissolved	Potassium - Dissolved	Sodium - Dissolved	Magnesium - Dissolved	Hardness (calc) equivalent CaCO3	Hydroxide Alkalinity (OH-) as CaCO3	Bicarbonate Alkalinity as CaCO3	Carbonate Alkalinity as CaCO3	Total Alkalinity as CaCO3	Sulphate, SO4	Chloride, Cl	Ionic Balance	Microbiologocal Testing
MW62	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MW206	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MW212	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MW214	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Creek1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
GWDUP301	✓	✓	✓	✓																															
GWDUP302	✓	✓	✓																																
FR302-IP	✓	✓	✓	✓																															
TB301	✓	✓	✓	✓																															
TS301	✓																																		

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.

Requests for longer term sample storage must be received in writing.

Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.

TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD	JKE Job Number: E36314PT	JKEnvironments
12 ASHLEY STREET		
CHATSWOOD NSW 2067		
P: (02) 99106200	Date Results Required: STANDARD	REAR OF 115 WICKS ROAD
F: (02) 99106201		MACQUARIE PARK, NSW 2113
		P: 02-9888 5000 F: 02-9888 5001
Attention: Aileen	Page: 1 OF 1	Attention:

Location:	Lismore	Sample Preserved in Esky on Ice
Sampler:	OB	Tests Required

Date Sampled	Lab Ref:	Sample Number	Sample Containers	PID	Sample Description	Alkalinity suite	EC, pH, reddox, DO	Turbidity	TDS, TSS, TOC, SAR	Ionic balance, including hardness	#3	Additional metals: Al, Ag, Sb, Ba, Be, B, Co, Fe, Li, Mn, Mo, Se, Sr, U, V	Silica (reactive) - dissolved silica	Nutrient suite	Faecal coliforms + Escherichia (E) coli	BTEX	TRH/BTEXN/PAH
30/05/2025	1	MW62	##	0.1	Water	X	X	X	X	X	X	X	X	X	X		
30/05/2025	2	MW206	##	10.7	Water	X	X	X	X	X	X	X	X	X	X		
30/05/2025	3	MW212	##	24.8	Water	X	X	X	X	X	X	X	X	X	X		
31/05/2025	4	MW214	##	44.4	Water	X	X	X	X	X	X	X	X	X	X		
29/05/2025	5	Creek1	##	-	Water	X	X	X	X	X	X	X	X	X	X		
30/05/2025	6	GWDUP301		-	Water						X	X					
30/05/2025	7	GWDUP302		-	Water		X					X					X
30/05/2025	8	FR302-IP		-	Field Rinsate						X	X					
27/05/2025	9	TB301		-	Trip Blank					X	X						
27/05/2025	10	TS301		-	Trip Spike											X	
				-								X			X		
				-								X					
				-								X					
				-			X										

Remarks (comments/detection limits required):

Sample Containers:

Each sample includes: x2 amber bottles, x2 HCl preserved glass vials, x2 unpreserved plastic bottles, x2 nitric acid preserved bottles (1 is field filtered), x1 sulphuric acid preserved bottle and x1 sterile container

Relinquished By:	Date:	Time:	Received By:	Date:
			O-WILCZAK	3/6/25

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 382346

Date Received: 3/6/25
Time Received: 1500
Received By: OW
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 382346-A

Client Details

Client	JK Environments
Attention	Oisin Butler
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E36314PT Lismore**
Number of Samples	Additional analysis 1 sample
Date samples received	03/06/2025
Date completed instructions received	10/06/2025

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	17/06/2025
Date of Issue	16/06/2025

NATA Accreditation Number 2901. This document shall not be reproduced except in full.

Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Diego Bigolin, Inorganics Supervisor

Authorised By
Nancy Zhang, Laboratory Manager

Miscellaneous Inorganics		
Our Reference		382346-A-2
Your Reference	UNITS	MW206
Date Sampled		30/05/2025
Type of sample		Water
Date prepared	-	13/06/2025
Date analysed	-	13/06/2025
Total Dissolved Solids (grav)	mg/L	230
Total Suspended Solids	mg/L	620

Method ID	Methodology Summary
Inorg-018	Total Dissolved Solids - determined gravimetrically. The solids are dried at 180+/-10°C. NOTE: Where the EC of the sample is <100µS/cm, the TDS will typically be below 70mg/L (as the sample is very likely to be at least drinking water quality). Therefore to ensure data quality for TDS, the TDS is typically calculated as per the equation below:- TDS = EC * 0.6
Inorg-019	Suspended Solids - determined gravimetricially by filtration of the sample. The samples are dried at 104+/-5°C.

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			13/06/2025	2	13/06/2025	13/06/2025		13/06/2025	[NT]
Date analysed	-			13/06/2025	2	13/06/2025	13/06/2025		13/06/2025	[NT]
Total Dissolved Solids (grav)	mg/L	5	Inorg-018	<5	2	230	[NT]		96	[NT]
Total Suspended Solids	mg/L	5	Inorg-019	<5	2	620	520	18	104	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Air volumes are typically provided by customers (often as flow rate(s) and sampling time(s) and/or simply volumes) sampled or exposure times (determines 'volume' passive badges are exposed to)). Hence in such circumstances the volume measurement is inevitably not covered by Envirolab's NATA accreditation. An exception may occur where Envirolab Newcastle does the sampling where accreditation exists for certain types of sampling and hence volume determination(s). Note air volumes are often used to determine concentrations for dust and/or analyses on filters, sorbents and in impingers. For canister sampling, the air volume is covered by Envirolab's NATA accreditation.

Urine Analysis - The BEI values listed are taken from the 2022 edition of "TLVs and BEIs Threshold Limits" by ACGIH.

Report Comments

TSS/TDS - Samples were out of the recommended holding time for this analysis.

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details

Client	JK Environments
Attention	Oisin Butler

Sample Login Details

Your reference	E36314PT Lismore
Envirolab Reference	382346-A
Date Sample Received	03/06/2025
Date Instructions Received	10/06/2025
Date Results Expected to be Reported	17/06/2025

Sample Condition

Samples received in appropriate condition for analysis	Holding time exceedance
No. of Samples Provided	Additional analysis 1 sample
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	10
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Please contact the laboratory within 24 hours if you wish to cancel the aformentioned testing. Otherwise testing will proceed as per the COC and hence invoiced accordingly.

Please direct any queries to:

Aileen Hie	Jacinta Hurst
Phone: 02 9910 6200	**Phone: 02 9910 6200**
Fax: 02 9910 6201	**Fax: 02 9910 6201**
Email: ahie@envirolab.com.au	**Email: jhurst@envirolab.com.au**

Analysis Underway, details on the following page:

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

Sample ID	Total Dissolved Solids(grav)	Total Suspended Solids	On Hold
MW62			✓
MW206	✓	✓	
MW212			✓
MW214			✓
Creek1			✓
GWDUP301			✓
GWDUP302			✓
FR302-IP			✓
TB301			✓
TS301			✓

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.
Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.
TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD	JKE Job Number: E36314PT	JKEnvironments
12 ASHLEY STREET		
CHATSWOOD NSW 2067		
P: (02) 99106200	Date Results Required: STANDARD	REAR OF 115 WICKS ROAD
F: (02) 99106201		MACQUARIE PARK, NSW 2113
		P: 02-9888 5000 F: 02-9888 5001
Attention: Aileen	Page: 1	Attention: Anna Bui

Location:	Lismore	Sample Preserved in Esky on Ice
Sampler:	OB	Tests Required

Date Sampled	Lab Ref:	Sample Number	Sample Containers	PID	Sample Description	Alkalinity suite	EC, pH, reddox, DO	Turbidity	TDS, TSS, TOC, SAR	Ionic balance, including hardness	#3L	Additional metals: Al, Ag, Sb, Ba, Be, B, Co, Fe, Li, Mn, Mo, Se, Sr, U, V	Silica (reactive) - dissolved silica	Nutrient suite	Faecal coliforms + Escherichia (E) coli		
2. 30/05/2025	382346	MW206	PVC	10.7	Water												

Remarks (comments/detection limits required):	Sample Containers:
Envirolab Reference: 382346	PVC - HDPE Plastic Bottles

Relinquished By:	Date:	Time:	Received By:	Date:
			EW MD	10/6/25 1500

382346-A
10/6/25
CW

Anna Bui

From: Oisin Butler <OButler@jkenvironments.com.au>
Sent: Tuesday, 10 June 2025 12:40 PM
To: Anna Bui; Craig Ridley
Cc: Envirolab Sydney Sample Receipt; Nam Dinh; Katrina Taylor
Subject: RE: E36314PT Lismore - 382346

Hi Anna,

Standard turnaround is fine for the results. We will send the sample to the lab today.

Regards
Oisin Butler
Environmental Scientist

T: +61 2 9888 5000
D: +61 493 309 876
E: OButler@jkenvironments.com.au
www.jkenvironments.com.au

PO Box 976
NORTH RYDE BC NSW 1670
115 Wicks Road
MACQUARIE PARK NSW 2113

JKEnvironments

From: Anna Bui <ABui@envirolab.com.au>
Sent: Tuesday, 10 June 2025 12:27 PM
To: Craig Ridley <CRidley@jkenvironments.com.au>; Oisin Butler <OButler@jkenvironments.com.au>
Cc: Envirolab Sydney Sample Receipt <Samplereceipt@envirolab.com.au>; Nam Dinh <NDinh@envirolab.com.au>; Katrina Taylor <KTaylor@jkenvironments.com.au>
Subject: RE: E36314PT Lismore - 382346

Hi Oisin/Craig,

Thanks. We'll log the TSS/TDS for MW206 as an A-job once the bottle is received. How urgently did you need the results?

Unfortunately, we don't have enough sample to re-extract for trace OCPs. We'd need another 200ml minimum in amber bottles.

Thanks,

Kind Regards,

Anna Bui | Client Services Officer | Envirolab Services

Great Science. Great Service.

12 Ashley Street Chatswood NSW 2067
T 612 9910 6200
E ABui@envirolab.com.au | W www.envirolab.com.au

Follow us on: LinkedIn | Facebook | Twitter

Samples will be analysed per our T&C's.

From: Craig Ridley <CRidley@jkenvironments.com.au>
Sent: Tuesday, 10 June 2025 11:30 AM
To: Oisin Butler <OButler@jkenvironments.com.au>; Anna Bui <ABui@envirolab.com.au>
Cc: Envirolab Sydney Sample Receipt <Samplereceipt@envirolab.com.au>; Nam Dinh <NDinh@envirolab.com.au>; Katrina Taylor <KTaylor@jkenvironments.com.au>
Subject: RE: E36314PT Lismore - 382346

Hi Anna,

Would it also be possible to re-extract this portion of sample for trace OCPs?

Regards
Craig Ridley
Associate | Environmental Scientist

T: +61 2 9888 5000
D: +61 421 856 992
E: CRidley@jkenvironments.com.au
www.jkenvironments.com.au

PO Box 976
NORTH RYDE BC NSW 1670
115 Wicks Road
MACQUARIE PARK NSW 2113

JKEnvironments

From: Oisin Butler <OButler@jkenvironments.com.au>
Sent: Tuesday, 10 June 2025 11:18 AM
To: Craig Ridley <CRidley@jkenvironments.com.au>; Anna Bui <ABui@envirolab.com.au>
Cc: Envirolab Sydney Sample Receipt <Samplereceipt@envirolab.com.au>; Nam Dinh <NDinh@envirolab.com.au>
Subject: RE: E36314PT Lismore - 382346

Hi Anna,

We do in fact have MW206 500ml unpreserved bottle, I will send it to the lab today for TSS and TDS testing.

Regards
Oisin Butler

Environmental Scientist

T: +61 2 9888 5000
D: +61 493 309 876
E: OButler@jkenvironments.com.au
www.jkenvironments.com.au

PO Box 976
NORTH RYDE BC NSW 1670
115 Wicks Road
MACQUARIE PARK NSW 2113

JKEnvironments

From: Craig Ridley <CRidley@jkenvironments.com.au>
Sent: Tuesday, 10 June 2025 9:41 AM
To: Anna Bui <ABui@envirolab.com.au>; Oisin Butler <OButler@jkenvironments.com.au>
Cc: Envirolab Sydney Sample Receipt <Samplereceipt@envirolab.com.au>; Nam Dinh <NDinh@envirolab.com.au>
Subject: RE: E36314PT Lismore - 382346

Hi Anna,

Thanks for letting us know. I don't believe we have any additional sample, so please proceed below as you've suggested.

Regards
Craig Ridley
Associate | Environmental Scientist

T: +61 2 9888 5000
D: +61 421 856 992
E: CRidley@jkenvironments.com.au
www.jkenvironments.com.au

PO Box 976
NORTH RYDE BC NSW 1670
115 Wicks Road
MACQUARIE PARK NSW 2113

JKEnvironments

From: Anna Bui <ABui@envirolab.com.au>
Sent: Friday, 6 June 2025 2:19 PM
To: Oisin Butler <OButler@jkenvironments.com.au>
Cc: Craig Ridley <CRidley@jkenvironments.com.au>; Envirolab Sydney Sample Receipt <Samplereceipt@envirolab.com.au>; Nam Dinh <NDinh@envirolab.com.au>
Subject: E36314PT Lismore - 382346

Hi Oisin,

I just noticed the COC that came with the GW samples cut off the trace OCPs column.
We've already extracted them for PAH, so will be able to get OCP results in the same run, however, we will no longer be able to get them to trace level. We don't have enough sample to re-extract.

We also didn't receive a 500ml unpreserved plastic for sample MW206, so will have to omit TSS & TDS.

Let us know if you have extra sample(s) to send in.

Thanks,

From: Oisin Butler <OButler@jkenvironments.com.au>
Sent: Wednesday, 4 June 2025 12:50 PM
To: Grace Zhang <GZhang@envirolab.com.au>; Nam Dinh <NDinh@envirolab.com.au>; Da-Hyun Lee <DLee@envirolab.com.au>; Envirolab Sydney Sample Receipt <Samplereceipt@envirolab.com.au>
Cc: Craig Ridley <CRidley@jkenvironments.com.au>
Subject: RE: E36314PT Lismore COCs

Thank you Grace.

Regards
Oisin Butler
Environmental Scientist

T: +61 2 9888 5000
D: +61 493 309 876
E: OButler@jkenvironments.com.au
www.jkenvironments.com.au

PO Box 976
NORTH RYDE BC NSW 1670
115 Wicks Road
MACQUARIE PARK NSW 2113

JKEnvironments

From: Grace Zhang <GZhang@envirolab.com.au>
Sent: Wednesday, 4 June 2025 12:49 PM
To: Oisin Butler <OButler@jkenvironments.com.au>; Nam Dinh <NDinh@envirolab.com.au>; Da-Hyun Lee <DLee@envirolab.com.au>; Envirolab Sydney Sample Receipt <Samplereceipt@envirolab.com.au>
Cc: Craig Ridley <CRidley@jkenvironments.com.au>
Subject: Re: E36314PT Lismore COCs

Hi Oisin,

No worries, I can get that arranged.

Thanks for confirming

Appendix F: Fieldwork Documents

JKEnvironments

Client:	School Infrastructure NSW	Job No.:	E36314PT
Project:	Proposed Richland River High Campus Rebuild	Well No.:	mw62
Location:	163 – 170 Alexandra Parade, North Lismore, NSW	Depth (m):	11.29

WELL FINISH DETAILS

	Gatic Cover ☐	Standpipe ☐	Other (describe) ☒ monument compromised

WELL DEVELOPMENT DETAILS

Method:	Peristaltic Pump	SWL – Before (m):	6.65
Date:	28/5/25	Time – Before:	12:31
Undertaken By:	OB	SWL – After (m):	8:00
Total Vol. Removed:	30 L	Time – After:	14:00
PID Reading (ppm):	6.0		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	SWL	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
1	6.65	22.0	3.25	1477	7.24	36.3
5		21.8	2.09	1446	7.12	18.6
10		21.7	2.11	1424	7.06	2.6
15		21.8	3.54	1456	7.04	-3.6
20		21.8	1.03	1443	7.03	-1.8
25		21.8	1.05	1442	7.03	7.9
30	7.86	21.7	1.08	1440	7.03	15.3

Comments: Odours (YES / NO), NAPL/PSH (YES / NO), Sheen (YES / NO), Steady State Achieved (YES / NO)

YSI Used: 1

low silt load

Tested By:	OB
Date Tested:	28/5/25
Checked By:	KT
Date:	12.06.2025

Remarks:

- Steady state conditions
- Difference in the pH less than 0.2 units, difference in the conductiveity less than 10% and SWL stable/not in drawdown
- Minimum 3 monitoring well volumes purged, unless well purged until it is effectively dry

JKEnvironments

Client:	School Infrastructure NSW	Job No.:	E36314PT
Project:	Proposed Richland River High Campus Rebuild	Well No.:	MW206
Location:	163 – 170 Alexandra Parade, North Lismore, NSW	Depth (m):	5.70

WELL FINISH DETAILS

	Gatic Cover ☐	Standpipe ☒	Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	Dev Pump	SWL – Before (m):	0.4
Date:	29/5/25	Time – Before:	15:04
Undertaken By:	NB	SWL – After (m):	5.53
Total Vol. Removed:	30 L	Time – After:	15:58
PID Reading (ppm):	1.1		

SPIPE 1.05m

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	SWL	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
5		23.3	6.22	290.8	7.18	175.1
10		23.4	6.35	310.5	7.20	171.6
15		23.5	6.48	287.5	7.33	169.0
20		23.6	6.59	293.3	7.44	150.6
25		23.4	7.54	302.3	7.54	133.7
30		22.6	7.38	317.8	7.66	112.4
		well pumped effectively dry				

Comments: Odours (YES / NO), NAPL/PSH (YES / NO), Sheen (YES / NO), Steady State Achieved (YES / NO)
YSI Used:

m silt load . m recharge

Tested By:	OB	**Remarks:**
Date Tested:	29/5/25	- Steady state conditions - Difference in the pH less than 0.2 units, difference in the conductiveity less than 10% and SWL stable/not in drawdown - Minimum 3 monitoring well volumes purged, unless well purged until it is effectively dry
Checked By:	KT	
Date:	12.06.2025	

JKEnvironments

Client:	School Infrastructure NSW	Job No.:	E36314PT
Project:	Proposed Richland River High Campus Rebuild	Well No.:	212
Location:	163 – 170 Alexandra Parade, North Lismore, NSW	Depth (m):	6.0

WELL FINISH DETAILS

	Gatic Cover ☒	Standpipe ☐	Other (describe) ☐

WELL DEVELOPMENT DETAILS

Method:	Dev Pump	SWL – Before (m):	1.80
Date:	28/5/25	Time – Before:	11:30
Undertaken By:	OK	SWL – After (m):	5.95 (dry)
Total Vol. Removed:	20 L	Time – After:	11:51
PID Reading (ppm):	1.6		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	SWL	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
1		24.6	11.50	1334	7.20	107.7
5		24.4	1.52	1264	7.75	17.3
10		24.6	1.47	1254	7.75	-43.5
15		24.5	1.01	1180	7.72	-53.9
20		24.9	1.00	1080	7.80	-63.1
		well pumped effectively dry				

Comments: Odours (YES / NO), NAPL/PSH (YES / NO), Sheen (YES / NO), Steady State Achieved (YES / NO)

YSI Used: 1

High silt load, low recharge, brown - rore water

Tested By:	OK	**Remarks:**
Date Tested:	28/5/25	- Steady state conditions - Difference in the pH less than 0.2 units, difference in the conductiveity less than 10% and SWL stable/not in drawdown - Minimum 3 monitoring well volumes purged, unless well purged until it is effectively dry
Checked By:	KT	
Date:	12.06.2025	

JKEnvironments

Client:	School Infrastructure NSW	**Job No.:**	E36314PT
Project:	Proposed Richland River High Campus Rebuild	**Well No.:**	mw214
Location:	163 – 170 Alexandra Parade, North Lismore, NSW	**Depth (m):**	6.3

WELL FINISH DETAILS

	Gatic Cover ☐	Standpipe ☒	1.0m	Other (describe) ☐	

WELL DEVELOPMENT DETAILS

Method:	DI: Pump	**SWL – Before (m):**	3.00
Date:	30/5/25	**Time – Before:**	08:38
Undertaken By:	OP	**SWL – After (m):**	6.25 (dry)
Total Vol. Removed:	30L	**Time – After:**	09:21
PID Reading (ppm):	3.2		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	SWL	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
1		19.5	5.98	3184	7.14	275.9
5		23.2	4.61	3277	7.05	235.1
10		21.4	4.20	3314	7.08	224.6
15	5.70	21.5	2.80	3269	7.09	283.1
water introduced 10		19.9	7.50	1130	8.21	377.0
25		19.9	8.30	1725	7.76	757.6
30	6.25	19.9	8.87	1527	7.90	754.6
		well pumped effectively dry				

Comments: Odours (YES / NO), NAPL/PSH (YES / NO), Sheen (YES / NO), Steady State Achieved (YES / NO)
YSI Used: 1

Hydrocarbon odour — H silt load, low recharge / brown

Tested By:	OK	**Remarks:**
Date Tested:	30/5/25	- Steady state conditions - Difference in the pH less than 0.2 units, difference i… conductivity less than 10% and SWL stable/not in drawdown - Minimum 3 monitoring well volumes purged, unless … until it is effectively dry
Checked By:	KT	
Date:	12.06.2025	

JKEnvironments

Client:	School Infrastructure NSW	Job No.:	E36314PT
Project:	Proposed Richland River High Campus Rebuild	Well No.:	MW62
Location:	163 – 170 Alexandra Parade, North Lismore, NSW	Depth (m):	11.29

monument compromised

WELL FINISH

Gatic Cover		Standpipe	X	Other (describe)

WELL PURGE DETAILS:

Method:	Peri Pump	SWL – Before:	6.78
Date:	30/5/25	Time – Before:	11:50
Undertaken By:	OB	Total Vol Removed:	~6.0 L
Pump Program No:	Low	PID (ppm):	0.1

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
12:00 (0)	6.78	0.6		19.5	10.96	1223.2	8.14	81.7
12:03 (3)	6.90	1.3		21.1	3.87	14390	7.08	136.9
12:06 (6)	7.00	2.0		21.2	2.51	1441	7.03	138.9
12:09 (9)	7.10	2.7		21.2	2.12	1440	7.01	129.4
12:12 (12)	7.17	3.4		21.2	1.90	1439	7.00	120.1
12:15 (15)	7.23	4.0		21.1	1.78	1437	7.00	113.2
12:18 (18)	7.23	4.5		21.0	1.69	1432	7.00	107.1
		Stands	stable achieved -	stable	sample			

Comments: Odours (YES / (NO)), NAPL/PSH (YES / (NO)), Sheen (YES / (NO)), Steady State Achieved ((YES) / NO)
Sampling Containers Used: 4 x glass amber, 8 x BTEX vials, 4 x HNO3 plastic, (x H2SO4 plastic, 1 x unpreserved plastic
YSI used: 1

x1 microbial
x2 174?

m recharge, low silt load GWMW301

Tested By:	CH
Date Tested:	30/5/25
Checked By:	KT
Date:	12.06.2025

Remarks:
- Steady state conditions
- difference in the pH less than 0.2 units, difference in conductivity less than 10% 10% and SWL stable/not in drawdown

JKEnvironments

Client:	School Infrastructure NSW	Job No.:	E36314PT
Project:	Proposed Richland River High Campus Rebuild	Well No.:	MW206
Location:	163 – 170 Alexandra Parade, North Lismore, NSW	Depth (m):	5.90

SPIPE 1.05 m

WELL FINISH

	Gatic Cover	✓	Standpipe 1.05 m		Other (describe)

WELL PURGE DETAILS:

Method:	Peri Pump	SWL – Before:	2.37
Date:	30/5/25	Time – Before:	13.04
Undertaken By:	OR	Total Vol Removed:	~15L
Pump Program No:	low	PID (ppm):	10.7

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
13:13 (3)	2.50	0.6		21.3	6.41	410.8	7.38	71.0
13:16 (6)	2.59	1.2		21.1	6.72	352.1	7.42	68.2
13:19 (9)	2.69	1.8		21.3	6.36	354.1	7.38	70.3
13:22 (12)	2.79	2.4		21.4	6.06	382.2	7.36	71.6
13:25 (15)	3.04	3.0		21.5	5.65	404.6	7.34	72.7
13:28 (18)	2.95	3.6		21.4	5.84	404.5	7.34	71.9
13:31 (21)	3.27	4.4	(pump stopped)	20.9	4.96	896.0	7.37	69.5
13:34 (24)	3.42	5.0		20.4	5.00	391.5	7.38	68.8
13:								
13:47 (34)	3.52	6.0		19.0	6.90	370.7	7.38	51.2
13:50 (37)	3.58	6.3		19.9	5.47	367.5	7.38	53.6
13:53 (40)	3.58	6.6		18.8	5.45	364.8	7.39	53.9
13:56 (43)	3.61	6.9		18.7	5.45	361.0	7.40	54.4
13:59 (46)	3.63	7.2		18.6	5.44	357.5	7.41	55.0
14:02 (49)	3.67	7.5	pump purged	18.7	5.46	356.5	7.41	56.0
14:04 (52)								
14:12 (62)	3.79	8.5		19.6	6.36	328.8	7.46	52.9
14:15 (65)	3.92	9.0		19.6	5.72	319.7	7.52	25.9
14:18 (68)	4.03	9.5		20.1	6.00	316.0	7.54	15.1
14:21 (71)	4.17	10.0		20.3	6.00	318.0	7.48	-3.1
14:24 (74)	4.30	10.5		20.3	6.16	307.7	7.43	8.4
14:27 (77)	4.43	11.0		20.4	6.28	311.6	7.41	16.9
14:30 (80)	4.59	11.5	pump flow rate settled	20.5	6.07	325.5	7.41	23.3
14:33 (83)	4.66	11.85		19.7	5.42	329.5	7.45	27.1
14:36 (86)	4.71	12.0		18.6	5.57	327.0	7.44	30.5
14:39 (89)	4.75	12.25	start sampling	19.0	5.78	321.7	7.40	34.4

Comments: Odours (YES / NO), NAPL/PSH (YES / NO), Sheen (YES / NO), Steady State Achieved (YES / NO)
Sampling Containers Used: 1 x glass amber, 6 x BTEX vials, 2 x HNO3 plastic, 1 x H2SO4 plastic, x unpreserved plastic
YSI used: GroPro 302

start sampling - threat of losing water

low recharge, moderate silt load, yellow brown

x1 microbial x2 PFAS

Tested By:	OR
Date Tested:	30/5/25
Checked By:	KT
Date:	12.06.2025

Remarks:
- Steady state conditions
- difference in the pH less than 0.2 units, difference in conductivity less than 10% 10% and SWL stable/not in drawdown

JKEnvironments

Client:	School Infrastructure NSW	**Job No.:**	E36314PT
Project:	Proposed Richland River High Campus Rebuild	**Well No.:**	MW212
Location:	163 – 170 Alexandra Parade, North Lismore, NSW	**Depth (m):**	6.0

WELL FINISH

X	Gatic Cover		Standpipe		Other (describe)

WELL PURGE DETAILS:

Method:	Peri Pump	**SWL – Before:**	4.93
Date:	30/5/25	**Time – Before:**	09:57
Undertaken By:	OB	**Total Vol Removed:**	~3 L
Pump Program No:	Low	**PID (ppm):**	24.8

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
10:10 (0)	5.24	0.5		21.7	3.02	1142	7.74	41.1
10:13 (3)	5.37	1.0	pump slowed	21.7	2.41	1190	7.71	-5.8
10:16 (6)	5.46	1.25	pump slowed	21.7	1.57	1195	7.68	-91.8
10:19 (9)	5.50	1.50	pump on lowest setting	21.4	1.23	1188	7.67	-98.9
10:22 (12)	5.55		↓					
10:25 (15)	5.60							
10:28 (18)	5.65							
	start sampling - threat of losing water							

Comments: Odours (YES / NO), NAPL/PSH (YES / NO), Sheen (YES / NO), Steady State Achieved (YES / NO)
Sampling Containers Used: 2 x glass amber, 4 x BTEX vials, 2 x HNO3 plastic, 1 x H2SO4 plastic, 1 x unpreserved plastic x2 PFAS
YSI used: 1

no microbial taken

Tested By:	OB	**Remarks:** - Steady state conditions - difference in the pH less than 0.2 units, difference in conductivity less than 10% 10% and SWL stable/not in drawdown
Date Tested:	30/5/25	
Checked By:	KT	
Date:	12.06.2025	

JKEnvironments

Client:	School Infrastructure NSW	Job No.:	E36314PT
Project:	Proposed Richland River High Campus Rebuild	Well No.:	214
Location:	163 – 170 Alexandra Parade, North Lismore, NSW	Depth (m):	6.3

WELL FINISH

	Gatic Cover		X	Standpipe	1.05m		Other (describe)

WELL PURGE DETAILS:

Method:	Peri Pump	SWL – Before:	3.29
Date:	31/5/25	Time – Before:	07:22
Undertaken By:	OR	Total Vol Removed:	~11L
Pump Program No:	Low	PID (ppm):	44.4

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
07:29 (0)	3.39	0.5		20.6	6.58	3601	7.19	103.7
07:32 (3)	3.43	1.5		20.2	6.70	3696	7.12	111.0
07:35 (6)	3.53	2.5		20.8	1.95	3786	7.09	99.3
07:38 (9)	3.83	3.5		21.1	1.19	3806	7.06	77.5
07:41 (12)	4.14	4.5		21.2	1.05	3780	7.06	64.6
07:44 (15)	4.54	5.5		21.2	1.08	3766	7.05	52.4
07:47 (18)	4.83	6.5	pump switched	21.3	1.08	3784	7.04	46.5
07:50 (21)	4.86	7.2		20.6	3.61	3694	7.05	42.7
07:53 (24)	4.92	7.9		20.2	3.88	3674	7.05	41.0
07:56 (27)	4.78	8.6		20.3	3.87	3661	7.05	40.8
	steady	stable	achieved – start sampling					

Comments: Odours (YES / NO), NAPL/PSH (YES / NO), Sheen (YES / NO), Steady State Achieved (YES / NO)
Sampling Containers Used: 2 x glass amber, 4 x BTEX vials, 2 x HNO3 plastic, 1 x H2SO4 plastic, 1 x unpreserved plastic x2 PFAS
YSI used: 1
faint hydrocarbon odour. m-ll silt load. High recharge, brown x1 Microbial

Tested By: OR	Remarks:
Date Tested: 31/5/25	- Steady state conditions - difference in the pH less than 0.2 units, difference in conductivity less than 10% 10% and SWL stable/not in drawdown
Checked By: KT	
Date: 12.06.2025	

JKEnvironments

WATER QUALITY METER CALIBRATION FORM

Client:	School Infrastructure NSW		
Project:	Proposed Richland River High Campus Rebuild		
Location:	163 – 170 Alexandra Parade, North Lismore, NSW		
Job Number:	E36314PT		
DISSOLVED OXYGEN			
Make: YSI		Model: 1	
Date of calibration: 29/5/25		Name of Calibrator: JT, OB	
Span value: 70% to 130%			
Measured value: 80.7			
Measured reading Acceptable (Yes/No): Yes.			
pH			
Make: YSI		Model: 1	
Date of calibration: 29/5/25		Name of Calibrator: JT, OB	
Buffer 1: Theoretical pH = 7.01± 0.01		Expiry date: 29/10/25	Lot No: CC291024
Buffer 2: Theoretical pH = 4.01± 0.01		Expiry date: 12/11/25	Lot No: CA121124
Measured reading of Buffer 1: 7.07			
Measured reading of Buffer 2: 4.07			
Slope: –		Measured reading Acceptable (Yes/No): Yes.	
EC			
Make: YSI		Model: 1	
Date: 29/5/25	Name of Calibrator: JT, OB		Temperature: 18 °C
Calibration solution: ROWE SCIENTIFIC		Expiry date: 13/08/25	Lot No: CR130824
Theoretical conductivity at temperature (see solution container): 1224 µS/cm			
Measured conductivity: 1557µS/cm		Measured reading Acceptable (Yes/No): Yes	
REDOX			
Make: YSI		Model: 1	
Date of calibration: 29/5/25		Name of Calibrator: JT, OB	
Calibration solution: Hanna Instruments.		Expiry date: 09/29	Lot No: 0567
Theoretical redox value: 240mV			
Measured redox reading: 236.1mV		Measured reading Acceptable (Yes/No): Yes.	

JKEnvironments

WATER QUALITY METER CALIBRATION FORM

Client:	School Infrastructure NSW		
Project:	Proposed Richland River High Campus Rebuild		
Location:	163 – 170 Alexandra Parade, North Lismore, NSW		
Job Number:	E36314PT		
DISSOLVED OXYGEN			
Make: YSI		Model: 1	
Date of calibration: 29/5/25		Name of Calibrator: OB	
Span value: 70% to 130%			
Measured value: 101 %			
Measured reading Acceptable (Yes/No): YES			
pH			
Make: YSI		Model: 1	
Date of calibration: 29/5/25		Name of Calibrator: OB	
Buffer 1: Theoretical pH = 7.01± 0.01		Expiry date: 29/10/25	Lot No: CC291024
Buffer 2: Theoretical pH = 4.01± 0.01		Expiry date: 12/11/25	Lot No: CA121124
Measured reading of Buffer 1: 7.01			
Measured reading of Buffer 2: 4.01			
Slope:		Measured reading Acceptable (Yes/No): YES	
EC			
Make: YSI		Model: 1	
Date: 29/5/25	Name of Calibrator: OB		Temperature: 21 °C
Calibration solution: Royce Scientific		Expiry date: 13/8/25	Lot No: CB130824
Theoretical conductivity at temperature (see solution container): 1305 µS/cm			
Measured conductivity: 1296 µS/cm		Measured reading Acceptable (Yes/No): YES	
REDOX			
Make: YSI		Model: 1	
Date of calibration: 29/5/25		Name of Calibrator: OB	
Calibration solution: HANNA		Expiry date: 09/29	Lot No: 0567
Theoretical redox value: 240mV			
Measured redox reading: 228.4 mV		Measured reading Acceptable (Yes/No): YES	

JKEnvironments

WATER QUALITY METER CALIBRATION FORM

Client:	School Infrastructure NSW		
Project:	Proposed Richland River High Campus Rebuild		
Location:	163 – 170 Alexandra Parade, North Lismore, NSW		
Job Number:	E36314PT		
DISSOLVED OXYGEN			
Make: YSI		Model: 1	
Date of calibration: 30/5/25		Name of Calibrator: OB	
Span value: 70% to 130%			
Measured value: 98%			
Measured reading Acceptable (Yes/No): Yes			
pH			
Make: YSI		Model: 1	
Date of calibration: 30/5/25		Name of Calibrator: OB	
Buffer 1: Theoretical pH = 7.01± 0.01		Expiry date: 10/25	Lot No: CC291024
Buffer 2: Theoretical pH = 4.01± 0.01		Expiry date: 11/25	Lot No: CA121124
Measured reading of Buffer 1: 7.01			
Measured reading of Buffer 2: 4.01			
Slope:		Measured reading Acceptable (Yes/No): Yes	
EC			
Make: YSI		Model: 1	
Date: 30/5/25	Name of Calibrator: OB		Temperature: 21 °C
Calibration solution: Rowe Scientific		Expiry date: 2/25	Lot No: CB130824
Theoretical conductivity at temperature (see solution container): 1305 µS/cm			
Measured conductivity: 1480 µS/cm		Measured reading Acceptable (Yes/No): Yes	
REDOX			
Make: YSI		Model: 1	
Date of calibration: 30/5/25		Name of Calibrator: OB	
Calibration solution: HANNA		Expiry date: 09/29	Lot No: 0567
Theoretical redox value: 240mV			
Measured redox reading: 230.0 mV		Measured reading Acceptable (Yes/No): Yes	

JKEnvironments

WATER QUALITY METER CALIBRATION FORM

Client:	School Infrastructure NSW			
Project:	Proposed Richland River High Campus Rebuild			
Location:	163 – 170 Alexandra Parade, North Lismore, NSW			
Job Number:	E36314PT			
DISSOLVED OXYGEN				
Make: YSI		Model: 1		
Date of calibration: 31/5/25		Name of Calibrator: OB		
Span value: 70% to 130%				
Measured value:				
Measured reading Acceptable (Yes/No): Yes				
pH				
Make: YSI		Model: 1		
Date of calibration: 31/5/25		Name of Calibrator: OB		
Buffer 1: Theoretical pH = 7.01± 0.01		Expiry date: 11/25	Lot No:	CC291024
Buffer 2: Theoretical pH = 4.01± 0.01		Expiry date: 11/25	Lot No:	CA121124
Measured reading of Buffer 1: 7.01				
Measured reading of Buffer 2: 4.01				
Slope:		Measured reading Acceptable (Yes/No): Yes		
EC				
Make: YSI		Model: 1		
Date: 31/5/25	Name of Calibrator: OB		Temperature: 18 °C	
Calibration solution: Reval Scientific		Expiry date: 8/25	Lot No:	CB130824
Theoretical conductivity at temperature (see solution container): 1224 µS/cm				
Measured conductivity: 1400 µS/cm		Measured reading Acceptable (Yes/No): Yes		
REDOX				
Make: YSI		Model: 1		
Date of calibration: 31/5/25		Name of Calibrator: OB		
Calibration solution: HANNA		Expiry date: 09/29	Lot No:	0567
Theoretical redox value: 240mV				
Measured redox reading: 232.8 mV		Measured reading Acceptable (Yes/No): yep		

JKEnvironments

PID FIELD CALIBRATION FORM

Client:	School Infrastructure NSW
Project:	Proposed Richland River High Campus Rebuild
Location:	163 – 170 Alexandra Parade, North Lismore, NSW
Job Number: E36314PT	

PID

Make: Honeywell	Model: MINIRAELITE+	Unit: 4	Date of last factory calibration: 28/1/25
Date of calibration: 3/6/25		Name of Calibrator: OS	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: 97.3 ppm		Error in measured reading: ± 2.7 ppm	
Measured reading Acceptable (Yes/No): Yes			

PID

Make:	Model:	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: ppm		Error in measured reading: ± ppm	
Measured reading Acceptable (Yes/No):			

PID

Make:	Model:	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: ppm		Error in measured reading: ± ppm	
Measured reading Acceptable (Yes/No):			

PID

Make:	Model:	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: ppm		Error in measured reading: ± ppm	
Measured reading Acceptable (Yes/No):			

PID

Make:	Model:	Unit:	Date of last factory calibration:
Date of calibration:		Name of Calibrator:	
Calibration gas: Iso-butylene		Calibration Gas Concentration: 100.0 ppm	
Measured reading: ppm		Error in measured reading: ± ppm	
Measured reading Acceptable (Yes/No):			

Appendix G: Report Explanatory Notes

STANDARD SAMPLING PROCEDURE (SSP)

These protocols specify the basic procedures to be used when sampling soils or groundwater for environmental site assessments undertaken by JKE.

The purpose of these protocols is to provide standard methods for: sampling, decontamination procedures for sampling equipment, sample preservation, sample storage and sample handling. Deviations from these procedures must be recorded.

A. Groundwater Sampling

Groundwater samples are more sensitive to contamination than soil samples and therefore adhesion to this protocol is particularly important to obtain reliable, reproducible results. The recommendations detailed in AS/NZS 5667.1:1998 are considered to form a minimum standard.

The basis of this protocol is to maintain the security of the borehole and obtain accurate and representative groundwater samples. The following procedure should be used for collection of groundwater samples from previously installed groundwater monitoring wells.

- After monitoring well installation, at least three bore volumes should be pumped from the monitoring wells (well development) to remove any water introduced during the drilling process and/or the water that is disturbed during installation of the monitoring well. This should be completed prior to purging and sampling.
- Groundwater monitoring wells should then be left to recharge for at least three days before purging and sampling. Prior to purging or sampling, the condition of each well should observed and any anomalies recorded on the field data sheets. The following information should be noted: the condition of the well, noting any signs of damage, tampering or complete destruction; the condition and operation of the well lock; the condition of the protective casing and the cement footing (raised or cracked); and, the presence of water between protective casing and well.
- Take the groundwater level from the collar of the piezometer/monitoring well using an electronic dip meter. The collar level should be taken (if required) during the site visit using a dumpy level and staff.
- Purging and sampling of piezometers/monitoring wells is done on the same site visit when using micro-purge (or other low flow) techniques.
- Layout and organize all equipment associated with groundwater sampling in a location where they will not interfere with the sampling procedure and will not pose a risk of contaminating samples. Equipment generally required includes:
  - Micropore filtration system or Stericup single-use filters (for heavy metals samples);
  - Filter paper for Micropore filtration system; Bucket with volume increments;
  - Sample containers: teflon bottles with 1 ml nitric acid, 75mL glass vials with 1 mL hydrochloric acid, 1 L amber glass bottles;
  - Bucket with volume increments;
  - Flow cell;
  - pH/EC/Eh/T meters;
  - Plastic drums used for transportation of purged water;
  - Esky and ice;
  - Nitrile gloves;
  - Distilled water (for cleaning);
  - Electronic dip meter;
  - Low flow pump pack and associated tubing; and

- Groundwater sampling forms.

- If single-use stericup filtration is not used, clean the Micropore filtration system thoroughly with distilled water prior to use and between each sample. Filter paper should be changed between samples. 0.45um filter paper should be placed below the glass fibre filter paper in the filtration system.
- Ensure all non-disposable sampling equipment is decontaminated or that new disposable equipment is available prior to any work commencing at a new location. The procedure for decontamination of groundwater equipment is outlined at the end of this section.
- Disposable gloves should be used whenever samples are taken to protect the sampler and to assist in avoidance of contamination.
- Groundwater samples are obtained from the monitoring wells using low flow/micro-purge sampling equipment to reduce the disturbance of the water column and loss of volatiles.
- During pumping to purge the well, the pH, temperature, conductivity, dissolved oxygen, redox potential and groundwater levels are monitored (where possible) using calibrated field instruments to assess the development of steady state conditions. Steady state conditions are generally considered to have been achieved when the difference in the pH measurements was less than 0.2 units and the difference in conductivity was less than 10%.
- All measurements are recorded on specific data sheets.
- Once steady state conditions are considered to have been achieved, groundwater samples are obtained directly from the pump tubing and placed in appropriate glass bottles, BTEX vials or plastic bottles.
- All samples are preserved in accordance with water sampling requirements detailed in the NEPM 2013 and placed in an insulated container with ice. Groundwater samples are preserved by immediate storage in an insulated sample container with ice as outlined in the report text.
- Record the sample on the appropriate log in accordance with AS1726:1993. At the end of each water sampling complete a chain of custody form.

B. <u>Decontamination Procedures for Groundwater Sampling Equipment</u>

- All equipment associated with the groundwater sampling procedure (other than single-use items) should be decontaminated between every sampling location.
- The following equipment and materials are required for the decontamination procedure:
  - Phosphate free detergent;
  - Potable water;
  - Distilled water; and
  - Plastic Sheets or bulk bags (plastic bags).
- Fill one bucket with clean potable water and phosphate free detergent, and one bucket with distilled water.
- Flush potable water and detergent through pump head. Wash sampling equipment and pump head using brushes in the bucket containing detergent until all materials attached to the equipment are removed.
- Flush pump head with distilled water.
- Change water and detergent solution after each sampling location.
- Rinse sampling equipment in the bucket containing distilled water.
- Place cleaned equipment on clean plastic sheets.
- If all materials are not removed by this procedure that equipment should not be used until it has been thoroughly cleaned

QA/QC DEFINITIONS

The QA/QC terms used in this report are defined below. The definitions are in accordance with US EPA publication SW-846, entitled *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (1994)[9] methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (H. Keith 1991)[10].

A. Practical Quantitation Limit (PQL), Limit of Reporting (LOR) & Estimated Quantitation Limit (EQL)

These terms all refer to the concentration above which results can be expressed with a minimum 95% confidence level. The laboratory reporting limits are generally set at ten times the standard deviation for the Method Detection limit (MDL) for each specific analyte. For the purposes of this report the LOR, PQL, and EQL are considered to be equivalent.

When assessing laboratory data it should be borne in mind that values at or near the PQL have two important limitations.

"The uncertainty of the measurement value can approach, and even equal, the reported value. Secondly, confirmation of the analytes reported is virtually impossible unless identification uses highly selective methods. These issues diminish when reliably measurable amounts of analytes are present. Accordingly, legal and regulatory actions should be limited to data at or above the reliable detection limit" Keith 1991.

B. Precision

The degree to which data generated from repeated measurements differ from one another due to random errors. Precision is measured using the standard deviation or Relative Percent Difference (RPD). Acceptable targets for precision in this report will be less than 50% RPD for concentrations greater than ten times the PQL, less than 75% RPD for concentrations between five and ten times the PQL and less than 100% RPD for concentrations that are less than five times the PQL.

C. Accuracy

Accuracy is a measure of the agreement between an experimental result and the true value of the parameter being measured. The assessment of accuracy for an analysis can be achieved through the analysis of known reference materials or assessed by the analysis of surrogates, field blanks, trip spikes and matrix spikes.

The proximity of an averaged result to the true value, where all random errors have been statistically removed. Accuracy is measured by percent recovery. Acceptable limits for accuracy generally lie between 70% to 130% recoveries. Certain laboratory methods may allow for values that lie outside these limits.

D. Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is primarily dependent upon the design and implementation of the sampling program. Representativeness of the data is partially ensured by the avoidance of contamination, adherence to sample handing and analysis protocols and use of proper chain-of-custody and documentation procedures.

[9] US EPA, (1994). *SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* (US EPA SW-846)

[10] Keith., H, (1991). *Environmental Sampling and Analysis, A Practical Guide*

E. Completeness

Completeness is a measure of the number of valid measurements in a data set compared to the total number of measurements made and overall performance against DQIs. The following information is assessed for completeness:

- Chain-of-custody forms; Sample receipt form;
- All sample results reported; All blank data reported;
- All laboratory duplicate and RPDs calculated;
- All surrogate spike data reported;
- All matrix spike and lab control spike (LCS) data reported and RPDs calculated;
- Spike recovery acceptable limits reported; and
- NATA stamp on reports.

F. Comparability

Comparability is the evaluation of the similarity of conditions (eg. sample depth, sample homogeneity) under which separate sets of data are produced. Data comparability checks include a bias assessment that may arise from the following sources:

- Collection and analysis of samples by different personnel; Use of different techniques;
- Collection and analysis by the same personnel using the same methods but at different times; and
- Spatial and temporal changes (due to environmental dynamics).

G. Blanks

The purpose of laboratory and field blanks is to check for artefacts and interferences that may arise during sampling and analysis.

H. Matrix Spikes

Samples are spiked with laboratory grade standards to detect interactive effects between the sample matrix and the analytes being measured. Matrix Spikes are reported as a percent recovery and are prepared for 1 in every 20 samples. Sample batches that contain less than 20 samples may be reported with a Matrix Spike from another batch. The percent recovery is calculated using the formula below. Acceptable recovery limits are 70% to 130%.

$$\frac{\text{(Spike Sample Result – Sample Result) x 100}}{\text{Concentration of Spike Added}}$$

I. Surrogate Spikes

Samples are spiked with a known concentration of compounds that are chemically related to the analyte being investigated but unlikely to be detected in the environment. The purpose of the Surrogate Spikes is to check the accuracy of the analytical technique. Surrogate Spikes are reported as percent recovery.

J. Duplicates

Laboratory duplicates measure precision, expressed as Relative Percent Difference. Duplicates are prepared from a single field sample and analysed as two separate extraction procedures in the laboratory. The RPD is calculated using the formula where D1 is the sample concentration and D2 is the duplicate sample concentration:

$$\frac{(D1 - D2) \times 100}{\{(D1 + D2)/2\}}$$